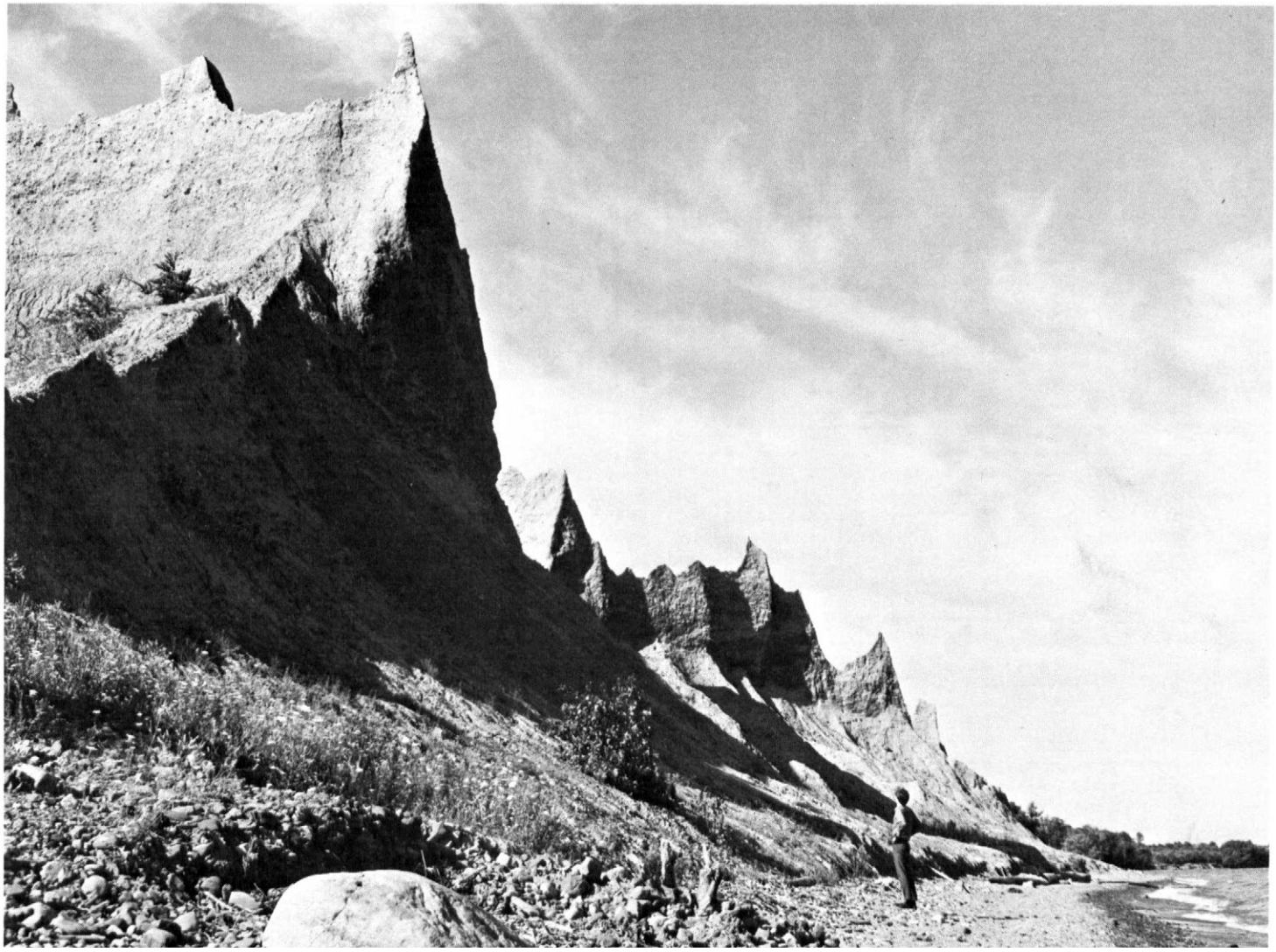
SOIL SURVEY OF

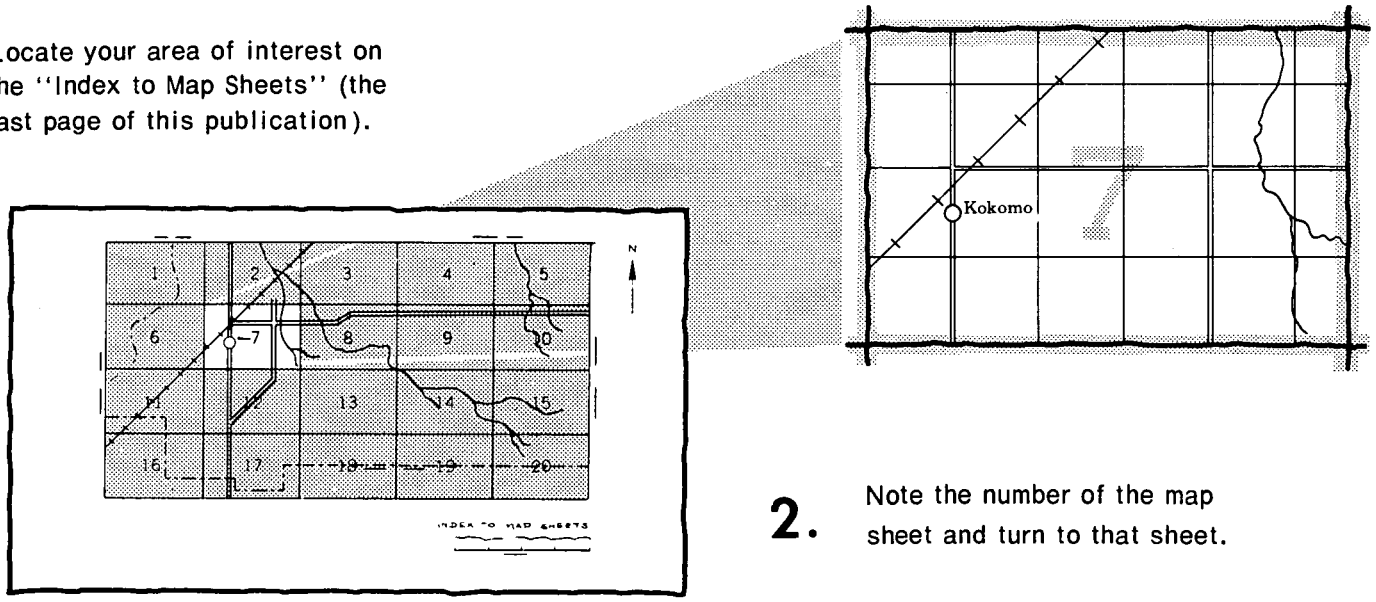
Wayne County, New York



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Cornell University Agricultural Experiment Station

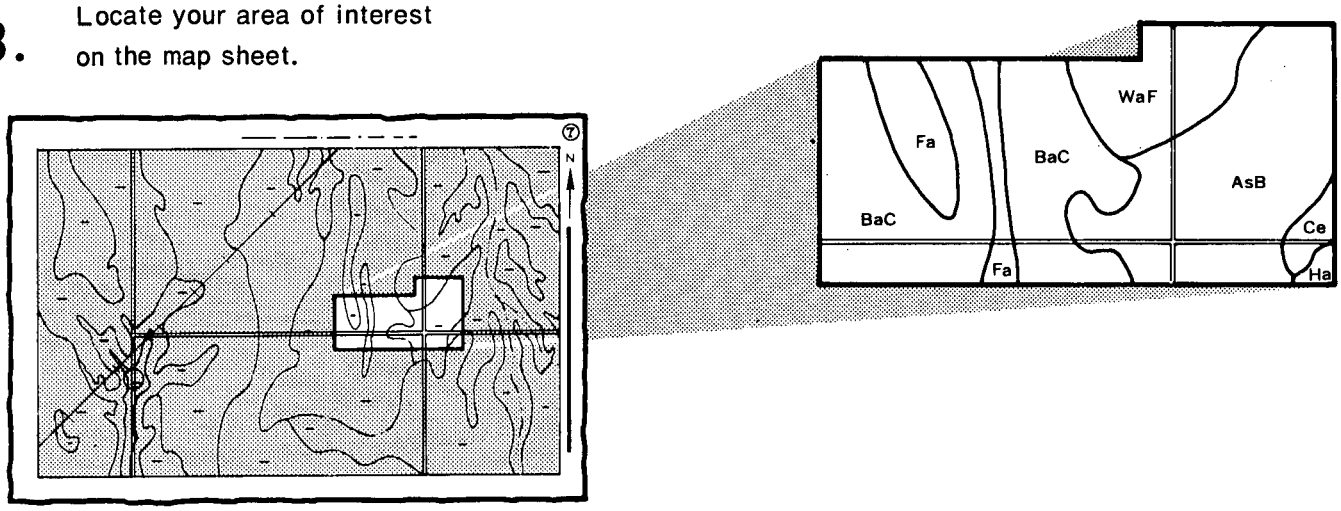
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

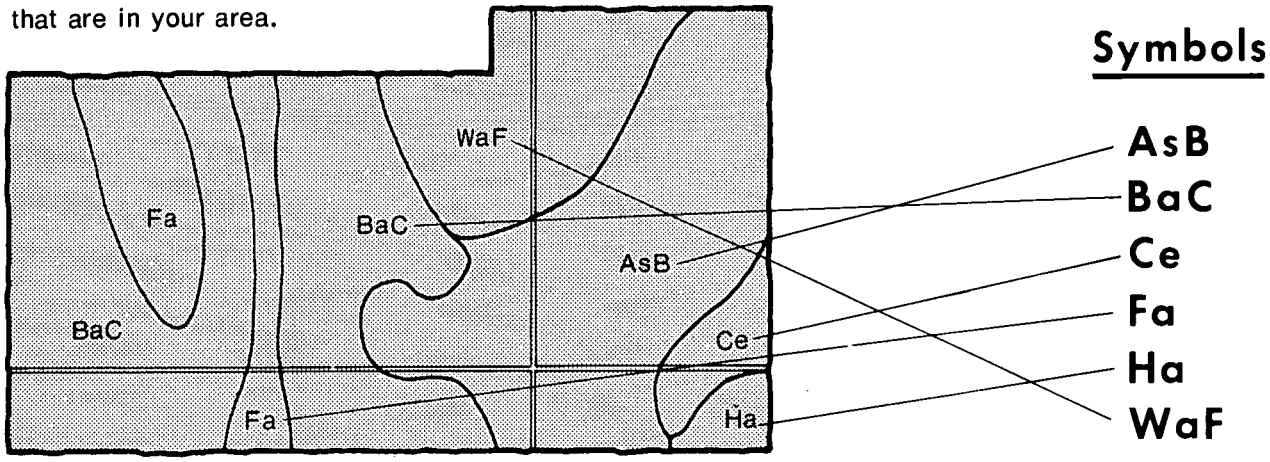


2. Note the number of the map sheet and turn to that sheet.

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

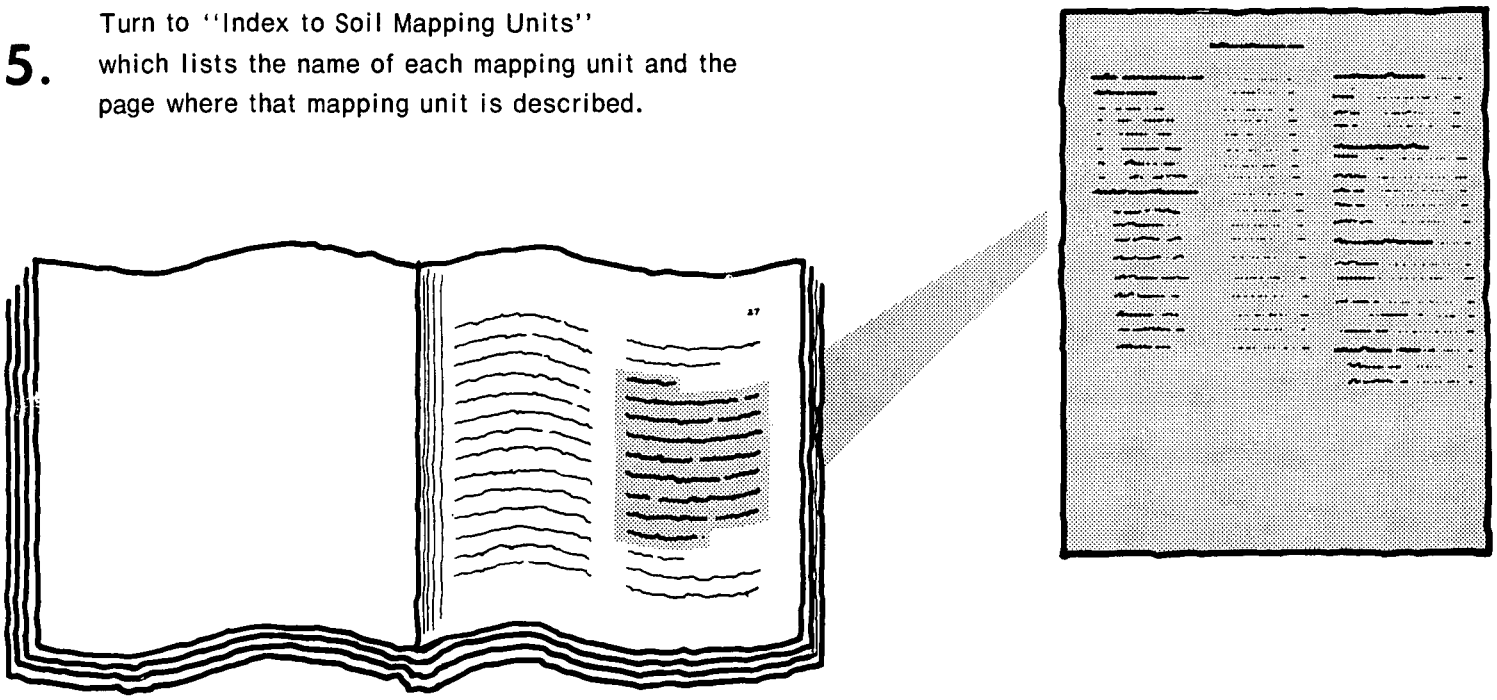


4. List the mapping unit symbols that are in your area.

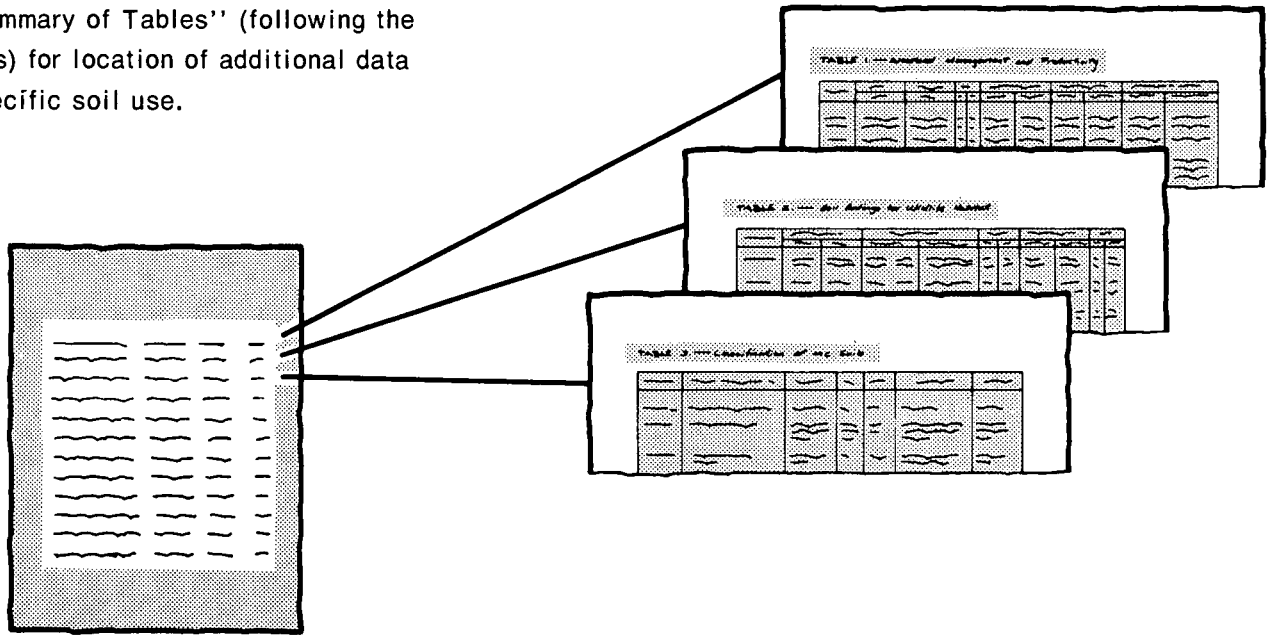


THIS SOIL SURVEY

5. Turn to "Index to Soil Mapping Units" which lists the name of each mapping unit and the page where that mapping 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 1944-72. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. It is part of the technical assistance furnished to the Wayne County Soil and Water Conservation District. Partial funding was provided through the Wayne County Soil and Water Conservation District.

Cover: Lakeshore erosion along the edge of a drumlin landform in an area of Sodus soils, steep, results in the high bluffs that are a prominent feature of the landscape.

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Issued October 1978

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Foreword

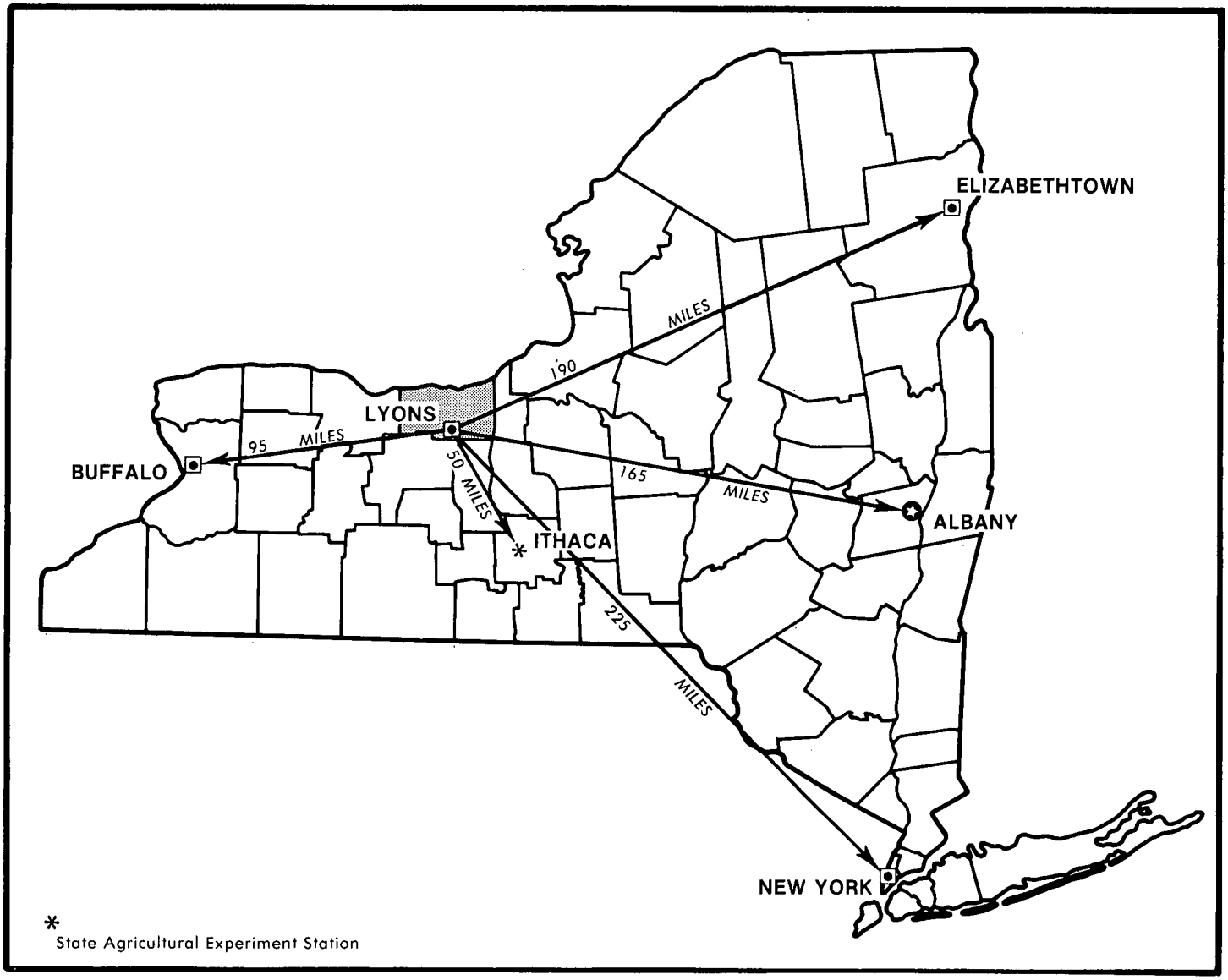
This soil survey contains much information useful in land-planning programs in Wayne County. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, 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 home buyers 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 use as 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.

Robert L. Hilliard
State Conservationist
Soil Conservation Service



Location of Wayne County in New York

SOIL SURVEY OF WAYNE COUNTY, NEW YORK

By Bradford A. Higgins and John A. Neeley, Soil Conservation Service

Fieldwork by Roger J. Case, Leslie W. Kick, John A. Neeley, Paul S. Puglia, William D. Seay, Wilbur Secor, John W. Warner, Jr., and John P. Wulforst, Soil Conservation Service

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

WAYNE COUNTY is in the north-central part of New York State. It has an area of 607 square miles, or 388,480 acres. Lyons, the county seat, is on the Clyde River somewhat southeast of the center of the county. Lyons is approximately 95 miles east of Buffalo, 38 miles east of Rochester, 50 miles west of Syracuse, and 165 miles west of Albany.

The county is in the Ontario-Mohawk Plain area within the Lake States Fruit, Truck, and Dairy Land Resource Region (*11*). It is roughly rectangular in shape, about 20 miles wide, and 34 miles long. It is bordered by Lake Ontario on the north, Seneca and Ontario Counties on the south, Cayuga County on the east, and Monroe County on the west.

Most of the soils of the county are suited to a wide variety of farm and nonfarm uses. The main exceptions are organic soils, shallow soils, and steep soils.

Improvement of natural drainage is one of the main problems in soil management. Organic soils and very wet soils need extensive drainage measures to make them suitable for crop production. Erosion is a problem on sloping to steep soils. Areas where the erosion hazard is serious are the lake bluffs along Lake Ontario and sloping or steep areas near streams and drainageways.

According to the 1969 census of agriculture, about 67 percent of the county is farmland, of which about 71 percent is cropland and pasture. Important crops are vegetables, fruits, and grain. Dairy products are also important.

Wayne County is located near good markets for farm products. The metropolitan areas of Rochester and Syracuse are within 50 miles of Lyons.

General Nature of the County

This section provides general information about Wayne County. It discusses settlement and development, agriculture, transportation and industries, vegetation, physiography and geology, drainage, water supply, and climate.

Settlement and Development

Wayne County was organized in 1823 from the northern parts of Seneca and Ontario Counties. The eastern half of Wayne County was part of what was known as "military tracts," the western half was a part of the Phelps and Gorham Purchase, and a narrow, triangular-shaped area between them that had its apex on Sodus Bay was known as "the Gore." The county was named for General Anthony Wayne of the Revolutionary War.

Permanent settlement began about 1790 along the Clyde River, Canandaigua Outlet, and Ganargua Creek, which were the early arteries of travel. Land in the western part was subject to purchase and was settled by pioneers from eastern New York, the New England States, Pennsylvania, Maryland, and Virginia. The eastern "military tracts" consisted of land grants given to Revolutionary War soldiers in recognition of their services, and many of these tracts changed hands several times before permanent settlement.

In 1825 the completion of the Erie Canal, now known as the New York State Barge Canal, greatly improved transportation and stimulated agricultural activities. For a number of years the canal was the chief outlet for shipping farm and other products to eastern markets. Some products were also shipped from Sodus Point and Pultneyville to other ports around Lake Ontario.

The 15-year period from 1840 to 1855 marked the greatest activity in railroad building. The opening of the main line of the New York Central (Penn Central) in 1853 marked the beginning of quick transportation to markets to the east and south.

Newark, Lyons, Palmyra, and Clyde, the principal villages, had respective populations of 11,644, 4,496, 3,776, and 2,828 in 1970. Lyons, the county seat, is in the south-central part of the county.

The rural population is evenly distributed except where it is influenced by the growing Rochester metropolitan area and the towns of Ontario, Walworth, Macedon, and Williamson(*7*). In 1920 the population of the county was 48,827, of which 71.8 percent was classed as rural. From

1920 to 1960 the towns and villages increased in population and the rural areas gradually decreased. The federal census for 1960 reported a county population of 67,989, of which the four principal villages made up 35 percent, and 65 percent was rural. From 1960 to 1970 the trend shifted from the larger villages to the rural areas. The 1970 census reported a county population of 79,404, and the four principal villages made up only 27 percent of this total.

Agriculture

The favorable climate, large acreage of good soils for farming, and excellent markets contribute to diversified and prosperous agricultural enterprises. The moderation of temperature by air currents passing over Lake Ontario makes the northern part of the county ideal for growing fruits such as cherries and peaches. The county is markedly free of hurricanes and harsh storms. Moderate temperatures, long frost-free periods, and good soils help make the county an outstanding fruit- and vegetable-growing area (*6*).

The 1969 Census of Agriculture indicates that about 67 percent of Wayne County is in farms. This includes 170,303 acres in cropland, 23,966 acres in pasture, 31,265 acres in farm woodlots, and 34,706 acres in farm buildings, farm lanes, and idle nonwooded areas. The number of farms has declined since 1964, especially the smaller farms of less than 100 acres, and the average size of farms has been increasing. The main increase has been in the 200- to 499-acre group. In 1969 the average size farm was 140.8 acres, an increase of about 8 percent over the 5 year period.

From 1964 to 1969, the number of dairy farms decreased by 25 percent, poultry farms by 60 percent, vegetable farms by 37 percent, and fruit farms by 23 percent. However, the number of dairy animals decreased by only 12 percent, chickens increased by 42 percent, acreage of vegetables increased by 26 percent, and fruit acreage increased by 4 percent.

Transportation and Industries

The principal east-west highways in Wayne County are State Routes 104 and 31. The major north-south highways are State Routes 350, 21, 88, 14, 414, and 89. State route 104 connects the northern villages and hamlets of Ontario Center, Williamson, Sodus, Wolcott, and Red Creek. State Route 31 connects the major southern villages of Macedon, Palmyra, Newark, Lyons, Clyde, and Savannah.

The north-south highways connect the major villages of Wayne County with the New York State Thruway (Interstate 90). There are 164 miles of state highways, 403 miles of county highways, and 807 miles of town highways in the county. The major villages in the southern part of Wayne County are also connected by railroad and the New York State Barge Canal.

Agriculture is the major industry in Wayne County. Canning factories, apple processors, farm cooperatives, and wood processing industries provide local markets for farm products. Most of the farm products are resold outside the county. There are many small industries in Wayne County. The principal items of manufacture are farm products, jewelry, plastics, air conditioning units, wood products, electronics components, food processing products and containers, fiber board, leather products, crushed stone, and machinery.

Vegetation

The early settlers in Wayne County found most of the area covered with thick forest. The clearings consisted mainly of Indian villages and marshy areas along the streams and bays.

The higher, drier land had a heavy growth of sugar maple, red maple, black walnut, white oak, northern red oak, American basswood, hickory, beech, black birch, black cherry, and chestnut. The lower, wetter areas had a tangle of vegetation— American elm, red maple, and black ash trees and alder, huckleberry, and cranberry bushes. Much of the low, level land was swampy and covered with water during several months of the year.

Very few of the virgin timber stands are left. Most areas have been cut over at least once, and some areas have been cut over several times. By 1967, only 24 percent of the land was in forest, including farm woodlots, and the rest was cropland, pasture, and idle land, and only a very small percentage was in urban uses (*12*).

Physiography and Geology

BERNARD S. ELLIS, senior staff geologist, Soil Conservation Service, assisted in the preparation of this section.

Wayne County lies entirely within the Erie-Ontario lowlands physiographic province. This province consists of the relatively low, flat areas to the south of Lake Ontario and Lake Erie. It rises slowly to the Portage Escarpment in the south where it borders the Allegheny Plateau Province (*3*).

Some of the classic drumlins and drumlin fields are in Wayne County, which lies in the center of a region that contains about 10,000 individual drumlins (*5*). Some of the most spectacular scenery along the south shore of Lake Ontario occurs in the northwest corner of the county, where the drumlins have been truncated by the wave action of the lake, and steep, high bluffs have formed. The southern shore of Lake Ontario is quite uniform with the exception of several embayments, one of the largest of which is Sodus Bay.

The elevation ranges from a low of about 250 feet above mean sea level on the shore of Lake Ontario to a high of 681 feet on Brantling Hill in the central part of the county. In general a band across the northern third of the county has the relatively flat topography of an old lake bed except along many north-flowing streams that dissect this plain at frequent intervals. The southern two-thirds of the county is dominated by drumlin fields.

Heights of these drumlins, above the base, range from a low of about 60 feet to a high of 250 feet. On the average, the drumlins are about 160 feet high, 3,500 feet long, and 1,000 feet wide. These dimensions reflect the streamlined form on the drumlins. The highway system is dominantly oriented in a north-south direction parallel to the long dimension of these hills, and very few roads transect the steep sides of these drumlins in an east-west direction.

Bedrock underlying Wayne County is of sedimentary origin. The major types of rock are sandstone, limestone, and shale, and one section of dolomite approximately 150 feet thick. The rocks are essentially flat and dip approximately 50 feet to the mile to the southwest. Because of this dip, erosion, and flat-lying characteristics, the rocks occur as broad bands running east-west across the county (Fig. 1).

The rocks are oldest on the north edge of the county at the Lake Ontario shoreline and become progressively younger to the south. The youngest rocks are Camillus Shale that occurs along the Barge Canal in the southern part of the county. More northern areas of this shale are underlain by Vernon Shale and by Lockport Dolomite. Route 104 (Ridge Road) crosses the county from east to west and bisects exposures of the Rochester Shale. The Sodus Shale outcrops to the north of this, and the shore of Lake Ontario is bordered by rocks of the Medina and Queenston Formations. The thickness of the bedrock formations exposed in the county is approximately 1,500 feet. Most of the exposures of the bedrock in the county occur in stream valleys, quarries, and deep roadcuts. These exposures are infrequent because most of the area is mantled with unconsolidated glacial deposits.

Wayne County was covered with glacial ice during the Wisconsin stage of the Pleistocene. This ice left a mantle of glacial deposits that averaged 40 feet in thickness.

Glaciation had a marked influence on the surficial appearance of Wayne County. In the north, the glacial lake sediments and ground moraine left a fairly flat surface that has been entrenched by post-glacial drainage. In the south, the drumlin fields are the most dramatic evidence of glaciation (Fig. 2). These long, cigar-shaped hills are classics for the study of drumlin morphology and genesis.

The glacier deposited several different types of material on which different soils subsequently formed. The most common type of glacial deposit in the county is glacial till. Till is a heterogeneous mixture of particles carried and deposited by the glacier. Examples of glacial till in Wayne County are the classic drumlin fields in the towns of Marion, Arcadia, and Lyons. Hilton, Appleton, and Ontario soils formed in till deposits.

After the ice sheet made its furthest advance and recession began, melt water poured from the ice mass and carried with it eroded material. The coarser material was deposited in the form of kames, eskers, terraces, and outwash plains. Outwash plains and terraces are located in the valleys of southern Wayne County, especially near the villages of Macedon, Palmyra, and Newark. Alton and Palmyra soils formed in these deposits.

The finer soil particles in the glacial melt water, such as silt and clay, settled out in quiet bodies of water. They are called lacustrine deposits. Many of these lacustrine deposits are located in broad, nearly level areas in the towns of Rose and Galen. Williamson and Niagara soils formed in these finer deposits.

The beach ridge is another prominent glacial feature in Wayne County. It is very conspicuous in the towns of Ontario, Williamson, and Sodus. This beach ridge was formed on the edge of glacial Lake Iroquois, which occupied the area during the Wisconsin period. This glacial lake extended south of the present Sodus Bay area. Where water flowed into this area from the south, a large delta was formed of mostly silts and fine sands. In the north near Sodus Bay, the area is deeply dissected by small streams.

Fairly large swamps exist in various areas of the county, notably in the southwest corner. These swamps are remnants of former shallow glacial lakes and arms of Lake Iroquois. They contain extensive organic deposits. Soils such as Adrian or Carlisle muck are mapped in these areas.

Drainage

There are no dominant streams draining Wayne County. An east-west line drawn roughly through the center of the county would separate it into areas that drain into Lake Ontario to the north and into the Barge Canal, Clyde River, and other streams to the south that empty into the Seneca River. The streams flow in a north-south direction and drain fairly uniform areas of the county.

Most stream valleys are not well defined in the county. They either wind across the flat lacustrine deposits or between the drumlins in the southern part of the area. The flood plains are very narrow and, with the exception of Ganargua Creek and Clyde River, they are usually less than 300 feet in width.

Water supply

There are two main sources of water in the county for domestic, agricultural, and industrial uses. These are ground water (wells and springs) and surface water (streams and reservoirs).

Springs are naturally occurring and are in confined areas where the water table reaches the surface of the ground. They are scattered throughout the county but are an unpredictable source of water.

Wells are either of the shallow type (usually dug) or of the deeper, drilled type. Dug wells are usually not a reliable source of water, inasmuch as they are subject to the minor fluctuations of the water table. Where wells in the county are located in glacial stream deposits of sand and gravel they are usually good, reliable producers (*8*). For the most part, dug wells in other types of deposits are less reliable. The deeper drilled wells normally penetrate into bedrock. The quality and quantity of this source of

water is variable, depending upon such factors as lithology, fracture patterns, and depth into the formation.

Some of the larger villages use surface water that is stored in reservoirs. In some instances the reservoir is outside the county, and the water is piped in.

The largest single source of water for the county is, of course, Lake Ontario. In spite of treatment costs, this source is used more and more as the need for water increases over the years.

Climate

Wayne County is cold and snowy in winter and warm in summer. Areas nearest the lake are markedly cooler than the rest of the county in summer. Precipitation is well distributed during the year and is adequate for most crops on most soils. From late fall through winter, snow squalls are frequent and total snowfall is normally heavy. In some years a single prolonged storm can produce more than 2 feet of snow on the ground, and strong winds create deep drifts.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Sodus Center for the period 1951 to 1974. 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 27 degrees F, and the average daily minimum temperature is 19 degrees. The lowest temperature on record, -27 degrees, occurred at Sodus Center on January 28, 1963. In summer the average temperature is 67 degrees, and the average daily maximum is 80 degrees. The highest temperature, 101 degrees, was recorded on August 27, 1953.

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, 18 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the April-September rainfall is less than 16 inches. The heaviest 1-day rainfall during the period of record was 3.3 inches at Sodus Center on October 19, 1967. Thunderstorms number about 29 each year, 17 of which occur in summer.

Average seasonal snowfall is 88 inches. The greatest snow depth at any one time during the period of record was 51 inches. On the average, 40 days have at least 1 inch of snow on the ground.

The average relative humidity in midafternoon is about 60 percent. Humidity is highest at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 65 percent in summer and 34 percent in winter. The prevailing direction of the wind is from the west-southwest. Average windspeed is highest, 12 miles per hour, in January.

Crop development early in the growing season is slowed by frequent cool winds off a cold lake. This slowing is important to fruit trees, which usually don't blossom until after the chance of a spring freeze is past. Fall winds, which blow off a relatively warm lake, delay the first fall freeze and prolong the growing season for all crops.

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 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 usable to farmers, managers of rangeland and woodland, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

The general soil map at the back of this publication shows map units that have a distinct pattern of soils, 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 management.

The terms for texture used in the introductory statements that describe the map units apply to the surface layer of the major soils in the unit. The terms for drainage used in the introductory statements also apply only to the major soils.

The Wayne County general soil map joins the general soil maps of published soil surveys of adjacent counties, but the names of the units differ from the names of adjacent units on those maps. The differences in naming are the result of the varying proportion of major soils from one county to another, changes and improvements in the classification of soils, and the different scale of the adjoining general soil maps.

The general soil map units in Wayne County are discussed on the following pages.

1. Ontario-Hilton

Deep, well drained and moderately well drained, medium textured soils; on glacial till plains

This unit is the most extensive in the county. It is on ground moraines, drumlins, and recessional moraines (Fig. 3). The landscape is a series of knolls and ridges interspersed with lower drainageways and higher elongated hills. Slopes are mainly 3 to 15 percent but range from 0 to 50 percent.

This unit covers about 37 percent of the county. Ontario soils make up about 40 percent of the unit, Hilton soils about 20 percent, and soils of minor extent about 40 percent.

Ontario and Hilton soils formed in glacial till deposits derived mostly from sandstone and limestone and from shale. These deposits are high in natural lime content.

Ontario soils are well drained and gently sloping to steep. Water movement is moderate in the surface layer and subsoil and slow in the substratum. A seasonal high water table is in the substratum at a depth of more than 3 feet in early spring. These soils are on the higher parts of the landscape.

Hilton soils are moderately well drained and nearly level to sloping. Water movement through the surface layer and subsoil is moderate. A temporary seasonal high water table is perched on the firm substratum during early spring and other wet periods. These soils commonly receive some runoff from the higher adjacent areas of Ontario soils.

Of minor extent in this unit are Appleton, Lyons, Madrid, Wassaic, Palmyra, Canandaigua, and Palms soils. Appleton and Lyons soils are wetter than Ontario and Hilton soils. The Appleton soils are somewhat poorly drained and are on foot slopes and sides of drainageways where runoff is received from higher soils. Lyons soils are poorly drained and very poorly drained and are along the bottom of drainageways and in concave depressions in the lowest parts of the landscape. Madrid soils are well drained and are coarser textured than Ontario soils. Wassaic soils are well drained and moderately well drained and moderately deep. They have bedrock at a depth of 20 to 40 inches. Palmyra soils are well drained to excessively drained and are on undulating benches and small rounded hills that contain gravelly outwash deposits. Canandaigua soils are poorly drained and very poorly drained and are in low, nearly level areas of silty glacial lake deposits. Palms soils are very poorly drained and are in a few bogs and very low depressions containing well decomposed deposits of organic matter.

This unit is used mainly for crops on dairy farms. Some areas along highways are used for housing developments. The wetter included soils and the steeper soils are mostly used for hay, pasture, or woodland. The use of random subsurface drainage, contour tillage, stripcropping, diversions, and sod waterways is suitable for these soils. Slow water movement through the substratum, gravel and stone fragments, and slope in some areas are the main limitations for community development. Ontario, Madrid, and Palmyra soils have good potential for residential development. Many of the higher areas of this unit provide scenic overlooks.

2. Madrid-Bombay

Deep, well drained and moderately well drained, moderately coarse textured soils; on glacial till plains

This unit is on ground moraines, drumlins, and recessional moraines. The landscape is a series of undulating or rolling knolls and ridges interspersed with higher elongated hills and a few low drainageways and bogs. Slopes are dominantly 3 to 8 percent but range from 0 to 25 percent.

This unit makes up about 11 percent of the county. Madrid soils make up about 30 percent of the unit, Bombay soils about 30 percent, and soils of minor extent about 40 percent.

Madrid and Bombay soils formed in glacial till deposits with a high content of fine sand. The natural lime content of these soils is moderately high.

Madrid soils are gently sloping to moderately steep and are well drained. Water movement is moderate in the surface layer, moderate to moderately slow in the subsoil, and moderately slow in the substratum. These soils generally occupy the higher parts of the landscape.

Bombay soils are nearly level to gently sloping and are moderately well drained. Water movement is moderate in the surface layer and moderate or moderately slow in the subsoil. A temporary seasonal high water table is perched above the firm substratum during early spring and other wet periods. These soils commonly receive runoff from higher adjacent areas of Madrid soils.

Of minor extent in this unit are Massena, Lyons, Hilton, Wassaic, Minoa, Lamson, Alton, and Palms soils. The Massena and Lyons soils are wetter than the Madrid and Bombay soils. The Massena soils are somewhat poorly drained to poorly drained and are on foot slopes and along the sides of drainageways. The Lyons soils are poorly drained and very poorly drained and are on low flats and at the bottom of drainageways. The Hilton soils have more clay in the subsoil than Bombay soils. The Wassaic soils are well drained and moderately well drained and have bedrock at a depth of 20 to 40 inches. The somewhat poorly drained Minoa soils and the poorly drained and very poorly drained Lamson soils are on broad flats and in depressions containing glacial lake deposits dominated by very fine sand and fine sand. Well drained to somewhat excessively drained, gravelly Alton soils are on glacial outwash benches and small rounded hills. The Palms soils are in a few low bogs and swamps containing well decomposed deposits of organic matter.

This unit is used mainly for row crops, small grain, hay, and pasture (Fig. 4). Some areas are used for fruit and orchard crops such as cherries and apples. Areas of the wetter minor soils and steeper soils are mostly in pasture or woodland or are idle. Drainage of the wetter minor soils and control of erosion through the use of contour tillage, stripcropping, diversions, and crop rotations are the main management practices. Moderately slow water movement through the substratum, gravel and stone fragments, and temporary wetness and slope in some areas are the principal limitations for most community development uses. The Madrid soils and the minor Alton soils have excellent potential for homesite development. Some of the higher points, such as the tops of drumlins, provide scenic overlooks.

3. Ira-Sodus

Deep, moderately well drained and well drained, moderately coarse textured soils that have a fragipan; on glacial till plains

This unit is on drumlins, ground moraines, and recessional moraines. The landscape is a series of elongated or cigar-shaped hills, ridges, and knolls commonly dissected by drainageways. Slopes are dominately 3 to 8 percent but range from 0 to 50 percent.

This unit covers 6 percent of the county. Ira soils make up about 45 percent of the unit, Sodus soils about 15 percent, and soils of minor extent about 40 percent.

Ira and Sodus soils formed in glacial till deposits derived mostly from sandstone.

Ira soils are moderately well drained and nearly level to sloping. Water movement through the surface layer and upper part of the subsoil is moderate. Water movement is slow through the fragipan and the substratum, and thus a temporary seasonal high water table is perched above the pan during early spring and other wet periods. These soils commonly receive some runoff from higher adjacent areas of Sodus soils.

Sodus soils are well drained and gently sloping to steep. The rate of water movement through the surface layer and upper part of the subsoil is moderate. A fragipan restricts water movement and perches free water for very brief periods in early spring. These soils are on the higher parts of the landscape and receive little or no runoff.

Of minor extent in this unit are Bombay, Hilton, Ontario, Cazenovia, Massena, Williamson, and Colonie soils. Moderately well drained Bombay soils are in a few large areas and do not have a fragipan. The Hilton soils are moderately well drained, and the Ontario soils are well drained. Neither of these soils have a fragipan. Well drained and moderately well drained Cazenovia soils are in areas where the glacial till deposits are moderately fine textured. Somewhat poorly drained to poorly drained Massena soils are on the lower parts of the landscape on flats, on foot slopes, and along drainageways. Moderately well drained Williamson soils formed in areas of silty, glacial, lake-laid sediments. They have a fragipan. Somewhat excessively drained Colonie soils are on ridges of remnant sandy deltas and sandbars.

This unit is commonly used for crops on dairy farms. Some areas are used for fruit and orchard crops. The steeper soils in this unit are mainly in pasture or are wooded. Suitable management includes contour tillage, stripcropping, diversions, and random subsurface drains and interceptor drains. Slow water movement through the fragipan, gravel and a few stone fragments, and in many areas temporary wetness and the slope are the main limitations for community development. Areas near Lake Ontario provide exceptional scenic views.

4. Sodus-Williamson

Deep, well drained and moderately well drained, moderately coarse textured and medium textured soils that have a fragipan, on glacial till plains and lowland lake plain fringe areas

This unit is in islandlike areas of drumlins and ground moraines and the surrounding lake plain. The landscape is a series of elongated hills and undulating ridges of glacial till separated by lower broad flats of stone-free glacial lake sediments. Slopes are dominantly 0 to 15 percent but range from 0 to 50 percent.

This unit covers 5 percent of the county. Sodus soils make up about 30 percent of the unit, Williamson soils about 25 percent, and soils of minor extent about 45 percent.

Sodus soils formed in glacial till deposits that were derived mainly from sandstone. They are well drained, gently sloping to steep, and moderately coarse textured. The rate of water movement through the surface layer and upper part of the subsoil is moderate. A dense fragipan in the lower part of the subsoil so restricts water movement that free water is perched above the pan for very brief periods in early spring. These soils are on the higher parts of the landscape.

Williamson soils formed in glacial, lake-laid sediments and windblown deposits dominated by silt and very fine sand. They are moderately well drained, gently sloping to steep, medium textured soils that are nearly free of coarse fragments. Water movement through the surface layer and upper part of the subsoil is moderate. A dense fragipan in the lower part of the subsoil so restricts water movement that free water is perched above the pan for very brief periods in early spring. These soils are on the higher parts of the landscape.

Of minor extent in this unit are Wallington, Canandaigua, Ira, Massena, Wayland, Palms, Adrian, Alton, and Fredon soils. Somewhat poorly drained Wallington soils are in low areas on foot slopes and along field drainageways. Poorly drained and very poorly drained Canandaigua soils are in the lower parts of the landscape on flats and in depresssions. They have a slightly higher clay content than Williamson soils. Moderately well drained Ira soils and somewhat poorly drained to poorly drained Massena soils are on nearly level hilltops and concave foot slopes. Poorly drained Wayland soils are on narrow alluvial flood plains adjacent to streams. Palms and Adrian soils are in a few wet, very low depressions and bogs that contain well decomposed deposits of organic matter. Palms soils are underlain by glacial till deposits, and Adrian soils are underlain by sandy sediments. Well drained to somewhat excessively drained Alton soils and somewhat poorly drained to poorly drained Fredon soils are on a few terraces, remnant beach ridges, and small, rounded knolls composed of gravelly glacial outwash deposits.

This unit is used mainly for crops. It is adjacent to Lake Ontario, and the moderate climatic effect of the lake makes the soils suitable for fruits and orchard crops. Many areas of the wetter minor soils and the steeper Sodus soils are idle, wooded, or used for pasture. Use of random subsurface drains in wetter minor soils and use of crop rotation are suitable management practices. The Williamson soils are easy to till, but they generally require erosion-control practices such as cross-slope tillage, minimum tillage, and use of cover crops. Temporary seasonal wetness, slow water movement through the fragipan, slope in some areas, gravel fragments, and susceptibility to erosion are the main limitations for community development. Some of the higher areas near Lake Ontario provide scenic views.

5. Appleton-Lockport

Deep and moderately deep, somewhat poorly drained, medium textured and moderately fine textured soils; on glacial till plains

This unit is the least extensive in the county. It is on low ground moraines and bedrock-controlled till plains. The landscape consists of broad flats interspersed with a few low ridges and benches. Slopes are dominantly 0 to 3 percent but range to 15 percent in some areas.

This unit covers about 4 percent of the county. Appleton soils make up about 45 percent of the unit, Lockport soils about 20 percent, and soils of minor extent about 35 percent.

Appleton soils formed in glacial till deposits derived from limestone and sandstone. They are deep, nearly level to gently sloping, medium textured soils that have a slight accumulation of clay in the subsoil. Water movement is moderate in the surface layer, moderately slow in the subsoil, and slow in the substratum. These soils have a seasonal high water table perched above the firm substratum during spring and other wet periods. Runoff is commonly received from higher areas of adjacent soils.

Lockport soils formed in reddish shaly glacial till deposits overlying shale bedrock. They are moderately deep, nearly level to gently sloping, moderately fine textured soils that have bedrock at a depth of 20 to 40 inches. Water movement is moderate in the surface layer and very slow in the subsoil and substratum. A seasonal high water table is commonly perched in the subsoil during spring and other wet periods. These soils frequently receive runoff from higher areas of adjacent soils.

Of minor extent in this unit are Brockport, Ovid, Cazenovia, Massena, Lyons, Newstead, Junius, Bombay, and Hilton soils. Somewhat poorly drained Brockport soils are in areas where the glacial till deposits and underlying bedrock are olive gray. Deep, somewhat poorly drained Ovid soils and moderately well drained to well drained Cazenovia soils are in areas where the till deposits have a slightly higher clay content than those in areas of Appleton soils. Somewhat poorly drained and poorly drained Massena soils have a slightly higher sand content and lower clay content than the Appleton soils. Poorly drained and very poorly drained Lyons soils are in

depressions and along drainageways in the lowest parts of the landscape. Moderately coarse textured Newstead soils are underlain by limestone bedrock at a depth of 20 to 40 inches. They are somewhat poorly drained to poorly drained. Somewhat poorly drained to poorly drained Junius soils formed in a small area of remnant sandy deltaic and sandbar deposits. Moderately well drained Hilton soils and slightly coarser textured Bombay soils are better drained than Appleton soils and occupy high ridges and knolls.

This unit is mainly used for hay, pasture, and woodland. A few areas are idle. Some drained areas are in crops. Interceptor drains, patterned drainage systems, sod waterways, cover crops, and crop rotations are suitable practices for these soils. Seasonal wetness, slow water movement through the subsoil and substratum, and moderate depth to bedrock in some areas are the main limitations for community development. Some areas provide good sites for dugout ponds and wildlife marshes.

6. Williamson-Elnora-Collamer

Deep, moderately well drained, medium textured and coarse textured soils; on lake plains

This unit is on lake plains interspersed with a few deltas, sandbars, and remnant beach ridges. The landscape is a broad plain interrupted by low knolls and ridges and by drainageways. Slopes are dominantly 0 to 6 percent but range to 12 percent in some areas.

This unit covers about 11 percent of the county. Williamson soils make up about 30 percent of this unit, Elnora soils about 15 percent, Collamer soils about 10 percent, and soils of minor extent about 45 percent.

Williamson soils formed in glacial lake sediments and a few wind-blown deposits dominated by silt and very fine sand. These soils are nearly level to sloping, medium textured, and nearly free of gravel and stone fragments. Water movement through the surface layer and upper part of the subsoil is moderate. A dense fragipan in the lower part of the subsoil restricts water movement and perches free water during wetter periods in the spring.

Elnora soils formed in sandy deposits free of gravel and stone fragments. These soils are nearly level to gently sloping and are coarse textured. Water movement is moderately rapid in the surface layer, moderately rapid or rapid in the subsoil, and rapid in the substratum. These soils have a temporary seasonal high water table in the subsoil during early spring and other very wet periods.

Collamer soils formed in silty glacial lake deposits that are nearly free of gravel and stone fragments. These soils are gently sloping and medium textured. They do not have a fragipan and have a slightly higher clay content than Williamson soils. Water movement in the surface layer is moderate, and in the subsoil it is moderate or moderately slow. These soils have a temporary seasonal high water table perched above the firm substratum during early spring and other very wet periods.

Of minor extent in this unit are Wallington, Niagara, Minoa, Lamson, Rhinebeck, Wayland, Colonie, Oakville, Alton, and Bombay soils and areas of freshwater marsh. Somewhat poorly drained Wallington soils are near Williamson soils on foot slopes and along field drainageways. Silty Niagara soils are near the Wallington soils but do not have a fragipan. Somewhat poorly drained Minoa soils are on low benches and flats. Poorly drained Lamson soils are in depressions and basins containing deposits with a high content of fine sand and very fine sand. Somewhat poorly drained Rhinebeck soils are in a few areas that have lake deposits high in clay content. Poorly drained and very poorly drained Wayland soils formed on flood plains along streams. Somewhat excessively drained Colonie soils and well drained Oakville soils are on higher sandy ridges, knolls, and benches. Alton soils are well drained to somewhat excessively drained and are on a few gravelly outwash ridges and terraces. Moderately well drained Bombay soils are on a few ridges where glacial till deposits protrude above the broad lake plain. A few areas of Fresh water marsh are adjacent to Lake Ontario.

This unit is commonly used for crops on dairy farms. Some areas, particularly near Lake Ontario, are well suited to fruits, vegetables, and orchard crops. These soils are easy to till, but temporary wetness in places delays spring planting. Random subsurface drainage of the wetter minor soils and intensive erosion control measures are needed. Temporary seasonal wetness, slow water movement through the fragipan or the substratum in many of the soils, and a severe erosion hazard in the more sloping areas are the principal limitations for community development.

7. Minoa-Phelps-Alton

Deep, somewhat poorly drained to somewhat excessively drained, medium textured to moderately coarse textured soils; on lake plains and outwash plains

This unit is on low glacial lake plains intermingled with outwash plains, terraces, deltas, and remnant beach ridges. The landscape consists of low, broad flats interrupted by slightly higher benches and ridges. Slopes are mainly 0 to 3 percent but range to 25 percent in some areas.

This unit covers about 11 percent of the county. Minoa soils make up about 20 percent of the unit, Phelps soils about 20 percent, Alton soils about 20 percent, and soils of minor extent about 40 percent.

Minoa soils formed in lake-laid deposits and deltaic deposits of very fine sand, fine sand, and silt. These soils are nearly level, somewhat poorly drained, and medium textured. They are free of gravel and stone fragments. Water movement in the surface layer and subsoil is moderate, and in the substratum it is moderate or moderately rapid. A seasonal high water table is in the upper part of the subsoil during the spring. These soils are on low flats.

Phelps soils formed in gravelly glacial outwash deposits. Phelps soils are nearly level to gently sloping, moderately well drained, and medium textured. The substratum is dominantly sand and gravel. Water movement is moderate in the surface layer and subsoil and moderately rapid to rapid in the substratum. A temporary seasonal high water table is in the subsoil during excessively wet periods, mostly in the spring. These soils are on benches and flats slightly above areas of Minoa soils.

Alton soils formed in gravelly glacial outwash deposits. Alton soils are well drained to somewhat excessively drained, moderately coarse textured, and nearly level to moderately steep. They have a high gravel and sand content, particularly in the substratum. Water movement in the surface layer and subsoil is moderately rapid, and in the substratum it is rapid or very rapid. These soils are on ridges, low, rounded hills, and terraces.

Of minor extent in this unit are Lamson, Junius, Elnora, Fredon, Halsey, Appleton, Hilton, Palmyra, Colonie, and Adrian soils. Poorly drained and very poorly drained Lamson soils are wetter than Minoa soils and are in depressions and along field drainageways. Somewhat poorly drained and poorly drained Junius soils and moderately well drained Elnora soils are slightly coarser textured than Minoa soils and are on slightly higher, better drained benches and ridges. Somewhat poorly drained and poorly drained Fredon soils and very poorly drained Halsey soils are in areas of gravelly outwash deposits. Somewhat poorly drained Appleton soils and moderately well drained Hilton soils are in a few large areas dominated by medium textured glacial till deposits. Gravelly Palmyra soils and sandy Colonie soils are on higher, better drained knolls, ridges, and benches. Palmyra soils have a higher clay content in the subsoil than Alton soils. Adrian soils are in the lowest depressions and bogs where organic deposits overlie sandy material.

This unit is commonly used for hay, pasture, and woodland. Droughtiness is a concern in most years, but some of the better drained soils in this unit are used intensively for crops. Subsurface drains and open-ditch drains are needed. Some areas are suitable for community development, particularly areas of the Alton soils. However, seasonal wetness is a limitation for farm and nonfarm uses in most areas. Some of the wetter soils are suitable as sites for dugout ponds.

8. Palmyra-Wayland

Deep, excessively drained to very poorly drained, medium textured soils; on outwash terraces and flood plains in valleys

This unit is on glacial outwash plains, terraces, kames, and adjacent low-lying flood plains. The landscape is narrow benches, broad flats, and a few low, rolling knolls and ridges dissected by lower flats adjacent to major streams. Slopes are dominantly 0 to 8 percent but range to 40 percent in a few areas.

This unit covers about 8 percent of the county. Palmyra soils make up about 45 percent of the unit, Teel soils about 15 percent, and soils of minor extent about 40 percent.

Palmyra soils formed in gravelly and sandy glacial outwash deposits. These are nearly level to steep, well drained to excessively drained soils that have a dominantly gravelly surface layer and subsoil. The substratum is coarse textured and consists of stratified sand and gravel deposits. Water movement is moderate in the surface layer and subsoil and very rapid in the substratum. These soils are on terraces, plains, and low, rounded hills and ridges.

Wayland soils formed in recent silty alluvial deposits on flood plains along major streams. These soils are nearly level, poorly drained to very poorly drained, and nearly free of gravel and stone fragments. Water movement through the surface layer is moderate or moderately slow, and in the subsoil and substratum it is slow. A seasonal high water table is in the upper part of the subsoil during periods of peak stream flow. Most areas are subject to occasional flooding.

Of minor extent in this unit are Teel, Hamlin, Adrian, Madalin, Phelps, Fredon, Halsey, Ontario, and Hilton soils and Alluvial land. Moderately well drained and somewhat poorly drained Teel soils are on slightly higher parts of the flood plain than the Wayland soils. Well drained Hamlin soils are on the highest parts of flood plains, generally on berms adjacent to streams. Adrian soils are in deep depressions and bogs containing organic deposits overlying sandy deposits. Poorly drained and very poorly drained Madalin soils are in a few concave depressions containing clayey, lake-laid sediments. Moderately well drained Phelps soils, somewhat poorly drained and poorly drained Fredon soils, and very poorly drained Halsey soils are on gravelly outwash plains and terraces in lower positions than the Palmyra soils. Well drained Ontario soils and moderately well drained Hilton soils formed in glacial till deposits. They are on islandlike ridges and elongated hills that protrude above the outwash plains.

This unit is mainly used for row crops and hay. Some areas of this unit are used for community development. Some of the steeper areas and areas of wetter Wayland soils are in pasture or woodland. In some areas, row crops and early-market crops can be grown intensively if the soils are properly managed. Random subsurface drainage of the wetter minor soils, flood protection on and pattern drainage of Wayland soils, crop rotations, and erosion control on the more sloping soils are needed. The Palmyra soils have excellent potential for residential development. Wayland soils have poor potential for this use because of the flood hazard and wetness. Flooding in some areas, prolonged or seasonal wetness, and gravel fragments in some areas are the main limitations of this unit for nonfarm uses.

9. Carlisle-Canandaigua

Deep, poorly drained and very poorly drained, organic soils and medium textured mineral soils, in swamps, in bogs, and on depressional lake plains

This unit is in marshes, bogs, low-lying flood plains, and depressional areas of lake plains. The landscape is a nearly level or depressional plain that is occasionally covered with water. Slopes are generally less than 1 percent but range to 3 percent.

This unit covers about 7 percent of the county. Carlisle soils make up about 35 percent of this unit, Canandaigua soils about 35 percent, and soils of minor extent about 30 percent.

Carlisle soils formed in well decomposed organic deposits more than 51 inches thick. They are very poorly drained, mucky soils. In drained areas, water movement through the soil is rapid. These soils have a prolonged high water table at or near the surface for most of the year, and they are frequently flooded or ponded during wet periods.

Canandaigua soils formed in silty glacial lake deposits. They are poorly drained and very poorly drained, medium textured soils that are generally free of gravel and stone fragments. In some areas they have a mucky surface layer. Water movement in the surface layer is moderate, and in the subsoil and substratum it is moderately slow. A prolonged high water table is near the soil surface during the wetter parts of the year.

Of minor extent in this unit are Palms, Edwards, Adrian, Chippeny, Martisco, Lyons, Wayland, Teel, Niagara, Madalin, and Palmyra soils and areas of Fresh water marsh. The Palms, Edwards, Chippeny, and Adrian soils are at the fringes of areas of Carlisle soils. The Palms soils are underlain at a depth of less than 51 inches by medium textured glacial till deposits. The Edwards soils are underlain by limy marl material, the Chippeny soils by bedrock, and the Adrian soils by sandy material. Very poorly drained Martisco soils are in a few areas where the muck deposits are less than 16 inches thick over marl. Lyons soils are in depressions containing glacial till deposits. Poorly drained and very poorly drained Wayland soils and moderately well drained to somewhat poorly drained Teel soils are on flood plains of a few streams. Silty, somewhat poorly drained Niagara soils are on slightly higher rises than the Canandaigua soils. Poorly drained and very poorly drained Madalin soils are in areas of clayey, lake-laid deposits. A few areas of gravelly Palmyra soils are on high benches and ridges that protrude above the low-lying plain. Areas of Fresh water marsh are covered with water most of the year.

This unit is mostly woodland or is in sedges, cattails, brush, and water-tolerant grasses. Some areas are cleared and drained and used intensively for vegetables and row crops. This unit has excellent potential for crops, particularly vegetables such as onions, celery, and potatoes. Subsurface drains, open-ditch drainage, dike and pump drainage systems, and wind erosion control are needed. Prolonged wetness, frequent ponding or flooding, and instability of the organic material are the main limitations for community development. Many areas of these soils have excellent potential for wetland wildlife habitat. A large area of this unit is in the Montezuma Marsh, in the southeastern part of the county.

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 profiles that are almost alike 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 Sodus series, for example, was named for the town of Sodus in Wayne 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, Ontario gravelly loam, 3 to 8 percent slopes, is one of several phases within the Ontario series.

Some map units are made up of two or more dominant kinds of soil. An *undifferentiated group* is such a map unit. It 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. Colonie and Dunkirk soils, hilly, 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. Beaches 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

Aa—Adrian muck. This nearly level, very poorly drained soil formed in organic deposits that are 16 to 50 inches thick over sandy mineral soil material. It is in basins or depressions in swamps or marshes. Slope ranges from 0 to 3 percent but is mostly less than 1 percent. The areas of this soil are irregular in shape and mostly 10 to 50 acres in size.

In a typical profile in a cultivated field, the surface layer is friable black muck 9 inches thick. Below that is firm, black muck 12 inches thick. The mineral substratum to a depth of 56 inches is loose, grayish brown sand.

Included with this soil in mapping are small areas of Palms soils. Sand spots, gravel spots, and drainageways are indicated on the soil map by sign or symbol.

There is an apparent prolonged high water table at or near the surface during much of the year. This soil is susceptible to flooding and ponding. Permeability is moderately rapid in the organic part and rapid in the underlying sand. The rooting depth is limited by the high water table. The available water capacity is high. Runoff is very slow or ponded. In unlimed areas, reaction ranges from medium acid to neutral in the organic part of the soil. If it is not artificially drained, it is suited only to woods and wildlife. Most of the acreage is cultivated, idle, or in woods.

Unless it is artificially drained, this soil is not suited to cultivated crops. If adequately drained, it can be very productive for certain vegetable crops. The prolonged high water table, susceptibility to flooding or ponding, and susceptibility to wind erosion are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available or if a pumping system is used. Subsurface drains function well even if placed in the mineral soil substratum. A regulated water table is desirable to prevent excessive subsidence and wind erosion. If drained, this soil gradually subsides because of oxidation, compaction, and settling of the organic material. Because of these factors, areas where the organic deposits are mostly less than 30 inches have a short productive life. Excessive tillage should be avoided because it encourages oxidation of the organic material and can result in the formation of traffic pans.

Because this soil is low in such nutrients as phosphorus and potassium, the response to fertilization is excellent. When the surface of this soil is dry, it is susceptible to wind erosion. Windbreaks, cover crops, and irrigation help to prevent the loss of soil by wind. This soil is in the lowest part of the landscape and is very susceptible to early- and late-season frosts.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suitable for shallow-rooted fruit crops. The main limitations are a prolonged high water table, susceptibility to flooding or ponding, the lack of good air drainage, and susceptibility to frost.

Without drainage this soil is not suited to pasture. Even if adequately drained it is only poorly suited.

Timber production on this soil is moderate. The erosion hazard is slight. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are a prolonged high water table, susceptibility to flooding or ponding, and organic texture.

This soil is not suited to most kinds of construction. The water table, susceptibility to flooding or ponding, poor stability, and low bearing strength generally limit this soil to recreation use, open space, and habitat for wetland wildlife. Capability subclass IVw.

AD—Alluvial land. Alluvial land consists of nearly level, recent deposits of alluvial material on flood plains. This map unit occurs mainly along small streams in Wayne County. Most areas are subject to frequent change because of stream overflow. Cross channeling of the flood plain is common, and drainage is not well established. These areas are well drained to very poorly drained within short distances; they are dominantly somewhat poorly drained or poorly drained.

Because of its variability and susceptibility to flooding, this map unit is difficult to drain. Most of the acreage is pastured, idle, or in woods. Alluvial land in most places is high in fertility and can be productive pasture.

The major concerns of pasture management are overgrazing and grazing the pasture when wet. Overgrazing affects pasture plants and can result in their complete loss and also in the erosion of stream banks. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing,

deferment of grazing, and keeping animals fenced out of the stream channel and adjacent streambanks are the main management needs. Lime and fertilizer should be applied as needed for the best pasture growth.

Because this map unit is variable, onsite investigation is needed for any proposed change in land use. Capability subclass Vw.

AgA—Alton gravelly sandy loam, 0 to 3 percent slopes. This nearly level, well drained to somewhat excessively drained soil formed in glacial outwash and beach deposits. It is on outwash plains, remnant beaches, and terraces. Areas of this soil are oriented in an east-west direction and are irregular in shape or occur as narrow strips. The areas are mostly 10 to 50 acres in size.

Typically, the surface layer of this soil is very friable, dark grayish brown gravelly sandy loam 8 inches thick. The subsoil, which is about 34 inches thick, consists of loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are Phelps and Fredon soils in depressions and drainageways. Williamson soils are included in some areas that are free of coarse fragments. Wet spots, drainageways, and gravel pits are indicated on the soil map by the conventional signs or symbols. Also included are areas where the surface layer is nongravelly sandy loam and loamy fine sand.

In this soil, the seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 20 to 35 percent in the surface layer and are mostly sandstone and limestone gravel. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is slow. The surface layer in unlimed areas is strongly acid to very strongly acid, and the subsoil is medium acid to neutral.

If irrigated, this soil has good potential for farming; without irrigation, it has only fair potential. Most of the acreage is cultivated or in fruit crops. A large part of the acreage is in urban use.

Without irrigation, this soil is fairly well suited to cultivated crops. If irrigated, it is well suited to most crops grown in the county, especially early-market and long-season varieties. The gravelly surface layer and low available water capacity are the main limitations. Surface gravel causes problems in the planting and cultivation of small seeded crops, and it can cause excessive wear of machinery.

This soil warms up quickly and can be worked early in the spring. Because of its low available water capacity and moderately rapid subsoil permeability, it tends to be droughty. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most soils. This soil is well suited to irrigation. Without irrigation, yields of most crops are reduced. Management practices, such as minimum tillage, use of cover crops, fertilization and liming according to soil tests, incorporating crop residue into the soil, and crop rotations, should be used to maintain or increase the organic-matter content of the soil and crop yields.

This soil is well suited to fruit crops, especially pitted fruits such as cherries and peaches. The main limitation is the low available water capacity. Irrigation is needed, especially for fruit crops with shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer according to soil tests and regular additions of organic materials help overcome leaching losses.

Overgrazing is a major concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, and equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when the soil is moist early in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are droughtiness, rapid to very rapid substratum permeability, and the gravelly surface layer. Frequent fertilizing and irrigating help to maintain grass and shrubs. Pollution of the ground water by waste disposal systems is a hazard. Capability subclass IIs.

AgB—Alton gravelly sandy loam, 3 to 8 percent slopes. This gently sloping, well drained to somewhat excessively drained soil formed in glacial outwash and beach deposits. It is on outwash plains, remnant beaches, and terraces. Some areas are undulating. Areas of this soil are irregular in shape or occur as narrow strips and are mostly 10 to 90 acres in size.

In a typical profile the surface layer is very friable, dark grayish brown gravelly sandy loam 8 inches thick. The subsoil, which is 34 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are Phelps and Fredon soils in depressions and drainageways. Williamson soils are included in some areas that are free of coarse fragments. Wet spots, drainageways, and gravel pits are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly sandy loam, fine sandy loam, and loamy sand.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 20 to 35 percent in the surface layer and are mostly sandstone and limestone gravel. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is slow. In unlimed areas, the surface layer is strongly acid to very strongly acid and the subsoil is medium acid to neutral.

If irrigated, this soil has good potential for farming; without irrigation, it has only fair potential. Most of the

acreage is cultivated or in fruit crops. A large part of the acreage is in urban development.

Without irrigation, this soil is fairly well suited to cultivated crops. If irrigated, it is well suited to most crops grown in the county, especially early-market and long-season varieties. The gravelly surface layer and the low available water capacity are the main limitations. The hazard of erosion is slight. Surface gravel causes problems in planting and cultivation of small seeded crops and can cause excessive wear of machinery.

This soil warms up rapidly and can be worked early in spring. Because of its low available water capacity and moderately rapid permeability in the subsoil, it tends to be droughty. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other soils.

Crops respond well to irrigation, but irrigation is somewhat more difficult than on the nearly level Alton soils. Without irrigation, yields of most crops are reduced. Management practices such as minimum tillage, use of cover crops, applying fertilizer, and lime according to soil test, incorporating crop residue into the soil, and crop rotations should be used to maintain or increase the organic-matter content and crop yields. Many of these practices also help control erosion in intensively cultivated areas.

This soil is well suited to fruit crops, especially pitted fruits such as cherries and peaches. The main limitation is the low available water capacity.

Irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients including lime, tend to be rapidly leached from this soil. Frequent additions of fertilizer and regular additions of organic materials help overcome leaching losses.

The major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, and equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when soil is moist in the spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are rapid to very rapid permeability of the substratum, a gravelly surface layer, and slope.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Frequent fertilizing and irrigating help to maintain grass and shrubs. There is a hazard of pollution of the ground water by waste disposal systems. Capability subclass IIs.

AgC—Alton gravelly sandy loam, 8 to 15 percent slopes. This sloping, well drained to somewhat excessively drained soil formed in glacial beach and outwash deposits. It is on remnant beaches, terraces, kames, and eskers. Some areas are rolling. Areas of this soil are irregular in shape or occur as narrow strips and are mostly 10 to 50 acres in size.

Typically the surface layer is very friable dark grayish brown gravelly sandy loam 6 inches thick. The subsoil, which is about 32 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are Phelps and Fredon soils in depressions and drainageways. Included in a few small areas are finer-textured Palmyra soils. Wet spots, drainageways, springs, and gravel pits are indicated on the soil map by conventional signs or symbols. Also included are areas where the surface layer is nongravelly sandy loam, fine sandy loam, and loamy sand.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 20 to 35 percent in the surface layer and are mostly sandstone and limestone pebbles. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is medium. In unlimed areas, the surface layer is strongly acid to very strongly acid and the subsoil is medium acid to neutral.

This soil has fair potential for farming. It can be used for some crops grown in the county including early-market and long-season varieties. Most of the acreage is cultivated or in fruit crops or in urban use.

This soil is moderately suited to cultivated crops. The gravelly surface layer, low available water capacity, and susceptibility to erosion are the main limitations.

Slope limits the intensive use of this soil. Surface gravel makes planting and harvesting difficult and it causes excessive wear of machinery.

Row crops can be grown frequently if the crop is suitable for planting in sod killed by herbicides, in crop residues, or in cover crops in a no-plow system of management. Measures to control erosion are needed to prevent the loss of soil, water, and nutrients. Stripcropping, minimum tillage, use of cover crops, incorporating crops residues into the soil, tillage at proper moisture levels, and crop rotations that include sod crops help to reduce runoff and control erosion in cultivated areas. This soil warms up early in spring. It can be used for early-market crops if it is protected from erosion. Sprinkler irrigation is not well adapted to this soil because of slope. Fertilizer should be applied during the growing season because nutrient losses through leaching can be excessive.

This soil is fairly well suited to fruit crops, including pitted fruits such as cherries and peaches. The main limitations are the low available water capacity and susceptibility to erosion. Operation of machinery and spray equipment can be difficult because of slope or included wet spots. Because this soil has a low available water capacity, irrigation is needed, especially for fruit with rather shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer according to soil tests and regular

additions of organic materials help overcome leaching losses.

A major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of desirable pasture plants and usually results in the loss of soil by erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, and equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are slope, rapid to very rapid permeability of the substratum, and a gravelly surface layer.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Frequent fertilizing and irrigating help to maintain grass and shrubs. Some areas have good potential as a source of sand and gravel. Capability subclass IIIe.

AgD—Alton gravelly sandy loam, 15 to 25 percent slopes. This moderately steep, well drained to somewhat excessively drained soil formed in glacial outwash and beach deposits. It is on remnant beaches, terrace fronts, kames, and eskers. Areas of this soil are oriented in a north-south or east-west direction and are irregular in shape or occur as narrow strips. The areas are mostly 10 to 40 acres in size.

Typically the surface layer of this soil is very friable dark grayish brown gravelly sandy loam about 6 inches thick. The subsoil, which is about 30 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are similar, but finer textured Palmyra soils and sandy spots of Oakville soils. Wet spots, drainageways, springs, and gravel pits are indicated on the soil map by the appropriate conventional sign or symbol. Also included are a few areas where the surface layer is nongravelly sandy loam, fine sandy loam, and loamy sand.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 20 to 35 percent in the surface layer and are mostly sandstone and limestone gravel. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is medium. In unlimed areas, the surface layer is strongly acid to very strongly acid and the subsoil is medium acid to neutral.

This soil has poor potential for farming. Most of the acreage is idle or is in pasture or in woods.

This soil is poorly suited to cultivated crops. The available water capacity, susceptibility to erosion, and moderately steep slopes are the main limitations.

Because of a low available water capacity and moderately rapid permeability of the subsoil, this soil tends to be droughty. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other soils. Slope is a problem in cultivating this soil, and erosion by water and wind is a serious limitation.

If this soil is cultivated, management practices, such as minimum tillage, stripcropping, use of cover crops, applying fertilizer according to soil tests, incorporating crop residues into the soil, tillage at the proper moisture level, and crop rotations that include a high proportion of sod crops, should be used to improve tilth, maintain the organic-matter content, and to help control erosion. Soil blowing can be a serious problem during extended dry periods.

This soil can be used for some fruit crops, including pitted fruits such as cherries and peaches. The main limitations are the low available water capacity, susceptibility to erosion, and moderately steep slopes. Operation of machinery and spray equipment and applying irrigation water are difficult because of slope. Sod cover should be maintained at all times. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer according to soil tests, and regular additions of organic materials help overcome leaching losses.

A major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction and complete loss of the desirable pasture plants and usually results in loss of soil by erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Pasture generally is poor because of droughtiness.

Timber production on this soil is moderately high. The erosion hazard is slight, but erosion can occur along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope interferes with machine harvesting and planting of trees. Seedling mortality is slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for most urban uses. The main limitations are the moderately steep slope, susceptibility to erosion, rapid permeability of the substratum, and a gravelly surface layer.

Removal of vegetation should be held to a minimum, and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, such as the use of sediment basins. Some areas are excellent sources of sand and gravel. Capability subclass IVe.

AlA—Alton cobbly loam, 0 to 3 percent slopes. This nearly level, well drained to somewhat excessively drained soil formed in glacial outwash and beach deposits. It is on outwash plains, remnant beaches, and terraces. Areas of this soil are roughly rectangular in shape and mostly from 10 to 20 acres in size.

Typically the surface layer of this soil is very friable dark grayish brown cobbly loam about 8 inches thick. The subsoil, which is about 34 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are Phelps and Fredon soils in depressions and drainageways. Included in some areas are Williamson soils that do not have coarse fragments. Wet spots, drainageways, and gravel pits are indicated on the soil map by the conventional signs or symbols. Also included are areas where the surface layer is noncobbly sandy loam, fine sandy loam, and loam.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments in the surface layer consist mostly of cobblestones that are 3 to 6 inches in diameter. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is slow. In unlimed areas, the surface layer is strongly acid to very strongly acid and the subsoil is medium acid to neutral.

Where irrigated, this soil has good to fair potential for farming; without irrigation, the potential is fair. Most of the acreage is in hay crops, cultivated crops, or fruit crops.

Without irrigation this soil is moderately suited to cultivated crops. If irrigated, this soil is fairly well suited to most crops grown in the county, especially early-market and long-season varieties. The cobbly surface layer and the low available water capacity are the main limitations. Surface cobblestones make planting and cultivation more difficult and cause more excessive wear of machinery than on the gravelly Alton soils.

This soil warms up rapidly, and it can be worked early in the spring. Because of low available water capacity and moderately rapid permeability in the subsoil, it tends to be droughty. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other kinds of soil.

This soil is well suited to irrigation, and without irrigation, yields of most crops are reduced. Management practices, such as minimum tillage, use of cover crops, applying fertilizer and lime according to soil test, incorporating crop residue into the soil, and crop rotation, should be used to maintain or increase the organic-matter content and crop yields.

This soil is well suited to fruit crops, especially pitted fruits such as cherries and peaches. The main limitations are a low available water capacity and cobblestones in the surface layer. Irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer according to soil tests and regular additions of organic materials help overcome leaching losses.

The major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The hazard of erosion is slight, and equipment limitations are slight to moderate. Seedling mortality is slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are droughtiness, rapid to very rapid permeability in the substratum, and a cobbly surface layer. Frequent fertilizing and irrigating help to maintain grass and shrubs. There is a hazard of pollution of the ground water by waste disposal systems. Capability subclass IIIs.

AlB—Alton cobbly loam, 3 to 8 percent slopes. This gently sloping, well drained to somewhat excessively drained soil formed in glacial outwash and beach deposits. It is on outwash plains, remnant beaches, and terraces. Areas of this soil are roughly rectangular in shape and are mostly 10 to 30 acres in size.

Typically the surface layer is very friable, dark grayish brown cobbly loam about 8 inches thick. The subsoil, which is about 34 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches, is loose, dark brown very gravelly sand.

Included with this soil in mapping are Phelps and Fredon soils in depressions or along drainageways. Included in some areas are Williamson soils that do not have coarse fragments. Wet spots, drainageways, and gravel pits are indicated on the soil map by the conventional signs or symbols. Also included are areas where the surface layer is noncobbly sandy loam, fine sandy loam, and loam.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments in the surface layer are mostly cobblestones 3 to 6 inches in diameter. Permeability is moderately rapid in the subsoil and rapid to very rapid in the substratum. The available water capacity is low. Runoff is slow. In unlimed areas, the surface layer is strongly acid to very strongly acid and the subsoil is medium acid to neutral.

Where irrigated, this soil has good to fair potential for farming; without irrigation, the potential is fair. Most of the acreage is in hay crops, cultivated crops, or fruit crops.

Without irrigation, this soil is moderately suited to cultivated crops. If irrigated, it is fairly well suited to most crops grown in the county, especially early-market and long-season varieties. The cobbly surface layer and the low available water capacity are the main limitations. Erosion is a slight hazard. Surface cobblestones make planting and cultivation difficult and can cause excessive wear of machinery.

This soil warms up quickly and can be worked early in spring. Because of its low available water capacity and moderately rapid permeability, it tends to be droughty. Because nutrients are leached rapidly from this soil, fer-

tilizer should be added more frequently and in smaller amounts than for most other kinds of soil.

This soil is well suited to irrigation, and without irrigation, yields of most crops are reduced. Irrigation is slightly more difficult than on the nearly level Alton soils. Management practices, such as minimum tillage, use of cover crops, applying fertilizer and lime according to soil test, incorporating crop residue into the soil, and crop rotation, should be used to maintain or increase the organic-matter content and crop yields and to control erosion.

This soil is well suited to fruit crops, especially pitted fruits such as cherries and peaches. The main limitations are the low available water capacity and a cobbly surface layer. Irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer according to soil tests and regular additions of organic materials help overcome leaching losses.

The major concern of pasture management on this soil is overgrazing. Overgrazing affects pasture plants and can result in their complete loss. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, and equipment limitations are slight to moderate. Seedling mortality is slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improves seedling survival.

This soil has limitations for some urban uses. The main limitations are droughtiness, rapid to very rapid permeability in the substratum, and a cobbly surface layer. Slope is also a limitation.

Frequent fertilizing and irrigating help to maintain grass and shrubs. There is a hazard of pollution of the ground water by waste disposal systems. Capability subclass IIIs.

Ap—Appleton loam, 0 to 5 percent slopes. This nearly level, somewhat poorly drained soil formed in glacial till. It is on foot slopes and in moderately low areas on till plains. Areas of this soil are commonly oriented in a north-south direction and generally occur as long, narrow strips between drumlins. The areas are mostly 50 to 150 acres in size.

In a typical profile the surface layer is friable, very dark grayish brown loam 9 inches thick. The subsurface layer is friable, mottled, light brownish gray loam 9 inches thick. The subsoil extends to a depth of 32 inches; it is firm, mottled, brown loam. The substratum, to a depth of 50 inches, is firm, mottled brown loam.

Included with this soil in mapping are Hilton soils in higher, drier areas and Lyons soils in depressions or along drainageways. Sand spots, clay spots, stony spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is gravelly loam, gravelly silt loam, or silt loam. Some areas are gently sloping.

There is a perched seasonal high water table above the subsoil, at a depth of 6 to 18 inches, early in spring or during other wet periods. Coarse fragments range from 5 to 15 percent in the surface layer and are mostly sandstone and limestone gravel. Permeability is moderately slow in the subsoil and slow in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is slow. In unlimed areas, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

This soil has fair potential for farming. Without artificial drainage, the potential is poor. Most of the acreage is cultivated, pasture, or woodland.

Without artificial drainage, this soil is poorly suited to cultivated crops. If adequately drained, it is well suited to most crops grown in the county except early-market and long-season varieties. Seasonal wetness is the main limitation.

This soil can be drained with tile and open ditches if suitable outlets are available. If the soil is adequately drained, row crops can be grown almost continuously. Management practices such as minimum tillage, use of cover crops, applying fertilizer according to soil test, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations should be used to improve tilth, maintain the organic matter content, and maintain or increase crop yields. Occasional surface stones or gravel can cause slight problems in planting and cultivation of small-seeded crops.

In drained areas, this soil responds fairly well to irrigation. Irrigation water should be carefully applied to prevent crusting or sealing of the surface.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits that have similar soil requirements. The main limitations are seasonal wetness and the lack of good air drainage. This soil can be drained with tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

The major concerns of pasture management on this soil are overgrazing and grazing the pasture when wet. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, and equipment limitations are moderate. Wetness interferes with machine harvesting

and planting of trees. Seedling mortality is moderate. Seedlings should be planted in the spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are a seasonal high water table and slow permeability in the substratum.

Basements need protection from underground seepage. Septic tank filter fields or sanitary sewers should be specially designed. Frequent fertilizing helps to maintain grass and shrubs. Some areas provide excellent sites for ponds. Capability class IIIw.

Be—Beaches. These are miscellaneous areas consisting mainly of sand and gravel deposits built up by wave action along the shore of Lake Ontario. These sand and gravel deposits are susceptible to overwash during stormy periods, when the lake level is high. Vegetation generally is sparse and often is temporary. These areas are used mainly for recreation. A few of the highest beach levels are sites for cottages, summer homes, or camps. Capability subclass not assigned.

BoA—Bombay gravelly fine sandy loam, 0 to 3 percent slopes. This is a nearly level, moderately well drained soil that formed in glacial till. It is in slightly convex areas on till plains, moraines, and drumlins. Areas of this soil generally are oriented in a north-south direction. They are irregular in shape and range from 20 to 150 acres in size.

Typically, the surface layer is friable, very dark grayish brown, gravelly fine sandy loam about 10 inches thick. The subsurface layer is friable, faintly mottled, brown, gravelly fine sandy loam about 5 inches thick. The subsoil, which extends to a depth of 45 inches, is distinctly mottled loam. In the upper part it is dark yellowish brown and has thin interfingers of leached brown material, in the middle part it is firm and brown, and in the lower part it is friable and brown. The substratum, extending to a depth of 60 inches, is firm, distinctly mottled, brown gravelly loam.

Included with this soil in mapping are Madrid soils on higher drier spots and Massena soils in depressions or drainageways. Included wet spots, sand spots, stony spots, and drainageways are indicated on the map by the appropriate conventional symbol. Also included are areas where the surface layer is not gravelly.

A temporary seasonal high water table is perched above the substratum early in spring. Coarse fragments range from 15 to 30 percent in the surface layer and are mostly sandstone or limestone gravel. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. Rooting depth is limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is slow. In unlimed areas, reaction ranges from strongly acid to slightly acid in the surface layer and strongly acid to neutral in the subsoil.

This soil has good potential for farming. Most of the acreage is cultivated, is in pasture, or is used for fruit crops.

This soil is well suited to cultivated crops. Temporary seasonal wetness and, to a lesser extent, the gravelly surface layer are the main limitations.

Row crops can be grown year after year under good management. Gravel and occasional stones or cobblestones hinder the use of machinery in fields of close-seeded crops and can cause excessive wear of machine parts. Wetness in spring delays planting in some years and can cause difficulty in harvesting long season crops. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotation are good management practices that should be used to improve tilth, maintain organic matter content, and maintain or increase crop yield. Random drainage of the wetter areas generally is needed so that fields can be more uniformly managed. Tile drainage generally works well in this soil.

This soil responds well to the use of tile and irrigation for high value crops. Because of the moderate to moderately slow permeability of the subsoil, irrigation water should not be applied rapidly or over a long period.

This soil is well suited to fruit crops except pitted fruits such as cherries and peaches. The main limitation is the temporary seasonal high water table. The wetter areas can be drained by tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Because spraying is usually done during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery having wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing this soil when wet are major concerns of pasture management. Overgrazing can cause the reduction or complete loss of desirable pasture plants. Grazing the pasture when wet can cause soil compaction, restricted growth, and the loss of pasture plants. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferred grazing, and restricted grazing in wet periods are the chief management needs.

Timber production on this soil is high. The erosion hazard, equipment limitations, and seeding mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

The main limitations for some urban uses are a seasonal high water table, moderately slow permeability of the substratum, and a gravelly surface layer.

Basements need to be protected from underground seepage. Septic tank filter fields and sanitary sewers may have to be specially designed. Capability subclass IIw.

BoB—Bombay gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil formed in glacial till. It is in slightly convex areas on till plains, moraines, and drumlins. Areas of this soil are oriented in a north-south direction and are irregular or oblong in shape. They range from 20 to 150 acres in size.

In a typical profile the surface layer is friable, very dark grayish brown, gravelly fine sandy loam 10 inches thick. The subsurface layer is friable, faintly mottled, brown gravelly fine sandy loam 5 inches thick. The subsoil extends to a depth of 45 inches and is mottled loam. In the upper part it is friable, dark yellowish-brown with thin interfingers of leached brown material; the middle part is firm and brown; and the lower part is friable and brown. The substratum, to a depth of 60 inches, is firm, distinctly mottled, brown, gravelly loam.

Included with this soil in mapping are Madrid soils in higher, drier areas and Massena soils in depressions or drainageways. Wet spots, sand spots, stony spots, and drainageways are indicated on the soil map by the conventional signs or symbols. Also included are areas where the surface layer is nongravelly.

There is a temporary seasonal high water table perched above the substratum early in spring. Coarse fragments range from 15 to 30 percent in the surface layer and are mostly sandstone or limestone gravel. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. The rooting depth is limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is medium. In unlimed areas, the surface layer is strongly acid to slightly acid in the surface layer and the subsoil is strongly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or is in pasture or fruit crops.

This soil is well suited to cultivated crops. Temporary seasonal wetness and, to a lesser extent, a gravelly surface layer and susceptibility to erosion are the main limitations. Occasional surface stones and gravel make the planting and cultivation of small-seeded crops difficult and can cause excessive wear of machinery. Planting may have to be delayed early in spring because of wetness. Because wetter soils are included, tile drainage is often needed to make management of fields more uniform.

Keeping cultivation to a minimum, not plowing when wet, disking before plowing, using crop residue, and using cover crops are essential management practices if row crops are grown intensively. Slopes are commonly long and subject to erosion, especially where water concentrates. In most places cross-slope tillage and grassed waterways control erosion. Where this soil is irrigated, irrigation water should not be applied too rapidly or over too long a period.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are the seasonal high water table and, to a lesser extent, the hazard of erosion. Areas of wetter soils can be drained with tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, using lighter machinery that has wider treads or other specially designed equipment help prevent compaction.

The major concerns of pasture management on this soil are overgrazing and grazing when wet. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a seasonal high water table, susceptibility to erosion, moderately slow permeability in the substratum, and a gravelly surface layer.

Basements need protection from underground seepage. Removal of vegetation should be held to a minimum and plant cover should be established as quickly as possible. Septic tank filter fields or sanitary sewers should be specially designed. Capability subclass IIe.

BoC—Bombay gravelly fine sandy loam, 8 to 15 percent slopes. This sloping, moderately well drained soil formed in glacial till. It is in sloping areas on moraines and drumlins. Areas of this soil are oriented in a north-south direction and are oblong in shape or occur as narrow strips on the sides of hills. Individual areas range from 4 to 50 acres in size.

Typically the surface layer is friable, very dark grayish brown gravelly fine sandy loam about 9 inches thick. The subsurface layer generally is friable, faintly mottled, brown gravelly fine sandy loam about 3 inches thick. The subsoil, which extends to a depth of 35 inches, is faintly mottled loam. In the upper part, it is friable, dark yellowish brown with thin interfingers of leached brown materials; in the middle part, it is firm and brown; and in the lower part, it is friable and brown. The substratum to a depth of 60 inches is firm, distinctly mottled, brown gravelly loam.

Included with this soil in mapping are Madrid soils in drier spots. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly.

There is a perched temporary seasonal high water table above the substratum early in spring. Coarse fragments range from 15 to 30 percent in the surface layer and are mostly sandstone or limestone. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. Rooting depth is limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is medium to rapid. In unlimed areas, the surface layer is strongly acid to slightly acid and the subsoil is strongly acid to neutral.

This soil has fair potential for farming. Most of the acreage is hay, cultivated crops, pasture, or fruit crops.

This soil is fairly well suited to cultivated crops. The seasonal high water table, susceptibility to erosion, and, to a lesser extent, a gravelly surface layer are the main limitations. Occasional surface stones and gravel make the planting and cultivation of small-seeded crops difficult and cause excessive wear of machinery.

Planting may have to be delayed early in spring because of wetness, wet spots, and springs. Tile drainage and diversions are needed to make management of fields more uniform. It generally is important to intercept and divert subsurface seepage and surface runoff on this soil. Erosion control measures are needed to prevent the loss of soil, water, and nutrients. Contour tillage, strip-cropping, minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotations that include sod crops a substantial part of the time are practices that help to reduce runoff and control erosion in cultivated areas.

Because of slope, farm machinery is difficult to use in places and the use of irrigation for specialized crops is either restricted or is not practical.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are the seasonal high water table and hazard of erosion. Plantings should be across the slope to prevent erosion along traffic lanes. Preventing soil compaction is a continuous problem. Because spraying is often done during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, using interceptor drains, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment will help prevent this problem.

The major concerns of pasture management on this soil are overgrazing and grazing when wet. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in loss of soil by erosion. If the pasture is grazed when wet, soil compaction occurs, growth is restricted, and a loss of pasture plants may occur. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed for the best pasture growth.

Timber production on this soil is high. The erosion hazard is slight, but erosion can be a problem along logging roads or skid trails. These roads or trails should be on the contour or across the slope wherever possible. Equipment limitations and seedling mortality are slight. Seedlings should be planted when soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a seasonal high water table, slope, susceptibility to erosion, moderately slow permeability in the substratum, and a gravelly surface layer.

Basements need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, such as the use of sediment basins. Septic tank filter fields or sanitary sewers may need to be specially designed. Capability class IIIe.

Ca—Canandaigua silt loam. This poorly drained and very poorly drained soil formed in glacial lake sediments that are dominantly silt. It occupies level or depressional areas on lake plains. Slope ranges from 0 to 3 percent. Most areas are irregular in shape or occur along narrow winding drainageways. The areas range from 5 to 200 acres in size.

In a typical profile the surface layer is friable, very dark gray silt loam 8 inches thick. The subsoil extends to a depth of 36 inches. It is friable, mottled, grayish brown very fine sandy loam in the upper 6 inches and firm, mottled, reddish gray silt loam in the lower 22 inches. The substratum to a depth of 40 inches is firm, grayish brown, thinly varved silt loam and very fine sandy loam.

Included with this soil in mapping are Collamer and Williamson soils on higher, drier spots and Lamson and Minoa soils in small areas that are sandy. Clay spots, gravel spots, and marshy areas are indicated on the soil map by the conventional signs or symbols. Included in a few large areas are soils that have a mucky surface layer.

An apparent prolonged high water table is at or near the surface in spring and during other wet periods. This soil is susceptible to ponding. It generally has no coarse fragments. Permeability is moderately slow in the subsoil and substratum. The rooting depth is limited by the prolonged high water table. The available water capacity is high. Where there is runoff it is very slow. Organic matter content is high. In unlimed areas, the surface layer and subsoil are slightly acid to mildly alkaline.

This soil has good potential for farming if it is drained. Without artificial drainge, its potential is poor. Most of the acreage is in pasture or woodland, but some areas are cultivated.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except for early-market and long-season varieties. It can be especially productive of certain vegetable crops. Prolonged wetness and susceptibility to ponding are the main limitations.

This soil can be tile drained if suitable outlets are available. Careful design and installation of drains is necessary, and drainage outlets need to be maintained. Some areas require open drains. If the soil is adequately drained, row crops can be grown continuously. The surface layer is generally free of coarse fragments and easily tilled. Organic-matter content is initially very high. Management practices such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation should be used to improve tilth, maintain the organic-matter content of the soil and maintain or increase crop yields. If this soil is irrigated, the water must be applied carefully to prevent puddling and crusting.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits that have similar soil requirements. The main limitations are a prolonged high water table, susceptibility to ponding, and the lack of good air drainage.

This soil can be drained with tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Because spraying is often done during wet periods, the heavy equipment can easily become mired. Draining, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment are ways of solving this problem.

The major concerns of pasture management on this soil are overgrazing and grazing when wet. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the wetness may result in the reduction or complete loss of desirable pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Partial drainage, as in the bedding system of land management, improves pasture production.

Timber production on this soil is moderate. The erosion hazard is slight. Wetness interferes with machine harvesting and planting of trees. Seedling mortality and windthrow hazard are severe. Partial drainage to prevent ponding, brush removal, and careful planting improve seedling survival.

This soil has serious limitations for most urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, and moderately slow permeability in the subsoil and substratum. This soil tends to be unstable and very susceptible to frost action. It is also susceptible to compaction.

In urban areas this soil is best suited to natural open-space areas. Some areas are sites for ponds or potential wetland wildlife habitat. The soil is an excellent source of topsoil, but it is difficult to excavate because of wetness. Capability subclass IIIw.

Cd—Carlisle muck. This nearly level, very poorly drained soil formed in organic deposits more than 51 inches thick. Slope ranges from 0 to 3 percent but is mostly less than 1 percent. The soil is in basins or depressions in swamps or marshes. Areas of this soil are roughly oblong in shape and mostly 10 to 100 acres in size.

In a typical profile in a cultivated field the surface layer is friable, black muck 10 inches thick. The next 26 inches is firm, black muck. Below that, to a depth of 66 inches, is friable, black muck.

Included with this soil in mapping are small spots of Palms and Edwards soils in which the organic material is less than 51 inches thick. Included drainageways are indicated on the soil map by the conventional sign or symbol.

An apparent prolonged high water table is at or near the surface during much of the year. This soil is susceptible to flooding and ponding. Woody fragments range from 0 to 5 percent in the surface layer. Permeability is rapid. The rooting depth is limited by the prolonged high water table. The available water capacity is high. Runoff is very slow or ponded. The surface layer and subsurface layer in areas that are not limed are medium acid to neutral.

This soil has good potential for high-value vegetable crops. Most of the acreage is cultivated, idle, or in woods.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except for early-market and long-season varieties. It is especially well suited to certain vegetable crops. The prolonged high water table, susceptibility to flooding and ponding, and susceptibility to wind erosion are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available or if a pumping system is used. Careful design and installation of drains is necessary. A regulated water table is desirable to prevent excessive subsidence and wind erosion. If drained, this soil gradually subsides because of oxidation and settling of the organic material. Excessive tillage should be avoided because it encourages oxidation of the organic material, and traffic pans may form.

If adequately drained, this is an excellent soil for growing certain high-value vegetable crops, such as onions, celery, and spinach. Because this soil is low in some nutrients, such as phosphorus and potassium, the response to high levels of fertilization is very good. When the surface of this soil is dry, it is very susceptible to wind erosion. Windbreaks and cover crops should be used to prevent the loss of soil by blowing. This soil is on the lowest part of the landscape and is very susceptible to early- and late-season frosts.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suited to shallow rooted fruit crops. The main limitations are a prolonged high water table, susceptibility to flooding and ponding, a lack of good air drainage, and wind erosion.

Without drainage, this soil is not suited to pasture. If adequately drained it is only poorly suited.

Timber production on this soil is low. The erosion hazard is slight. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses and is not suited to most kinds of construction. A prolonged high water table, susceptibility to flooding and ponding, poor stability, and low bearing strength generally limit the use of this soil to recreation, open space, agriculture, woods, and wetland wildlife. Capability subclass IIIw.

CeB—Cazenovia silt loam, 3 to 8 percent slopes. This gently sloping, well drained to moderately well drained

soil formed in glacial till. It is on till plains and moraines. The areas are irregular in shape and range from 10 to 30 acres in size.

In a typical profile in a cultivated field, the surface layer is friable, dark grayish brown silt loam 10 inches thick. The subsurface layer is a friable, brown, heavy silt loam 5 inches thick. The subsoil extends to a depth of 36 inches. It is firm, mottled, reddish brown silty clay loam in the upper 11 inches and firm, mottled, dark reddish brown silty clay loam in the lower 10 inches. The substratum to a depth of 50 inches is firm, reddish brown clay loam.

Included with this soil in mapping are a few small spots of coarser textured Hilton soils, Ovid soils in depressions and drainageways, and small areas of Lockport or Brockport soils that are moderately deep to shale. Wet spots, sand spots, clay spots, stony spots, and drainageways are indicated on the soil map by the appropriate conventional symbol. Also included are areas of a soil that has a gravelly loam or gravelly silt loam surface layer.

There is a perched seasonal high water table above the substratum early in spring or during other wet periods. Coarse fragments range from 2 to 15 percent in the surface layer and are mostly reddish colored sandstone, limestone, or shale pebbles. Permeability is moderately slow in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is medium. In unlimed areas, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most crops grown in the county except early-market and long-season varieties. The seasonal high water table, heavy textured subsoil, and susceptibility to erosion are the main limitations. Coarse fragments in the surface layer and susceptibility to crusting make the planting and cultivation of small-seeded crops difficult. Planting may have to be delayed early in spring because of temporary wetness. Tile drainage is often needed to make management of fields more uniform, particularly if wetter soils are included.

Keeping cultivation to a minimum, use of cover crops, not plowing when wet, disking before plowing, and using crop residue are essential management practices if cultivated crops are grown intensively. Erosion is a problem, especially on long slopes. In most areas, cross-slope tillage, stripcropping, and grassed waterways control erosion. Although natural fertility is good, supplemental fertilization is needed for optimum yields. If this soil is irrigated, water should not be applied too rapidly or over too long a period. Cultivation before irrigation helps to break up any crust and to improve soil aggregation.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are the seasonal high water table and susceptibility to erosion. Included wet spots can be drained with tile; however, gravel inlets may be needed to allow the surface water to percolate down to the tile.

Preventing soil compaction is a continuous problem. Because spraying operations are often done during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, using lighter machinery that have wider treads or other specially designed equipment help prevent this problem.

Overgrazing and grazing when this soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion may occur along logging roads or skid trails. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a seasonal high water table, moderately slow permeability in the subsoil, and slow permeability in the substratum.

Basements need protection from underground seepage. Large construction sites need some form of sediment control such as the use of sediment basins. Carefully designed and contructed septic tank filter fields are required if municipal sewers are not available. Capability subclass IIe.

CeC—Cazenovia silt loam, 8 to 15 percent slopes. This sloping, well drained to moderately well drained soil formed in glacial till. It is on moraines or sides of drumlins. Areas of this soil are roughly oblong in shape or occur as narrow strips in drumlin areas. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark grayish brown silt loam about 10 inches thick. The subsurface layer is friable, brown heavy silt loam about 5 inches thick. The subsoil, extends to a depth of 32 inches. It is firm, mottled, reddish brown silty clay loam in the upper part and firm, mottled, dark reddish brown silty clay loam in the lower part. The substratum to a depth of 50 inches consists of firm, reddish brown clay loam.

Included with this soil in mapping are small spots of coarser textured Hilton or Bombay soils. Wet spots, sand spots, clay spots, stony spots, drainageways, and springs are indicated on the soil map by an appropriate conventional sign or symbol. In some areas the surface layer is gravelly loam and gravelly silt loam.

There is a perched seasonal high water table above the substratum early in spring or during excessively wet

periods. Coarse fragments range from 2 to 15 percent in the surface layer and are mostly reddish shale, limestone, or sandstone gravel. Permeability is moderately slow in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is rapid. In unlimed areas, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

This soil has fair potential for farming. Most of the acreage is cultivated, pastured, or in fruit crops.

This soil is moderately well suited to cultivated crops. The seasonal high water table, heavy-textured subsoil, and susceptibility to erosion are the main limitations. Coarse fragments in the surface layer and susceptibility to crusting make the planting and cultivation of small seed crops difficult.

Erosion control measures are needed to prevent loss of soil, water, and nutrients. Contour tillage, stripcropping, minimum tillage, use of cover crops, applying fertilizer, incorporating crop residues into the soil, tillage at the proper moisture level, and crop rotation that includes grasses and legumes help to reduce runoff and control erosion in cultivated areas.

Because of slope, the use of some farm machinery is difficult in places and the use of irrigation is either reduced or not practical.

Planting may have to be delayed early in spring because of wetness, wet spots, and springs. Subsurface drains or interceptor drains may be needed to make management of fields more uniform, particularly where wetter soils are included. Permanent grass waterways are needed to control erosion and wetness of downslope areas by intercepting seepage and runoff water and carrying it from the field.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are the seasonal high water table and susceptibility to erosion. Included wet spots can be drained with tile; however, gravel inlets may be needed to allow the surface water to percolate down to the tile. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when this soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight; however, erosion may occur along logging roads or skid trails. Logging roads and skid trails should be on the contour or across the slope wherever possible. If water accumulates in roads, it should be diverted off the down-slope side. Equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for many urban uses. The main limitations are a seasonal high water table, susceptibility to erosion, moderately slow permeability in the subsoil, and slow permeability in the substratum.

Basements need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible to prevent erosion. Large construction sites need some sediment control, such as sediment basins. Septic tank filter fields should be specially designed to overcome the moderately slow permeability in the subsoil. Capability subclass IIIe.

CoA—Cazenovia gravelly silt loam, bedrock substratum, 0 to 3 percent slopes. This nearly level, well drained to moderately well drained soil formed in glacial till. It is on till plains that are bedrock controlled. Areas of this soil are oriented in an east-west direction and are irregular or roughly rectangular in shape. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark grayish brown gravelly silt loam 10 inches thick. The subsurface layer is friable, brown heavy silt loam 5 inches thick. The subsoil extends to a depth of 38 inches. It is firm, mottled, reddish brown silty clay loam in the upper part and firm, mottled, dark reddish brown silty clay loam in the lower part. The substratum is firm, reddish brown clay loam that is underlain at a depth of about 50 inches by bedrock.

Included with this soil in mapping are Ovid soils in depressions and drainageways, spots of coarser textured Hilton soils, and small areas of Lockport soils that are moderately deep to shale bedrock. Wet spots, sand spots, clay spots, stony spots, and drainageways are indicated on the soil map by the conventional sign or symbol. Also included is a soil that has a nongravelly surface layer.

There is a perched seasonal high water table above the substratum early in spring or during other excessively wet periods. Bedrock is at a depth of 40 to 60 inches. Coarse fragments range from 15 to 25 percent in the surface layer and are mostly reddish sandstone or shale gravel. Permeability is moderately slow in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is slow. In unlimed areas, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most crops grown in the county except early-market and long-season varieties. The seasonal high water table, gravelly surface layer, and heavy textured subsoil are the main limitations. Surface

stones and gravel can make the planting and cultivation of small seeded crops difficult and cause excessive wear of machinery.

Row crops can be grown year after year under good management. Slight wetness briefly delays spring planting in some years and may cause difficulty in harvesting long-season crops. Random drainage of the wetter included soils is needed for more uniform management of fields. Included soils that are moderately deep to bedrock or have large stones are more difficult to drain. Good management practices, such as minimum tillage, use of cover crops, fertilizing according to soil test, incorporating crop residues into the soil, tillage at the proper moisture levels, and crop rotation, improve tilth, maintain the organic-matter content of the soil, and obtain optimum crop yields. This soil is well suited to irrigation for high-value crops. Because of the moderately slow permeability of the subsoil, irrigation water should not be applied rapidly or over a long period.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are a seasonal high water table and the lack of good air drainage. Included wet spots can be drained with tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment will help prevent this problem.

Overgrazing and grazing when this soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, and equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for many urban uses. The main limitations are a seasonal high water table, moderately slow permeability in the subsoil, gravelly surface layer, and the underlying shale bedrock.

Underground excavations can be costly because of the bedrock. Basements need protection from underground seepage. Septic tank filter fields or municipal sewers should be specially designed. Capability subclasss IIw.

CoB—Cazenovia gravelly silt loam, bedrock substratum, 3 to 8 percent slopes. This gently sloping well drained to moderately well drained soil formed in glacial till. It is on till plains that are controlled by bedrock. Areas of this soil are oriented in a east-west direction and are irregular or roughly rectangular in shape. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark grayish brown gravelly silt loam 10 inches thick. The subsurface layer is usually friable, brown heavy silt loam 5 inches thick. The subsoil, extends to a depth of 36 inches. It is firm, mottled reddish brown, silty clay loam in the upper part and firm, mottled, dark reddish brown silty clay in the lower part. The substratum consists of firm, reddish brown clay loam. Bedrock is at a depth of about 50 inches.

Included with this soil in mapping are Ovid soils in depressions or drainageways, spots of coarser textured Hilton soils, and small areas of Lockport soils that are moderately deep to shale bedrock. Wet spots, sand spots, clay spots, stony spots, and drainageways are indicated on the soil map by a conventional sign or symbol. Areas of soils that have a nongravelly surface layer are also included.

A perched seasonal high water table is above the substratum early in spring or during other excessively wet periods. Bedrock is at a depth of 40 to 60 inches. Coarse fragments range from 15 to 25 percent in the surface layer and are mostly reddish sandstone or shale gravel. Permeability is moderately slow in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is medium. The surface layer in unlimed areas is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most crops grown in the county except early-market and long-season varieties. It can be especially productive of certain vegetable crops. The seasonal high water table, gravelly surface layer, heavy textured subsoil, and susceptibility to erosion are the main limitations. Coarse fragments in the surface layer can make the planting and cultivation of small seeded crops difficult and cause excessive wear of machinery. Planting may have to be delayed early in spring because of wetness. Because of the included wetter soils, tile drainage is needed for more uniform management of fields.

Keeping cultivation to a minimum, not plowing when wet, using cover crops, disking before plowing, and using crop residue are essential management practices if cultivated crops are grown intensively. Erosion is a hazard especially on the longer slopes. In most places contour stripcropping and grassed waterways control erosion. If the soil is irrigated, water should not be applied too rapidly or over too long a period. Cultivation before irrigation helps to break up any crust and to improve soil aggregation.

This soil is well suited to fruit crops, except for pitted fruits such as cherries and peaches. The main limitations are a seasonal high water table and susceptibility to erosion. Included wet spots can be drained with tile; however, gravel inlets may be needed to allow the surface water to percolate down to the tile. Preventing soil com-

paction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining a good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that have wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when this soil is wet are major concerns of pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in loss of soil by erosion. If the pasture is grazed when wet, soil compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion may occur along logging roads or skid trails. Roads or trails should be on the contour or across the slope wherever possible. Equipment limitations are slight. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for many urban uses. The main limitations are a seasonal high water table, moderately slow permeability in the subsoil, and a gravelly surface layer.

Underground excavations can be costly because of the bedrock. Basements need protection from underground seepage. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIe.

Cp—Chippeny muck. This nearly level, very poorly drained soil formed in organic deposits that are moderately deep over bedrock. It is in level areas on bedrock-controlled bogs or in very low depressions. Slope ranges from 0 to 3 percent but is mostly less than 2 percent. Areas of this soil are oriented in an east-west direction and are roughly rectangular in shape. The areas are mostly 10 to 50 acres in size.

In a typical profile in an idle field, the surface layer is friable muck 8 inches thick. The next 12 inches is firm, black muck. Below that, a mineral substratum is friable, light gray loam 2 inches thick. The bedrock, at a depth of 22 inches, is fractured dolomitic limestone.

Included with this soil in mapping are small spots of Palms soils that are deep to bedrock. Included rock outcrops and drainageways are indicated on the soil map by the appropriate conventional sign or symbol.

An apparent prolonged high water table is at or near the surface during much of the year. Bedrock is at a depth of 20 to 51 inches. This soil is susceptible to flooding and ponding. Woody fragments range from 0 to 15 percent in the surface layer. Permeability is moderately slow in the organic material and moderately slow or moderate in the mineral soil substratum. Rooting depth is limited by the high water table and bedrock. The available water capacity is high and runoff is very slow or ponded. The organic-matter content is very high. The organic mantle in unlimed areas is medium acid to mildly alkaline.

This soil has poor potential for farming. Most of the acreage is idle, pastured, or in woods.

If not drained, this soil is not suited to cultivated crops. The prolonged wetness, moderate depth to bedrock, and susceptibility to flooding and ponding are the main limitations. Installing artificial drainage is very difficult because of the lack of suitable outlets and the moderate depth to hard bedrock.

This soil is not suited to fruit crops. The main limitations are a prolonged high water table, moderate depth to rock, and susceptibility to flooding and ponding. Drainage generally is extremely difficult.

Because of the excessive wetness and moderate depth to rock, this soil generally is not suited to pasture. Partial drainage is difficult to install.

Woodland production on this soil is low. The erosion hazard is slight, but equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality and windthrow hazard are severe. Selecting species suitable for wetland, brush removal, and careful planting improve seedling survival.

This soil has very severe limitations for most urban uses. They are a moderate depth to bedrock, a prolonged high water table, susceptibility to flooding and ponding, and organic texture.

Underground excavations are extremely difficult, and this soil should not be used for most kinds of construction. It is best used as open space or for wetland wildlife habitat. Capability subclass VIIw.

CrB—Collamer silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil formed in glacial lake sediment that is dominantly silt. It is on slightly convex ridges, knolls, and benches on lake plains. Some areas are undulating. Areas of this soil are oriented in an east-west direction and are irregular in shape. The areas are mostly 5 to 30 acres in size.

In a representative profile in an apple orchard, the surface layer is friable, dark brown silt loam 9 inches thick. The subsurface layer is 5 inches thick and consists of friable, pale brown silt loam with small areas of brown material. The subsoil is 23 inches thick. In the upper 8 inches it is friable, brown, heavy silt loam that has thin interfingering of leached light reddish brown material. In the lower 23 inches it is firm, mottled, brown heavy silt loam. The substratum, to a depth of 45 inches, is firm, mottled, brown silt loam varved with very fine sand. Below that to a depth of 52 inches it is dark brown very fine sandy loam with thin varves of silt loam.

Included with this soil in mapping are Dunkirk soils on higher drier spots than the Collamer soil and Niagara soils in depressions and along drainageways. Included in a few small areas are Williamson soils that have a lower clay content and sandy Arkport soils. Wet spots, sand spots, clay spots, gravel spots, and drainageways are in-

dicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is very fine sandy loam or fine sandy loam.

A perched seasonal high water table is perched in the subsoil early in spring. There generally are no coarse fragments, but the fragments can make up as much as 4 percent of the surface layer and are mostly gravel sized. Permeability is moderate in the surface layer and the upper part of the subsoil, and it is moderately slow in the lower part of the subsoil and substratum. Rooting depth is slightly limited by the seasonal high water table. The available water capacity is high. Runoff is medium. In unlimed areas, the surface layer is strongly acid to neutral and the subsoil is medium acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most of the cultivated crops grown in the county except early-market and long-season varieties. It can be especially productive of certain vegetable crops. Temporary seasonal wetness and susceptibility to erosion are the main limitations.

This soil is well suited to close-seeded crops, such as carrots, beets, and certain other vegetable crops. Careful management is needed to control erosion. Maintaining winter cover crops, returning crop residue to the soil, using sod crops in the rotation, cross-slope tillage, and keeping tillage to a minimum are satisfactory erosion-control practices where slopes are short. On longer slopes, such management measures as terracing, contour stripcropping, and keeping grass in waterways may be needed.

This soil is very susceptible to crusting and compaction. Good structure is difficult to maintain, and the formation of traffic pans is common. Plowing and cultivation should be done at the proper moisture levels. Planting may have to be delayed early in spring because of wetness. Where wetter soils are included, tile drainage is needed for more uniform management of fields.

Irrigation of this soil is not efficient because of the moderately slow or slow permeability of the subsoil and the potential crusting of the surface soil.

This soil is well suited to fruit crops, except pitted fruits such as cherries and peaches. The main limitations are a temporary seasonal high water table and susceptibility to erosion. Tile drainage of wet included soils is generally beneficial. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment will help prevent this problem.

Overgrazing and grazing when this soil is wet are the major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed for the best pasture growth.

Timber production on this soil is high. The erosion hazard is slight; but erosion may be severe along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations and seedling mortality are slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, susceptibility to erosion, and moderately slow permeability in the subsoil and substratum.

Basements need to be protected from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of sediment control, such as the use of sediment basins. Septic tank filter fields or sanitary sewers should be specially designed. Capability class IIe.

CsA—Colonie loamy very fine sand, 0 to 2 percent slopes. This nearly level, somewhat excessively drained soil formed in sandy glacial lake and beach deposits. It occurs on lake plains, beaches, and sand bars and deltas. Areas of this soil are oriented in an east-west direction and are irregular or roughly rectangular in shape. The areas are mostly 5 to 50 acres in size.

Typically the surface layer is very friable, brown loamy very fine sand 7 inches thick. The subsoil extends to a depth of 45 inches. It is 5 inches of very friable, yellowish brown loamy fine sand; 5 inches of friable, reddish brown very fine sandy loam; 9 inches of very friable, brown, loamy fine sand; and 19 inches of very friable, brown, very fine and fine sand. The substratum to a depth of 60 inches is loose brown fine sand with a few mottles.

Included with this soil in mapping are Elnora soils in wet spots, Oakville soils that have no bands or lamellae in the subsoil, and small areas of a similar soil that has thicker bands. Wet spots, gravel spots, and drainageways are indicated on the soil map by the conventional signs or symbols. Areas where the surface layer is loamy fine sand or fine sandy loam are also included.

The seasonal high water table stays below a depth of 6 feet. Coarse fragments generally are absent, but they may range up to 2 percent and are mostly scattered sandstone or limestone gravel. Permeability is rapid. The available water capacity is low. Runoff is slow. In areas that are not limed the surface layer and subsoil are very strongly acid to slight acid.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, pastured, or in fruit crops.

This soil is fairly well suited to most crops grown in the county, including early-market and long-season varieties. Vegetable crops are particularly suited if adequate moisture and fertilizer are available. The low available water capacity and susceptibility to wind erosion are the main limitations.

Because this soil has low available water capacity and rapid permeability, it tends to be droughty, especially during extended dry periods. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other kinds of soil. This soil can be planted early in the season, is generally free of coarse fragments, is easily worked, and responds well to a high level of management. It can be irrigated frequently. Tilth is good if management practices include minimum tillage, cover crops, optimum fertilization, incorporating crop residues into the soil, and crop rotations. These practices also help control wind erosion, which can be a serious problem during dry periods.

This soil is fairly well suited to fruit crops, including pitted fruits such as cherries and peaches. The main limitations are low available water capacity and susceptibility to wind erosion. Because this soil has a low available water capacity, irrigation is needed, especially for fruit crops that have a shallow root system. Nutrients, including lime, tend to be rapidly leached from this soil. Frequent additions of fertilizer and regular additions of organic materials help overcome leaching losses.

A major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It usually results in loss of soil by wind erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderate. Seedling mortality is severe because of droughtiness. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has minor limitations for some urban uses. They are rapid permeability and sandy texture.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Pollution of the ground water from septic tank filter fields is a hazard in some areas. Lawns are often difficult to establish and may require frequent watering. Capability subclass IIIs.

CsB—Colonie loamy very fine sand, 2 to 6 percent slopes. This gently sloping, somewhat excessively drained soil formed in sandy lake and beach deposits. It is in slightly convex, gently sloping or undulating areas on lake plains, beaches, and sand bars and deltas. Areas of this soil are oriented in an east-west direction and are irregular or oblong in shape. The areas are mostly 5 to 50 acres in size.

In a typical profile in an orchard, the surface layer is very friable, brown, loamy very fine sand 7 inches thick. The subsoil extends to a depth of 42 inches. It is 5 inches of very friable, yellowish brown, loamy fine sand; 5 inches of friable, reddish brown, very fine sandy loam, 8 inches of very friable, brown, loamy fine sand; and 17 inches of very friable, brown, very fine and fine sand. The substratum to a depth of 60 inches is loose, brown, fine sand that has a few mottles.

Included with this soil in mapping are Elnora soils in depressions or drainageways, Oakville soils that have no bands or lamellae in the subsoil, and small areas of a similar soil that has thicker and better expressed bands. Wet spots, gravel spots, and drainageways are indicated on the soil map by an appropriate conventional sign or symbol. Areas where the surface layer is loamy fine or fine sandy loam are also included.

The seasonal high water table stays below a depth of 6 feet. There are generally no coarse fragments, but the fragments may range up to 2 percent and consist mostly of scattered sandstone or limestone gravel. Permeability is rapid. The available water capacity is low. Runoff is slow. In unlimed areas, the surface layer and subsoil are very strongly acid to slightly acid.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, pastured, or in fruit crops.

This soil is fairly well suited to cultivated crops. It is suited to most crops grown in the county including early-market and long-season varieties. The low available water capacity and susceptibility to wind erosion are the main limitations.

Because the soil has low available water capacity and rapid or moderately rapid permeability, it tends to be droughty during extended dry periods. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other kinds of soil. This soil can be planted early in the season, generally is free of coarse fragments, is easily worked, and responds well to a high level of management. It can be irrigated frequently but is slightly more difficult to irrigate than the nearly level Colonie soil. Tilth is good if management practices include minimum tillage, cover crops, optimum fertilization, incorporating crop residues into the soil, and crop rotation. These practices also help control wind erosion. Erosion by water is a hazard if the soil is left bare during the winter and early in spring. If irrigation is not used, wind erosion is a hazard during dry periods.

This soil is fairly well suited to fruit crops, including pitted fruits such as cherries and peaches. The main limitations are a low available water capacity and susceptibility to erosion. Because this soil has a low available water capacity, irrigation is needed, especially for fruit crops that have shallow root system. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent fertilization and regular additions of organic materials help overcome leaching losses.

A major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in the loss of soil by wind or water erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the chief management needs. Lime and fertilizer should be applied as needed for the best pasture growth.

Timber production on this soil is moderate. Seedling mortality is severe because of droughtiness. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has minor limitations for some urban uses. The main limitations are rapid permeability and sandy texture.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of wind-erosion control. Pollution of the ground water by septic tank disposal systems is a hazard in some areas. Because of droughtiness, lawns are often difficult to establish. Capability subclass IIIs.

CsC—Colonie loamy very fine sand, 6 to 12 percent slopes. This sloping, somewhat excessively drained soil formed in sandy lake and beach deposits. It occupies slightly convex areas on lake plains, beaches, sand bars, and deltas. Some areas are rolling. Areas of this soil are oriented in an east-west direction, and they generally occur as rather narrow strips associated with less sloping Colonie soils. The areas are mostly less than 25 acres in size.

Typically the surface layer is very friable, brown, loamy very fine sand 7 inches thick. The subsoil extends to a depth of 40 inches. It is 5 inches of very friable, yellowish brown, loamy fine sand; 4 inches of friable, reddish brown, very fine sandy loam; 7 inches of very friable, brown, loamy fine sand; and 17 inches of very friable, brown, very fine and fine sand. The substratum to a depth of 60 inches is loose brown fine sand.

Included with this soil in mapping are Elnora soils in wet spots and drainageways, small spots of Oakville soils that do not have bands or lamellae in the subsoil, and a similar soil that has thicker and better expressed bands. Wet spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are soils that have a surface layer of loamy fine sand or fine sandy loam.

The seasonal high water table is below a depth of 6 feet. Coarse fragments generally are absent, but they can range up to 2 percent and are mostly scattered sandstone or limestone gravel. Permeability is rapid. The available water capacity is low. Runoff is medium. In areas that are not limed, the surface layer and subsoil are very strongly acid to slightly acid.

This soil has fair to poor potential for farming. Most of the acreage is idle, pastured, or in fruit crops. Some areas are cultivated.

This soil can be used for some cultivated crops, including early-market and long-season varieties. The low available water capacity and susceptibility to erosion are the main limitations.

Because of its low available water capacity and rapid permeability, this soil tends to be droughty during extended dry periods. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other kinds of soil.

This soil can be planted early in the season, generally is free of coarse fragments, and responds moderately well to a high level of management. Because of slope, irrigation is somewhat difficult. Tilth can be maintained if management practices include minimum tillage, cover crops, good fertilization, incorporating crop residues, and sod crops in the cropping system. Along with these practices, cross-slope tillage and stripcropping help control water erosion in cultivated areas. If irrigation is not used, soil blowing can be a serious problem during dry periods.

This soil is fairly well suited to fruit crops, including pitted fruits such as cherries and peaches. The main limitations are the low available water capacity and susceptibility to water and wind erosion. Because this soil has a low available water capacity, irrigation is needed, especially for fruit crops that have a shallow root system. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent fertilization according to soil tests and regular additions of organic materials can help overcome leaching losses. Sod cover between rows help control erosion.

The major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in loss of soil by erosion. Proper stocking rates to maintain key plants, the rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Wood production on this soil is moderate. Seedling mortality is severe because of droughtiness. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are susceptibility to erosion, rapid permeability of the subsoil and substratum, sandy texture, and slope.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of erosion control. Pollution of the ground water from septic tank disposal systems is a problem in some areas. Lawns may be difficult to establish and maintain because of the tendency of this soil to be droughty. Capability subclass IVs.

CsD—Colonie loamy very fine sand, 12 to 20 percent slopes. This moderately steep, somewhat excessively drained soil formed in sandy lake and beach deposits. It is in slightly convex areas on dissected lake plains and deltas. Some areas are hilly and have complex slopes. Areas of this soil are irregular in shape or many occur as narrow strips. The areas are mostly less than 25 acres in size.

Typically the surface layer is very friable, brown, loamy very fine sand 6 inches thick. The subsoil extends to a depth of 38 inches. It is 4 inches of very friable, yellowish brown, loamy fine sand; 4 inches of friable, reddish brown very fine sandy loam; 7 inches of very friable, brown loamy fine sand; and 17 inches of very friable, brown, very fine and fine sand. The substratum to a depth of 60 inches is loose brown fine sand.

Included with this soil in mapping are Oakville soils that have no bands or lamellae in the subsoil and small spots of a similar soil containing thicker and better expressed bands. Less sloping Colonie soils are included in many places. Wet spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are soils that have a surface layer of loamy fine sand or fine sandy loam.

The seasonal high water table is below a depth of 6 feet. There are generally no coarse fragments, but the fragments range up to 2 percent in places and consist mostly of scattered sandstone and limestone gravel. Permeability is rapid. The available water capacity is low. Runoff is medium. In unlimed areas, the surface layer and subsoil are very strongly acid to slightly acid.

This soil has poor potential for farming. Most of the acreage is idle, pastured, or in fruit crops.

This soil is poorly suited to cultivated crops. The low available water capacity, susceptibility to erosion, and moderately steep slopes are the main limitations.

Because of low available water capacity and rapid permeability, this soil tends to be droughty. Because nutrients are leached rapidly from this soil, fertilizer should be added more frequently and in smaller amounts than for most other kinds of soil. Slope is a problem in cultivating this soil, and erosion by water and wind is a severe hazard.

Cultivated crops should be grown infrequently and with a maximum of conservation practices. Soil blowing can be a serious problem during extended dry periods.

This soil can be used for some fruit crops, including pitted fruits such as cherrries and peaches. The main limitations are low available water capacity, susceptibility to water and wind erosion, and moderately steep slopes. Operation of machinery generally is difficult on this soil. If soil is exposed along traffic lanes, it will be susceptible to wind and water erosion. Because this soil has a low available water capacity, yields are reduced.

The major concern of pasture management on this soil is overgrazing. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It generally results in loss of soil by erosion. Proper stocking rates to maintain key plants, the rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed for the best pasture growth, but application is somewhat difficult because of slope.

Timber production on this soil is moderate. The erosion hazard is slight, but erosion may occur along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Slope interferes with machine harvesting and planting of trees. Seedling mortality is severe because of droughtiness. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitation is moderately steep slope. Other limitations are susceptibility to erosion, rapid permeability in the subsoil and substratum, and sandy texture.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need erosion control. Maintaining streets and roads is difficult. Capability subclass VIs.

CTE—Colonie and Dunkirk soils, hilly. This undifferentiated group consists of areas of Colonie soil or Dunkirk soil or both. These are moderately steep and steep, well drained and somewhat excessively drained soils that formed in sandy or silty glacial lake deposits. They are on dissected lake plains and deltas. The areas are mainly a series of low, complex, sloping hills. Some areas are on the sides of gullies. Slope ranges from 15 to 45 percent. The areas are roughly rectangular, long and narrow, or irregular in shape and are mostly larger than 50 acres in size.

Typically, the surface layer of the Colonie soil is very friable, brown, loamy very fine sand 6 inches thick. The subsoil extends to a depth of 36 inches. It is 4 inches of very friable, yellowish brown loamy fine sand; 3 inches of friable, reddish brown very fine sandy loam; 7 inches of very friable, brown loamy fine sand; 16 inches of very friable, brown very fine and fine sand. The substratum, to a depth of 60 inches, consists of loose brown fine sand.

Typically the surface layer of the Dunkirk soil is friable, dark grayish brown silt loam 6 inches thick. The subsurface layer is friable, brown very fine sandy loam 5 inches thick. The subsoil, to a depth of 30 inches, is firm, brown silt loam that has thin pale brown interfingers of leached material in the upper 5 inches. The substratum, to a depth of 60 inches, consists of firm, brown silt and very fine sand.

Included with these soils in mapping are Elnora or Collamer soils in small, wetter areas or along drainageways. Spots of a sandy soil similar to the Colonie soil but with thicker and better expressed bands or lamellae are also included. Wet spots, gravel spots, drainageways, and spring are indicated on the soil map by an appropriate conventional sign or symbol. Included in a few small areas are soils that have a surface layer of loamy fine sand or silty clay loam.

The seasonal high water table in this undifferentiated group is below a depth of 6 feet. There are generally no coarse fragments, but fragments can range up to 2 percent. They consist mostly of scattered sandstone or limestone gravel. Permeability is rapid in the Colonie soil and moderately slow in the subsoil and substratum of the Dunkirk soil. The available water capacity is low in the Colonie soil and high in the Dunkirk soil. Runoff is medium to very rapid. In areas that are not limed the surface layer is very strongly acid to neutral, and the subsoil is very strongly acid to mildly alkaline.

These soils have poor potential for farming. Most of the acreage is idle, pastured, or in woods.

These soils are not suited to cultivated crops. The susceptibility to erosion and moderately steep or steep slopes are the main limitations.

These soils are poorly suited to fruit crops. The main limitations are a serious erosion hazard and moderately steep or steep slopes.

Overgrazing and erosion are major concerns of pasture management on these soils. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It results in the excessive loss of soil by erosion. If the pasture is grazed when wet, compaction is a hazard resulting in loss of soil, nutrients, and pasture plants and in downslope sedimentation and pollution. Proper stocking rates to maintain key plants, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are the main management needs. Reseeding and applying fertilizer are difficult because of the moderately steep and steep slopes.

Timber production on these soils ranges from moderate to high. The erosion hazard is moderate to severe. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Slope interferes with machine harvesting and planting of trees. Seedling mortality is moderate to severe. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

These soils have serious limitations for many urban uses. The main limitations are moderately steep and steep slopes and susceptibility to erosion.

These soils are not suitable for most kinds of construction. Most areas have potential for open space, woods, or recreational use. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Capability subclass VIe.

DkB—Dunkirk silt loam, 2 to 6 percent slopes. This gently sloping, well drained soil formed in silty glacial lake sediments. It is in convex areas on lake plains and deltas. Areas of this soil are oriented in an east-west direction and are irregular in shape. The areas range from 5 to 10 acres in size.

In a typical profile in a cultivated field, the surface layer is friable, dark grayish brown silt loam 7 inches thick. The subsurface layer is friable, brown very fine sandy loam 7 inches thick. The subsoil extends to a depth of 40 inches. It is firm, brown silt loam that has thin interfingers of pale brown leached material in the upper 7 inches. The substratum, to a depth of 80 inches, consists of firm, brown silt and very fine sand.

Included with this soil in mapping are small spots of wetter Williamson or Collamer soils in lower areas or along drainageways. Colonie soils are included in areas of sandy deposits. Wet spots, sand spots, clay spots, gravel spots, and drainageways are indicated on the soil map by an appropriate conventional sign or symbol. Also included are areas where the surface layer is fine sandy loam or very fine sandy loam.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 0 to 5 percent in the surface layer, but they generally do not occur. Permeability is moderate in the surface layer and subsurface layer and moderately slow in the subsoil and substratum. Root penetration is excellent. The available water capacity is high. Runoff is medium. In areas that are not limed, the surface layer and subsurface layer are strong acid to neutral, and the subsoil is medium acid to mildly alkaline.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to cultivated crops and is especially productive of certain vegetable crops. The highly erodible nature of this soil is the main limitation.

This soil generally is free of coarse fragments and is especially well suited to close-seeded crops, such as carrots, beets, and certain other vegetable crops. Careful management is needed to reduce crusting and control erosion. This soil is very susceptible to compaction. Maintenance of good structure is difficult and traffic pans are common. Tillage should be done at the proper moisture levels. Tile may be needed for more uniform management of fields where wetter soils are included. Control of erosion is a continuous problem. Good management practices, including maintaining winter cover crops, using crop residue, using sod crops in the crop rotation, and keeping tillage to a minimum, generally control erosion if slopes are short. On longer slopes, such management practices as terraces, contour strips, and grass kept in waterways are needed. This soil can be irrigated, but irrigation efficiency is reduced by the moderately slow permeability of the subsoil and the potential crusting of the surface soil.

This soil is well suited to fruit crops, including pitted fruits such as cherries and peaches. The main limitation is susceptibility to erosion.

Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining included wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are the major concerns of pasture management on this soil. Overgrazing can cause the reduction and complete loss of desirable pasture plants. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plants rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion can be serious along logging roads or skid trails. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is slight, but seedlings should be planted when the soil is moist in spring. Brush removal and careful planting also improve seedling survival.

This soil has some limitations for some urban uses. The main limitations are susceptibility to erosion and moderately slow permeability in the subsoil.

Basements may need protection from underground seepage. Removal of vegetation should be held to a minimum and plant cover should be established as quickly as possible. Septic tank filter fields or sanitary sewers should be specially designed . Capability subclass IIe.

DkC3—Dunkirk silt loam, 6 to 12 percent slopes, severely eroded. This sloping, well drained soil formed in silty glacial lake sediments. It is in convex dissected areas on lake plains and deltas. Areas of this soil are oriented in an east-west direction and are irregular in shape. The areas range from 5 to 10 acres in size.

Typically the surface layer is friable, dark grayish brown silt loam 5 inches thick. The subsurface layer is friable, brown very fine sandy loam 3 inches thick. The subsoil extends to a depth of 35 inches. It is firm, brown silt loam that has interfingers of pale brown, leached material in the upper 6 inches. The substratum, to a depth of 80 inches, consists of firm, brown silt and very fine sand.

Included with this soil in mapping are some large noneroded areas, a few very severely eroded spots, and wet inclusions along drainageways. Wet spots, sand spots, clay spots, and drainageways are indicated on the soil map by an appropriate conventional sign or symbol. Also included are soils that have a surface layer of silty clay loam or fine sandy loam.

The seasonal high water table is at a depth of more than 6 feet. Coarse fragments range from 0 to 5 percent in the surface layer, but there are none in most places. Permeability is moderate in the surface layer and subsurface layer and moderately slow in the subsoil and substratum. Root penetration is good. The available water capacity is high. Runoff is medium to rapid. In areas that are not limed, the surface layer and subsurface layer are strongly acid to neutral, the subsoil is medium acid to mildly alkaline.

This soil has fair potential to poor potential for farming. Most of the acreage is cultivated, pastured, or in fruit crops.

This soil is poorly suited to cultivated crops. The susceptibility to continuing erosion is the main limitation.

Cultivation is possible, but the cropping system should include several years of sod. Row crops can be grown more frequently if they are planted directly in a minimum tillage or no-plow system of management. This soil needs protective cover year round. If this soil is cultivated, stripcropping and contour tillage should be practiced. Green manure crops, cover crops, return of crop residues to the soil, and tillage at the proper moisture level build up the organic-matter content and tilth of the soil.

This soil can be used for some fruit crops, including pitted fruits such as cherries and peaches. The main limitation is susceptibility to erosion. Preventing erosion is the main concern of management. Traffic lanes should be across the slope as much as possible. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wetter included soils, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It generally results in the excessive loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed for best pasture growth.

Timber production on this soil is high. The erosion hazard is moderate. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is slight, but seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are susceptibility to erosion and moderately slow permeability in the subsoil.

Basements may need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of sediment control, such as the use of sediment basins. Septic tank filter fields or sanitary sewers should be specially designed. Frequent fertilization helps maintain grass and shrub cover. Capability subclass IVe.

DkD—Dunkirk silt loam, 12 to 20 percent slopes. This moderately steep, well drained soil formed in silty glacial lake sediments. It is on convex hillsides and sides of dissected drainageways on lake plains and deltas. Some areas are hilly and have complex slopes. Areas of this soil are oriented in a northeast-southwest or east-west direction and are irregular in shape. The areas range from 5 to 10 acres in size.

Typically the surface layer is friable dark grayish brown silt loam 6 inches thick. The subsurface layer is friable, brown very fine sandy loam about 5 inches thick. The subsoil, extends to a depth of 33 inches. It consists of firm, brown silt loam with thin interfingers of pale brown, leached material in the upper 6 inches. The substratum to a depth of 80 inches consists of firm, brown silt and very fine sand.

Included with this soil in mapping are some severely eroded areas, Colonie soils in sandy spots, and areas of wetter Collamer soils along drainageways. Wet spots, sand spots, clay spots, and drainageways are indicated on the soil map by an appropriate conventional sign or symbol. In some areas the surface layer is silty clay loam or fine sandy loam.

The seasonal high water table generally is at a depth of more than 6 feet. Coarse fragments, where present, range from 0 to 5 percent in the surface layer. Permeability is

moderate in the surface layer and subsurface layer and moderately slow in the subsoil and substratum. Root penetration is good. The available water capacity is high. Runoff is rapid. In areas that are unlimed, the surface layer and subsurface layer are strongly acid to neutral, the subsoil is medium acid to mildly alkaline.

This soil has poor potential for farming. Most of the acreage is idle, pastured, or in woods.

This soil is poorly suited to cultivated crops. The susceptibility to erosion and moderately steep slopes are the main limitations.

This soil is very erodible and in many places has short and complex slopes. Cultivation is possible, but the cropping system should include several years of sod. Row crops can be grown more frequently if they are planted directly in a minimum tillage or no-plow system of management. This soil needs a protective cover all year. It should be cultivated in narrow strips across the general slope. Cover crops and return of crop residues to the soil are particularly important.

This soil is moderately to poorly suited to fruit crops. The main limitations are susceptibility to erosion and moderately steep slopes. Preventing erosion is the main management concern. Orchards should be left in sod, and traffic lanes should be across the slope as much as possible.

Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, using lighter machinery that has wider treads or other specially designed equipment will help prevent this problem. Slope makes the use of some machinery difficult.

The major concerns of pasture management on this soil are overgrazing and grazing when the soil is wet. Overgrazing affects pasture plants and can result in their complete loss. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed, but application is somewhat difficult because of slope.

Timber production on this soil is high. The erosion hazard is severe. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. The moderately steep slopes interfere somewhat with machine harvesting and the planting of trees. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are moderately steep slopes, susceptibility to erosion, and moderately slow permeability in the subsoil.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of sediment control, such as of sediment basins. Septic tank filter fields or sanitary sewers should be specially designed. Undercutting of foot slopes can cause mass slumps and slides. Capability subclass IVe.

Ed—Edwards muck. This nearly level, very poorly drained soil formed in organic deposits 16 to 51 inches thick over marl. It occupies level or low bogs. Slope ranges from 0 to 3 percent but is mostly less than 1 percent. Areas of this soil are usually oblong in shape and mostly range from 20 to 40 acres in size.

In a typical profile in a cultivated field, the surface layer is friable, black muck 9 inches thick. The next 21 inches is also friable, black muck. The substratum to a depth of 54 inches consists of friable, grayish brown marl.

Included with this soil in mapping are small spots of Palms, Adrian, Carlisle, and Martisco organic soils. Included drainageways are indicated on the soil map by the appropriate conventional sign or symbol.

There is an apparent prolonged high water table at or near the surface during much of the year, unless the soil is artifically drained. Marl occurs at a depth of 16 to 51 inches. This soil is susceptible to flooding and ponding. Woody fragments range from 0 to 5 percent in the surface layer. Permeability is rapid in the organic material and variable in the marl. Rooting depth is limited by the high water table. The available water capacity is high. Runoff is very slow or ponded. In areas that are not limed, the organic surface and subsurface layers are medium acid to mildly alkaline.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, or in woods.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to most vegetable crops grown in the county except early-market and long season varieties. The prolonged high water table, moderate depth to marl, susceptibility to flooding and ponding, and susceptibility to wind erosion are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available or if a pumping system can be used. A regulated water table is desirable to prevent excessive subsidence and wind erosion. If drained, this soil gradually subsides because of oxidation and settling of the organic material. Excessive tillage should be avoided because it encourages oxidation of the organic material and can result in formation of traffic pans.

If adequately drained, this is a good soil for growing certain high-value vegetable crops. Because this soil is low in nutrients such as phosphorus and potassium, application of fertilizer should vary with the crop grown. When the surface of this soil is dry, it is very susceptible to wind erosion. Windbreaks and cover crops need to be used to prevent the loss of soil by wind. This soil is on the lowest part of the landscape and is very susceptible to early-and late-season frosts.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suitable for shallow rooted fruits. The main limitations are a prolonged high water table, moderate depth to marl, susceptibility to flooding and ponding, lack of good air drainage, susceptibility to frost damage, and wind erosion.

Without drainage, this soil is not suited to pasture. If adequately drained it is only poorly suited.

Timber production on this soil is low. Equipment limitation is severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Brush removal and careful planting improve seedling survival. Because of shallow rooting, windthrow is a particular hazard.

This soil has severe limitations for most urban uses. The main limitations are a prolonged high water table, susceptibility to flooding or ponding, and organic texture. Poor stability and low bearing strength are also limitations. This soil is not suitable for most construction. Some areas are suited to recreation, open space, or wetland wildlife habitat. The underlying marl is a potential source of agricultural lime. Capability subclass IVw.

ElA—Elnora loamy fine sand, 0 to 2 percent slopes. This nearly level, moderately well drained soil formed in glacial lake and remnant beach sediments that are dominantly sand. It is in slightly convex, nearly flat areas on lake plains, beaches, and sand bars and deltas. Areas of this soil are oriented in an east-west direction and are irregular in shape. The areas range from 5 to 20 acres in size.

In a typical profile the surface layer is very friable, dark grayish brown loamy fine sand about 10 inches thick. The subsoil extends to a depth of 32 inches. It consists of very friable, strong brown loamy fine sand in the upper 11 inches and very friable, faintly mottled, brown fine sand in the lower 11 inches. The substratum, to a depth of 40 inches, consists of loose, distinctly mottled, grayish brown fine sand. Below that to a depth of 60 inches it is loose, mottled, brown fine sand.

Included with this soil in mapping are small areas of Minoa or Junius soils in depressions or drainageways, better drained Colonie or Oakville soils on higher drier spots, and silty Williamson soils. Wet spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loamy very fine sand, fine sand, and fine sandy loam.

An apparent seasonal high water table rises into the lower part of the subsoil early in spring or during wet periods. Where present, coarse fragments range up to 2 percent in the surface layer. Permeability is moderately rapid to rapid in the subsoil and rapid in the substratum. Rooting depth is somewhat limited by the seasonal high water table early in the growing season. The available water capacity is low. Runoff is slow. In areas that are not limed, the surface layer and subsoil are very strongly acid to slightly acid.

This soil has fair potential for farming. Most of the acreage is cultivated, pastured, or in fruit crops.

Without artificial drainage, this soil is fairly well suited to cultivated crops. It is suited to most crops grown in the county except early-market and long-season varieties. It can be productive of certain vegetable crops. Seasonal wetness, the sandy surface layer, and low available water capacity are the main limitations.

Drainage and irrigation are needed for the best crop response on this soil. Tile drainage generally works well if suitable outlets are available. Because nutrients are leached rapidly, lime and fertilizer should be added more frequently and in smaller amounts than for many other kinds of soil. When adequately drained and managed, this soil is suitable for most crops grown in the county. It is relatively free of coarse fragments and easily tilled. It can be suitable for close-seeded crops, such as carrots or beets, and for certain vine crops, such as melons. It is well suited to irrigation. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth, and maintain organic-matter content. These practices also reduce damage from soil blowing on exposed fields that are drained.

This soil is fairly well suited to fruit crops, except for pitted fruits such as cherries and peaches. If adequately drained, fertilized, and irrigated, it is also suitable for pitted fruits. The main limitations are seasonal wetness and low available water capacity. This soil can be drained with tile if suitable outlets are available. Because this soil tends to be droughty late in the growing season, irrigation is needed, especially for fruits that have shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent fertilizing and regularly adding organic materials will help ovecome leaching losses.

Overgrazing is a major concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderate. The erosion hazard and equipment limitations are slight. Seedling mortality is moderate. Seedlings should be planted when this soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a seasonal high water table, rapid permeability of the substratum, and sandy texture. Basements need protection from underground seepage. There is a hazard of pollution of ground water by waste disposal systems in some areas because of the rapid permeability of the substratum. Capability subclass IIIw.

ElB—Elnora loamy fine sand, 2 to 6 percent slopes. This gently sloping, moderately well drained soil formed in glacial lake and remnant beach sediments that are dominantly sand. It occupies slightly convex, undulating areas on lake plains, beaches, sand bars, and deltas. Areas

of this soil are oriented in an east-west direction and are irregular in shape. The areas are mostly 5 to 20 acres in size.

Typically the surface layer is very friable dark grayish brown loamy fine sand 8 inches thick. The subsoil extends to a depth of 29 inches. It consists of very friable, strong brown loamy fine sand in the upper 10 inches and very friable, faintly mottled, brown fine sand in the lower 11 inches. The substratum to a depth of 40 inches, consists of loose, distinctly mottled, grayish brown fine sand. Below that to a depth of 60 inches it is loose, mottled, brown fine sand.

Included with this soil in mapping are small areas of Minoa or Junius soils in depressions or drainageways, better drained Colonie or Oakville soils on higher, drier knolls, and Williamson soils in silty spots. Wet spots, gravel spots, and drainageways are indicated on the soil map by an appropriate conventional sign or symbol. Also included are areas where the surface layer is loamy very fine sand, fine sand, or fine sandy loam.

An apparent seasonal high water table rises into the lower part of the subsoil early in spring or during other wet periods. Where present, coarse fragments range up to 2 percent in the surface layer. Permeability is moderately rapid to rapid in the subsoil and rapid in the substratum. Rooting depth is somewhat limited by the seasonal high water table early in the growing season. The available water capacity is low. Runoff is slow. In areas that are not limed, the surface layer and subsoil are very strongly acid to slightly acid.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, pastured, or in fruit crops.

Without artificial drainage, this soil is fairly well suited to cultivated crops. It is suited to most crops grown in the county except early-market and long-season varieties. It can be productive of certain vegetable crops. Seasonal wetness, a sandy surface layer, erosion hazard, and low available water capacity are the main limitations.

Drainage and irrigation are needed for the best crop response on this soil. Tile drainage generally works well if a suitable outlet is available. Because nutrients are leached rapidly from this soil, lime and fertilizer should be added more frequently and in smaller amounts than for many other soils. If adequately drained and managed, this soil is suitable for most crops grown in the county. It is relatively free of coarse fragments and easily tilled. Water erosion is more of a hazard than on the nearly level Elnora soil. This soil can be used for close-seeded crops such as carrots or beets, and for certain vine crops, such as melons. It is well suited to irrigation. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth, maintain organic-matter content, and reduce the hazard of erosion. These practices also help to reduce damage from soil blowing on exposed fields that are drained.

This soil is fairly well suited to fruit crops, except for pitted fruits such as cherries and peaches. If adequately drained, fertilized, and irrigated it is also suitable for pitted fruits. The main limitations are seasonal wetness, low available water capacity, and susceptibility to water and wind erosion. This soil can be drained with tile if suitable outlets are available. Because this soil tends to be droughty, irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients, including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer and regular additions of organic materials help overcome leaching losses.

The major concern of pasture management of this soil is overgrazing. Overgrazing can cause the reduction or complete loss of desirable pasture plants. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderate. The erosion hazard and equipment limitations are slight. Seedling mortality is moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a seasonal high water table, rapid permeability in the substratum, and sandy texture. Basements need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Pollution of ground water by waste disposal systems is a hazard in some areas because of the rapid permeability of the substratum. Capability subclass IIIw.

FaB—Farmington silt loam, 0 to 8 percent slopes. This nearly level to gently sloping, well drained soil formed in glacial till that is 10 to 20 inches deep over bedrock. It is on bedrock-controlled till plains. Some areas have a stepped appearance. Areas of this soil are oriented in an east-west direction and are irregular or roughly rectangular in shape. The areas are mostly 5 to 20 acres in size.

In a typical profile in an idle field, the surface layer is friable, dark grayish brown silt loam 9 inches thick. The subsoil is friable dark brown silt loam 6 inches thick. Hard limestone bedrock is at a depth of 15 inches.

Included with this soil in mapping are areas of Joliet soils in depressions and spots of Wassaic, Newstead, or Hilton soils that are more than 20 inches deep to bedrock. Wet spots, stony spots, gravel spots, and bedrock outcrops are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is stony or gravelly loam or silt loam.

There is no seasonal high water table in the soil material above the bedrock. Bedrock is at a depth of 10 to 20 inches. Coarse fragments range from 5 to 15 percent in the surface layer and consist mostly of limestone and sandstone gravel. Permeability is moderate in the subsoil. Rooting depth is limited by the bedrock. The available

water capacity is low or very low. Runoff is slow to medium. In areas that are not limed, the surface layer is strongly acid to slightly acid, and the subsoil is medium acid to neutral.

This soil has poor to fair potential for farming. Most of the acreage is cultivated, idle, or pastured.

This soil can be used for some cultivated crops. It is best suited to early, short-season crops and is moderately suited to row crops that can be planted in crop residue in a no-plow system of management. The shallow depth to bedrock, very low or low available water capacity, and susceptibility to erosion are the main limitations. Occasional surface stones, coarse fragments, or included rock outcrops can make the planting and cultivation of fine-seeded crops difficult and cause excessive wear of machinery. The shallow depth to rock limits the rooting depth and the available water capacity. The suitability for high-value crops is improved if the soil is irrigated. Inclusions of rock outcrops, stony areas, or wet spots seriously limit the cultivation of this soil in some areas. Cover crops, return of crop residues into the soil, and minimum tillage reduce the erosion hazard.

This soil is poorly suited to fruit crops. The main limitations are shallow depth to rock, very low to low available water capacity, and susceptibility to erosion.

Because this soil is droughty, irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients including lime, tend to be leached rapidly from this soil. Frequent additions of fertilizer and regular additions of organic materials help overcome leaching losses.

Overgrazing and grazing when the soil is wet are the major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants and usually results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. The erosion hazard is slight, but erosion can be a serious problem along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is severe. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitation is shallow depth to bedrock. Susceptibility to erosion is also a hazard.

Excavation is costly. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible because of erosion. Septic tank filter fields or sanitary sewers should be specially designed. Because much of the bedrock is jointed, there is a hazard of pollution of ground water by waste disposal systems. Some areas have potential for limestone quarries. Capability subcalss IIIs.

Fr—Fredon loam. This nearly level, somewhat poorly drained and poorly drained soil formed in glacio-fluvial deposits and is underlain by sand and gravel. This soil is in moderately low areas on outwash plains, terraces, and remnant beaches. Slope ranges from 0 to 3 percent. Areas of this soil are roughly oblong in shape. They range from 5 to 30 acres in size.

In a typical profile in a cultivated field, the surface layer is friable, very dark grayish brown loam 8 inches thick. The subsoil extends to a depth of 24 inches. In the upper 6 inches it is friable, distinctly mottled, brown loam. In the middle 6 inches it is slightly sticky, distinctly mottled, brown heavy loam. In the lower 4 inches it is slightly sticky, brown sandy loam. The substratum, to a depth of 50 inches, consists of brown stratified sand and gravel.

Included with this soil in mapping are Halsey soils in depressions and drainageways and Phelps or Palmyra soils on small higher benches and knolls. Sand spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is gravelly loam and fine sandy loam.

An apparent prolonged high water table rises into the upper part of the subsoil early in spring or during other wet periods. This soil is occasionally ponded. Coarse fragments range from 5 to 15 percent in the surface layer and are mostly gravel-size sandstone. Permeability is moderate to moderately slow in the subsoil and moderately rapid to rapid in the substratum. Rooting depth is somewhat limited by the seasonal high water table. The available water capacity is moderate. Runoff is slow. In unlimed areas, the surface layer is medium acid to slightly acid and the subsoil is medium acid to neutral.

If drained, this soil has fair potential for farming; without artificial drainage, it has poor potential. Most of the acreage is cultivated or is woodland.

Without artificial drainage, this soil is poorly suited to cultivated crops. If adequately drained, this soil is suited to most crops grown in the county except early-market and long-season varieties. It can be especially productive of certain vegetable crops, such as tomatoes, cabbage, sweet corn, cucumbers, squash, and other vine crops. Prolonged seasonal wetness and occasional ponding are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available. If this soil is adequately drained, row crops can be grown almost continuously. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth, maintain organic-matter content, and maintain or increase crop yields. In some areas land smoothing helps remove excess water. This soil is fairly well suited to irrigation in some years.

Without artificial drainage, this soil is poorly suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits with similar soil requirements. The

main limitations are prolonged seasonal wetness, susceptibility to occasional ponding, and lack of good air drainage. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Drainage of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, using lighter machinery that has wider treads, or using other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are the major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are the prolonged high water table, susceptibility to occasional ponding, and the rapid permeability of the substratum.

Excavation can be costly. Basements need protection from underground seepage. Drainage is needed for most kinds of construction. Septic tank filter fields or municipal sewers should be specially designed. Pollution of the ground water by waste disposal systems can be a hazard. Capability subclass IIIw.

FW—Fresh water marsh. Fresh water marsh consists of level, wet areas that are periodically flooded or are ponded. The water in these areas is at or near the surface most of the year. The water level changes with that of the adjacent open-water areas. Cattails, rushes, and other water-tolerant herbaceous plants make up the dominant vegetation. The soil material consists of mixed organic and mineral deposits, and it varies greatly within short distances (Fig. 8).

The largest areas are near streams that flow into Lake Ontario at Sodus Bay, East Bay, Port Bay, and Blind Sodus Bay. A large area is in southeastern Wayne County in Savannah, and small areas are scattered throughout the county.

Onsite investigation is needed to determine the feasibility of any proposed change in land use. Capability subclass VIIIw.

Ha—Halsey silt loam. This is a nearly level, very poorly drained soil that formed in glacial outwash and remnant beach deposits. It is on low flats and in depressions on outwash plains, beaches, and terraces. Slope ranges from 0 to 3 percent but is mostly less than 2 percent. Areas of this soil are roughly oblong or rectangular in shape. The areas range from 5 to 25 acres in size.

In a typical profile in an idle field, the surface layer is friable, very dark gray silt loam 9 inches thick. The subsurface layer is friable, faintly mottled, grayish brown loam 6 inches thick. The subsoil extends to a depth of 28 inches. It is friable, mottled, olive gray loam in the upper 9 inches and friable, mottled, light olive gray fine sandy loam in the lower 4 inches. The substratum, to a depth of 50 inches, consists of loose, dark gray very gravelly sand and stratified sand and gravel.

Included with this soil in mapping are Fredon or Phelps soils in small slightly higher and drier areas, and Adrian or Palms soils in marshy spots. Marshy spots, gravel spots, drainageways and gravel pits are indicated on the soil map by an appropriate conventional sign or symbol. Also included are areas where the surface layer is mucky.

There is an apparent prolonged high water table at or near the surface during much of the year. This soil is susceptible to ponding. Coarse fragments range from 0 to 10 percent in the surface layer and are mostly gravel-size sandstone. Permeability is moderate to moderately rapid in the subsoil and rapid in the substratum. Rooting depth is limited by the high water table. The available water capacity is moderate. Runoff is very slow or ponded. In unlimed areas, the surface layer and subsoil are medium acid to slightly acid.

If drained, this soil has fair potential for farming; without artificial drainage, its potential is poor. Most of the acreage is idleland, pastureland, or woodland.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, this soil is suited to most crops grown in the county except early-market and long-season varieties. It can be especially productive of certain vegetable crops. Prolonged wetness and susceptibility to ponding are the main limitations.

This soil can be tile drained if suitable outlets are available. Careful design and installation of drainage systems is necessary, and outlets need to be maintained. Response to drainage is excellent. If the soil is adequately drained, row crops can be grown almost continuously. Organic-matter content is initially very high. Management practices, such as minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth, maintain organic-matter content, and maintain or increase crop yields. Irrigation generally is not required.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits with similar soil requirements. The main limitations are prolonged wetness, susceptibility to ponding, and lack of good air drainage.

This soil can be drained with tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Using lighter machinery that has wider treads or other specially designed equipment will help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a prolonged high water table and susceptibility to ponding.

Excavation can be costly. Basements need protection from underground seepage. Most construction sites need to be drained and protected from ponding. Many areas are best used as open-space corridors or for habitat for wetland wildlife. Capability subclass IVw.

Hm—Hamlin silt loam. This nearly level, well drained soil formed in alluvial sediments that are dominantly silt. It is in higher, better drained areas on flood plains. Areas of this soil occur as narrow strips along fairly large streams. The areas range from 5 to 20 acres in size.

In a typical profile in an idle field, the surface layer is friable, very dark grayish brown silt loam 9 inches thick. The subsoil extends to a depth of 40 inches. It is friable, dark grayish brown silt loam in the upper 9 inches and friable, dark brown silt loam in the lower 22 inches. The substratum, to a depth of 48 inches, consists of friable, dark grayish brown silt loam. Below that, it is friable, brown very fine sandy loam to a depth of 64 inches.

Included with this soil in mapping are small areas of Teel or Wayland soils in depressions or in cross-channel drainageways. Wet spots and gravel spots are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam or fine sandy loam.

In spring, a seasonal high water table rises into the upper part of the substratum for very brief periods. Its level is influenced by the water level in the adjacent stream.

This soil is susceptible to flooding. Coarse fragments, mainly gravel, range from 0 to 5 percent in the surface layer. Permeability is moderate in the subsoil and substratum. The available water capacity is high. Runoff is slow. The natural fertility is high. In unlimed areas, the surface layer and subsoil are slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or is used for hay or pasture.

This soil is well suited to cultivated crops. Corn and alfalfa hay do especially well on it. The susceptibility to flooding, accessibility, and inclusions of wetter soils are the main limitations.

When flooding occurs, it is usually in the spring and may delay tillage and planting in some years. Therefore, this soil is not well suited to early-market crops. There is some danger of ice damage, especially to winter wheat and alfalfa.

This soil generally is free of gravel and stones and is easily worked. Small fields, cross channeling caused by flooding, and included wet spots cause limitations in cultivating. Winter cover is needed to protect the soil during flood periods. Streambanks need protection from erosion in some areas. This soil is well suited to irrigation because it is nearly level, has moderate permeability, and has a source of irrigation water nearby.

This soil is fairly well suited to fruit crops. The main limitations are accessibility, susceptibility to flooding, lack of good air drainage, susceptibility to ice damage, and streambank or cross-channel erosion.

Preventing soil compaction is a continuous problem. The crops are often sprayed during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Lime and fertilizer should be applied as needed for best pasture growth.

Timber production on this soil is high. Machine harvesting and planting of trees is difficult in some nearly inaccessible places. Seedling mortality is slight although flooding is a hazard. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitation is susceptibility to flooding.

Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Building construction should be limited. All buildings should be above the flood level and protected from flooding or ice damage. Septic tank filter fields or sewers should be specially designed. Capability class I.

HnA—Hilton gravelly loam, 0 to 3 percent slopes. This nearly level, moderately well drained soil formed in glacial till. It is in slightly convex areas on till plains and drumlins. Areas of this soil are oriented in a north-south direction and are irregular in shape. The areas range from 10 to 100 acres in size.

Typically the surface layer is friable, dark brown gravelly loam 8 inches thick. The subsurface layer is friable, brown gravelly loam 4 inches thick. The subsoil, which is 20 inches thick, is firm, mottled, reddish brown

gravelly loam. The upper 3 inches has leached, thin interfingers of pinkish gray material. The substratum, to a depth of 50 inches, consists of very firm, reddish gray gravelly loam.

Included with this soil in mapping are Appleton soils in depressions and drainageways and Ontario soils on higher, better drained knolls. Included wet spots, sand spots, clay spots, stony spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam, silt loam, and fine sandy loam.

In spring and other excessively wet periods, a temporary seasonal high water table is perched above the substratum. Bedrock is at depth of more than 5 feet. Coarse fragments range from 15 to 25 percent in the surface layer and consist mostly of gravel-size sandstone and limestone. Permeability is moderate in the subsoil and slow in the substratum. Rooting depth is slightly limited by the seasonal high water table early in spring. The available water capacity is moderate. Runoff is slow. In unlimed areas, the surface layer is strongly acid to slightly acid and the subsoil is slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most cultivated crops grown in the county except early-market and long-season varieties. Temporary seasonal wetness and a gravelly surface layer are the main limitations.

Occasional stones or cobblestones and gravel interfere with the use of precision machinery for close-seeded crops and may cause excessive wear of machine parts. Slight wetness briefly delays spring planting in wet years and may cause difficulty in harvesting long-season crops. Random drainage of the wetter included soils is needed to make management of fields more uniform. Standard management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content. This soil is well suited to drainage and irrigation for high-value crops. Because of the slow permeability of the substratum, irrigation water should not be applied rapidly or over a long period.

This soil is fairly well suited to fruit crops, except pitted fruits such as cherries and peaches. The main limitation is the temporary seasonal wetness. Preventing soil compaction is a continuous problem. Because crops are often sprayed during wet periods, the heavy equipment used causes traffic pans to form. Tile drainage, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, slow permeability in the substratum, and gravelly surface texture.

Basements need protection from underground seepage. Septic tank filter fields or sewers should be specially designed. Capability subclass IIw.

HnB—Hilton gravelly loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil formed in glacial till. It is in slightly convex areas on till plains and drumlins. Some areas are undulating. Areas of this soil are oriented in a north-south direction and are irregular or oblong in shape. The areas range from 10 to 100 acres in size.

In a typical profile the surface layer is friable, dark brown gravelly loam 8 inches thick. The subsurface layer is friable, brown gravelly loam 3 inches thick. The subsoil, which is 20 inches thick, is firm, mottled, reddish brown gravelly loam. The upper 3 inches has leached, thin interfingers of pinkish gray material. The substratum, to a depth of 50 inches, consists of very firm, reddish gray gravelly loam.

Included with this soil in mapping are Appleton soils in depressions or drainageways and Ontario soils on higher, better drained knolls. Wet spots, sand spots, clay spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the nongravelly surface layer is loam, silt loam, and fine sandy loam.

There is a temporary seasonal high water table perched above the substratum early in spring or other wet periods. Bedrock is at a depth of more than 5 feet. Coarse fragments range from 15 to 25 percent in the surface layer and consist mostly of gravel-size sandstone and limestone. Permeability is moderate in the subsoil and slow in the substratum. Rooting depth is slightly limited by the seasonal high water table early in the growing season. The available water capacity is moderate. Runoff is medium. In unlimed areas, the surface layer is strongly acid to slightly acid, and the subsoil is slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most crops grown in the county. Temporary seasonal wetness, a gravelly surface layer, and susceptibility to erosion are the main limitations.

Surface stones or gravel cause problems in cultivating some crops and can cause excessive wear of machinery. Planting may be delayed early in spring because of tem-

porary wetness. Tile drainage is often needed to make management of fields more uniform, especially where included wetter soils occur. Keeping cultivation to a minimum, not plowing when wet, crop rotation, disking before plowing, and using crop residue are essential management practices for maintaining good soil tilth and maintaining organic-matter content. Erosion is a problem on long slopes, especially where water concentrates. These areas may need such management practices as contour tillage and stripcropping. If this soil is irrigated, irrigation water should not be applied too rapidly or over too long a period. Cultivation before irrigation is helpful to break up any crust.

This soil is fairly well suited to fruit crops except pitted fruits such as cherries and peaches. The main limitation is temporary seasonal wetness. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. It can result in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. Erosion can be a slight problem in traffic areas. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, slow permeability in the substratum, and gravelly surface texture.

Basements need some sort of protection from underground seepage, such as interceptor drains. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIe.

HnC—Hilton gravelly loam, 8 to 15 percent slopes. This sloping, moderately well drained soil formed in glacial till. It is on the sides of ridges and knolls of moraines and on the sides of drumlins. Some areas are rolling. Areas of this soil are oriented in a north-south direction and in many places are horseshoe shaped or occur as narrow strips. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark brown gravelly loam 8 inches thick. The subsurface layer is friable, brown gravelly loam 2 inches thick. The subsoil, which is 18 inches thick, is firm, mottled, reddish brown gravelly loam. The upper 3 inches has leached, thin interfingers of pinkish gray material. The substratum, to a depth of 50 inches, consists of very firm reddish gray gravelly loam.

Included with this soil in mapping are small, higher areas of better drained Ontario and Madrid soils. Wet spots, stony spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam or fine sandy loam.

There is a temporary seasonal high water table perched above the substratum early in spring or other wet periods. Bedrock is at a depth of more than 5 feet. Coarse fragments range from 15 to 25 percent in the surface layer and consist mostly of gravel-size sandstone and limestone. Permeability is moderate in the subsoil and slow in the substratum. Rooting depth is slightly limited by the seasonal high water table early in the growing season. The available water capacity is moderate. Runoff is moderately rapid. In unlimed areas, the surface layer is strongly acid to slightly acid and the subsoil is slightly acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated or is used for pasture or fruit crops or is idle.

This soil is fairly well suited to cultivated crops. Temporary seasonal wetness, susceptibility to erosion, and a gravelly surface layer are the main limitations.

Cultivation may have to be delayed early in spring because of temporary wetness, wet spots, and springs. Tile drainage and diversions may be needed for a more uniform management of fields. Some places need interceptor drains to divert runoff from higher adjacent areas. Erosion-control measures are needed to prevent the loss of soil, water, and nutrients. Contour tillage, stripcropping, minimum tillage, use of cover crops, good fertilization, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotations that include sod crops are management practices that reduce runoff and control erosion in cultivated areas. Because of slope and occasional stones and gravel, the use of precision farm machinery is somewhat difficult. Irrigation of specialized crops is either reduced or not practical because of slope.

This soil is fairly well suited to fruit crops, except pitted fruits such as cherries and peaches. The main limitations are temporary seasonal wetness and susceptibility to erosion. Trees should be planted and traffic lanes should be across slope to prevent serious erosion. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes the formation of traffic pans. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable

pasture plants. It can result in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion can be serious in traffic areas. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting will improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are a seasonal high water table, slope, susceptibility to erosion, and slow permeability in the substratum.

Basements need protection from underground seepage. Interceptor drains are beneficial in some areas. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of sediment control such as the use of sediment basins. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIIe.

HoA—Hilton gravelly loam, bedrock substratum, 0 to 3 percent slopes. This nearly level, moderately well drained soil formed in glacial till that is 40 to 60 inches deep to bedrock. It is in slightly convex areas on till plains. Areas of this soil are oriented in a east-west direction and are irregular or rectangular in shape. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark brown gravelly loam 8 inches thick. The subsurface layer is friable, reddish brown gravelly loam 4 inches thick. The subsoil, which is 20 inches thick, is firm, mottled, reddish brown gravelly loam. The upper 3 inches has leached, thin interfingers of pinkish gray material. The substratum, extending to a depth of 50 inches, consists of very firm, reddish gray gravelly loam. Underlying the substratum is bedrock.

Included with this soil in mapping are Appleton and Newstead soils in small depressions and Ontario soils and moderately deep Wassaic soils on higher, better drained knolls. Wet spots, sand spots, stony spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the nongravelly surface layer is loam, silt loam, and fine sandy loam.

There is a temporary seasonal high water table perched above the substratum early in spring or during other wet periods. Bedrock is at a depth of 40 to 60 inches. Coarse fragments range from 15 to 25 percent in the surface layer and consist mostly of gravel-size sandstone and limestone. Permeability is moderate in the subsoil and slow in the substratum. Rooting depth is slightly limited by the temporary seasonal high water table early in the growing season. The available water capacity is moderate. Runoff is slow. In unlimed areas, the surface layer is strongly acid to slightly acid and the subsoil is slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to most crops grown in the county except early-market and long-season varieties. Row crops can be grown yearly under good management. Temporary seasonal wetness and the gravelly surface layer are the main limitations. Gravel and, in places, surface stones or cobblestones interfere with the use of precision machinery for close-seeded crops and can cause excessive wear of machine parts. Slight wetness briefly delays spring planting in some years and may cause difficulty in harvesting long-season crops. Random drainage of the wetter included soils is needed for a more uniform management of fields. Tile drainage generally works well in this soil. Included moderately deep soils interfere with drainage. Good management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content. This soil is well suited to tile drains and to irrigation for high-value crops. Because of the slow permeability of the subsoil, irrigation water should not be applied rapidly or over a long period.

This soil is fairly well suited to fruit crops, except pitted fruits such as cherries and peaches. The main limitations are temporary seasonal wetness and depth to rock.

Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. If the pasture is grazed when wet, compaction occurs, growth is restricted, and can cause the reduction or loss of desirable pasture plants. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. Erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are depth to bedrock, a temporary seasonal high water table, slow permeability in the substratum, and a gravelly surface layer.

Deep excavation is costly. Basements need protection from underground seepage. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIw.

HoB—Hilton gravelly loam, bedrock substratum, 3 to 8 percent slopes. This gently sloping, moderately well drained soil formed in glacial till that is 40 to 60 inches deep to bedrock. It is in slightly convex areas on till plains. Areas of this soil are oriented in an east-west direction and are irregular or rectangular in shape. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable dark brown gravelly loam 8 inches thick. The subsurface layer is friable brown gravelly loam 3 inches thick. The subsoil, which is 20 inches thick, is firm, mottled, reddish brown gravelly loam. The upper 3 inches has thin, leached coatings of pinkish gray material. The substratum consists of very firm, reddish gray gravelly loam. Bedrock is at a depth of 50 inches.

Included with this soil in mapping are areas of Appleton and Newstead soils in depressions or drainageways, and Ontario soils and moderately deep Wassaic soils on higher, better drained knolls or benches. Wet spots, sand spots, stony spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the nongravelly surface layer is loam, silt loam, or fine sandy loam.

There is a temporary seasonal high water table perched above the substratum early in spring or during other wet periods. Bedrock is at a depth of 40 to 60 inches. Coarse fragments range from 15 to 25 percent in the surface layer and consist mostly of gravel-size sandstone and limestone. Permeability is moderate in the subsoil and slow in the substratum. Rooting depth is slightly limited by the temporary seasonal high water table early in the growing season. The available water capacity is moderate. Runoff is medium. In unlimed areas, the surface layer is strongly acid to slightly acid, and the subsoil is slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is suitable for most crops grown in the county except early-market and long-season varieties. Temporary seasonal wetness, a gravelly surface layer, and susceptibility to erosion are the main limitations.

Planting may have to be delayed early in spring because of wetness. Because of included wetter soils, tile drainage generally is needed for a more uniform management of fields. Included moderately deep soils however, can make drainage difficult. Occasional surface stones and gravel interfere with precision machinery and cause excessive wear of equipment. Erosion is a hazard, especially on long slopes where water concentrates. In most places, contour tillage, stripcropping, and grassed waterways can control erosion. Keeping cultivation to a minimum, not plowing when wet, disking before plowing, and returning crop residue to the soil are management practices that help maintain good soil tilth and organic-matter content and minimize the erosion hazard. In irrigated areas, water should not be applied too rapidly or over too long a period. Cultivation before irrigation is helpful to break up any crust.

This soil is fairly well suited to fruit crops except pitted fruits such as cherries and peaches. The main limitations are temporary seasonal wetness, depth to rock, and susceptibility to erosion.

Drainage by tile is usually very expensive because of included soils that are moderately deep to bedrock. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes the formation of traffic pans. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. If the pasture is grazed when wet, compaction occurs, growth is restricted, and there may be a reduction or loss of desirable pasture plants. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion can occur in traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is slight. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for some urban uses. The main limitations are depth to bedrock, a temporary seasonal high water table, slow permeability in the substratum, and gravelly surface texture.

Deep excavation is costly. Basements need some protection from underground seepage, such as interceptor drains. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIe.

IrA—Ira gravelly fine sandy loam, 0 to 3 percent slopes. This nearly level, moderately well drained soil has a fragipan and formed in glacial till. It is in slightly convex, nearly flat areas on till plains and drumlins. Areas of this soil are oriented in a north-south direction and are irregular or roughly oblong in shape. The areas range from 10 to 50 acres in size.

Typically the surface layer is friable, dark grayish brown gravelly fine sandy loam 6 inches thick. The upper part of the subsoil is friable, yellowish red and brown gravelly fine sandy loam 14 inches thick. Next is a 3-inch-thick leached layer of firm, mottled, light brownish gray gravelly fine sandy loam. The lower part of the subsoil, 23 inches thick, is a fragipan of mottled, very firm, yellowish red gravelly loam. The substratum, to a depth of 50 inches, consists of firm, reddish gray gravelly fine sandy loam.

Included with this soil in mapping are small areas of better drained Sodus soils in slightly higher positions and wetter Wallington soils in some low spots. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the soil map by an appropriate conventional

sign or symbol. A soil that has a nongravelly surface layer is also included.

A seasonal high water table is perched above the fragipan early in spring and during other wet periods. A fragipan occurs at a depth of 18 to 26 inches. Coarse fragments range from 15 to 35 percent in the surface layer and consist mostly of reddish sandstone gravel. Permeability is moderate in the upper part of the subsoil and slow in the fragipan in the lower part of the subsoil and in the substratum. Rooting depth is limited by the seasonal high water table and the fragipan. The available water capacity is moderate to low. Runoff is slow. In unlimed areas, the surface layer is very strongly acid to strongly acid, and the upper part of the subsoil is strongly acid to medium acid.

This soil has fair potential for farming. Most of the acreage is cultivated or is used for pasture or fruit crops or as woodland.

This soil is fairly well suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except early-market and long-season varieties. Temporary seasonal wetness, moderate depth to the fragipan, a gravelly surface layer, and moderate to low available water capacity are the main limitations.

Row crops can be grown year after year under good management. Temporary wetness briefly delays spring planting in some years and may cause difficulty in harvesting long-season crops. Random drainage of the wetter included soils is needed for more uniform management of fields. Because of the fragipan, tile drainage generally does not function at optimum efficiency in this soil. Occasional surface stones and gravel make planting and cultivation of small seeded crops difficult and can cause excessive wear of machinery. Good management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content. Irrigation can be used to reduce the hazard of droughtiness. Because of the slow permeability of the subsoil, irrigation water should not be applied rapidly or over a long period.

This soil is moderately well suited to poorly suited to fruit crops. The fragipan limits the rooting depth. The main limitations are the seasonal high water table, moderate depth to the fragipan, and moderate to low available water capacity. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes the formation of potholes and traffic pans. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem. Irrigation may be needed during extended dry periods.

Overgrazing and grazing when the pasture is wet are major concerns of pasture management on this soil. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Erosion hazard, equipment limitations, and seedling mortality are slight. Brush removal and careful planting improve seedling survival and growth.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, slow permeability in the fragipan and substratum, and a gravelly surface layer.

Basements need protection from underground seepage. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIw.

IrB—Ira gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil has a fragipan and formed in glacial till. It is in slightly convex areas on till plains and drumlins. Some areas are undulating. Areas of this soil are oriented in a north-south direction and are irregular or roughly oblong in shape. The areas range from 10 to 50 acres in size.

In a typical profile the surface layer is friable, dark grayish brown gravelly fine sandy loam 5 inches thick. In the upper part, the subsoil is friable, yellowish red and brown gravelly fine sandy loam 13 inches thick. Below that is a leached layer of firm, mottled, light brownish gray gravelly fine sandy loam 3 inches thick. In the lower part, the subsoil is a fragipan of mottled, very firm, yellowish red gravelly loam 23 inches thick. The substratum, to a depth of 50 inches, consists of firm, reddish gray gravelly fine sandy loam.

Included with this soil in mapping are better drained Sodus soils on high spots and wetter Wallington soils in drainageways or depressions. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the soil map by the appropriate conventional sign or symbol. A soil that has a nongravelly surface layer is also included.

A seasonal high water table is perched above the fragipan early in spring and during other wet periods. There is a fragipan at a depth of 18 to 26 inches. Coarse fragments range from 15 to 35 percent in the surface layer and consist mostly of reddish sandstone gravel. Permeability is moderate in the upper part of the subsoil and slow in the fragipan in the lower part of the subsoil and in the substratum. Rooting depth is limited by the seasonal high water table and the dense fragipan. The available water capacity is moderate to low. Runoff is medium. In unlimed areas, the upper part of the subsoil is strongly acid to medium acid.

This soil has fair potential for farming. Most of the acreage is cultivated or is used for pasture or fruit crops or as woodland.

This soil is fairly well suited to cultivated crops except early-market and long-season varieties. Seasonal wetness, the moderate depth to the fragipan, the gravelly surface layer, the moderate to low available water capacity, and susceptibility to erosion are the main limitations.

Planting may have to be delayed early in spring because of wetness. Because of included wetter soils, drainage is needed for a more uniform management of fields. Occasional surface stones and gravel make planting and cultivation of small-seeded crops somewhat difficult and can cause excessive wear of machinery. Keeping cultivation to a minimum, not plowing when wet, disking before plowing, and using crop residue are essential management practices if row crops are grown intensively. Long slopes are common and erosion is a hazard, especially where water concentrates. In most places, cross-slope tillage, contour stripcropping, and grassed waterways can control erosion. In irrigated areas, water should not be applied too rapidly or over too long a period. Cultivation before irrigation helps to break up any crust.

This soil is moderately well suited to poorly suited to fruit crops. The fragipan limits rooting depth. The main limitations are a seasonal high water table, moderate depth to fragipan, and moderate to low available water capacity. Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem. Irrigation is needed during extended dry periods.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Erosion hazard, equipment limitations, and seedling mortality are slight. Brush removal and careful planting improve seedling survival and growth.

This soil has serious limitations for some urban uses. The main limitations are a temporary seasonal high water table, susceptibility to erosion, slow permeability of the fragipan and substratum, and a gravelly surface layer.

Basements need protection from underground seepage. Interceptor drains are needed in some areas to divert subsurface seepage. Septic tank filter fields or sanitary sewers should be specially designed. Capability subclass IIe.

IrC—Ira gravelly fine sandy loam, 8 to 15 percent slopes. This sloping, moderately well drained soil has a fragipan and formed in glacial till. It occupies sloping areas on till plains and drumlins that commonly receive some runoff. Areas of this soil are oriented in a north-south direction and are irregular or roughly oblong in shape. The areas range from 5 to 20 acres in size.

Typically the surface layer is friable, dark grayish brown gravelly fine sandy loam 5 inches thick. The upper part of the subsoil is friable, yellowish red and brown gravelly fine sandy loam 12 inches thick. Below that is a 3-inch thick leached layer of firm, mottled, light brownish gray gravelly fine sandy loam. The lower part of the subsoil is a fragipan that is mottled, very firm, yellowish red gravelly loam 20 inches thick. The substratum, to a depth of 50 inches, consists of firm, reddish gray gravelly fine sandy loam.

Included with this soil in mapping are Sodus soils on high spots, areas of less sloping Ira soils, and Massena soils in drainageways or depressions. Sand spots, stony spots, drainageways, and springs are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly.

There is a perched seasonal high water table above the fragipan early in spring and during other wet periods. A fragipan is at a depth of 18 to 26 inches. Coarse fragments range from 15 to 35 percent in the surface layer and consist mostly of reddish sandstone gravel. Permeability is moderate in the upper part of the subsoil and slow in the fragipan and substratum. Rooting depth is limited by the seasonal high water table and the dense fragipan. The available water capacity is moderate to low. Runoff is medium. In unlimed areas, the surface layer is very strongly acid to strongly acid, and the upper part of the subsoil is strongly acid to medium acid.

This soil has fair to poor potential for farming. With adequate erosion control, it is suitable for most crops grown in the county except early-market and long-season varieties. Most of the acreage is cultivated or is used for pasture or fruit crops, or as woodland.

This soil is moderately suited to poorly suited to cultivated crops. The seasonal high water table, moderate depth to fragipan, gravelly surface layer, moderate to low available water capacity, and susceptibility to erosion are the main limitations.

Planting may have to be delayed early in spring because of wetness, wet spots, and springs. Drainage of included wet spots may be needed for more uniform management of fields. Interceptor drains are needed in many places to divert runoff and subsurface seepage from higher adjacent areas.

Erosion control measures are needed to prevent the loss of soil, water, and nutrients. Contour tillage, stripcropping, minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and cropping systems that include sod crops are management practices that promote good soil tilth and improve organic-matter content. Occasional surface stones and gravel make planting and cultivation of small-seeded crops somewhat difficult and can cause excessive wear of machinery.

Because of slope, the use of precision farm machinery is difficult in places, and the use of irrigation for specialized crops is either reduced or not practical.

This soil is moderately well suited to poorly suited to fruit crops. The fragipan limits rooting depth. The main limitations are seasonal high water table, moderate depth to fragipan, medium to low available water capacity, and susceptibility to erosion.

Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes the formation of potholes and traffic pans. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads, or other specially designed equipment can help prevent this problem. Reduced yields or crop failures are possible during dry years. Planting across slope and using a sod cover between rows reduce the erosion hazard.

Overgrazing and grazing when wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It usually results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight except in cutover areas and along logging roads. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Brush removal and careful planting improve seedling survival and growth.

This soil has serious limitations for some urban uses. The main limitations are a temporary seasonal high water table, susceptibility to erosion, slow permeability of the fragipan and substratum, gravelly surface texture, and slope.

Interceptor drains are often needed around basements. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need such sediment control measures as sediment basins. Septic tank filter fields should be specially designed. Capability subclass IIIe.

Jo—Joliet loam. This nearly level, poorly drained soil formed in glacial till deposits that are 10 to 20 inches thick over limestone bedrock. It is in low, nearly flat areas on bedrock-controlled till plains. Slope ranges from 0 to 3 percent. Areas of this soil are oriented in an east-west direction and are irregular or roughly rectangular in shape. The areas are mostly 5 to 10 acres in size.

In a typical profile the surface layer is friable, very dark brown loam 5 inches thick. The subsoil consists of friable, mottled, dark gray loam 6 inches thick. The bedrock, at a depth of 11 inches, consists of gray, calcareous, dolomitic limestone.

Included with this soil in mapping are Farmington soils on higher and drier spots. A similar soil, but more acid and containing more coarse fragments, is a common inclusion in a few areas. Spots of deeper Wassaic or Newstead soils are also included in some areas. Included stony spots or marshy spots are indicated on the soil map by the appropriate conventional sign or symbol. Areas of soils that have a mucky surface layer or Chippeny soils are included in depressions.

There is a perched prolonged high water table at or near the surface in spring or during other wet periods. Bedrock is at a depth of 10 to 20 inches. This soil is susceptible to ponding. Coarse fragments range from 0 to 15 percent in the surface layer and consist mostly of glacial erratics of limestone and sandstone. Permeability is moderate in the subsoil. Rooting depth is limited by the high water table and bedrock. The available water capacity is low to very low. Runoff is slow. In unlimed areas, the surface layer is slightly acid to neutral, and the subsoil is slightly acid to moderately alkaline.

This soil has poor potential for farming. Most of the acreage is idle land or pasture.

This soil is poorly suited to cultivated crops. Prolonged seasonal wetness, shallow depth to bedrock, and susceptibility to ponding seriously limit the use of this soil.

Wetness and shallow depth to rock limit this soil to short-season, water-tolerant plants. Drainage is needed, but it is difficult and expensive to install because of the shallow depth to rock. Some surface drainage can be established if suitable outlets are available. This soil generally receives runoff or seepage water from surrounding soils at higher elevations. Interceptor drains are needed to divert this runoff in some areas.

This soil is not suited to fruit crops. The main limitations are prolonged high water table, shallow depth to rock, susceptibility to ponding, and a lack of good air drainage.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are moderate. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe. Brush removal, careful planting, and surface drainage improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a shallow depth to bedrock, a prolonged seasonal high water table, and susceptibility to ponding.

Excavation is costly. If possible, this soil should be left in open space or used for extensive type recreation. Some areas have potential for wetland wildlife habitat. Capability subclass IVw.

Ju—Junius loamy very fine sand. This nearly level, somewhat poorly drained and poorly drained soil formed in sandy glacial lake sediment. It is in nearly flat areas on lake plains and sand bars. Slope ranges from 0 to 3 percent. Areas of this soil are oriented in a north-south

direction and are roughly oblong or rectangular in shape. The areas range from 5 to 50 acres in size.

In a typical profile the surface layer is very friable, dark gray loamy very fine sand 10 inches thick. The subsoil is 26 inches thick. In the upper part it is very friable, mottled, grayish brown loamy fine sand. In the middle part it is very friable, mottled, yellowish brown loamy fine sand. In the lower part it is very friable, brown fine sand. The substratum, to a depth of 50 inches, consists of very friable, dark grayish brown fine sand.

Included with this soil in mapping are Elnora soils in slightly higher, better drained areas and wetter Lamson soils in low spots and depressions. Gravel spots and drainageways are indicated on the soil map by an appropriate conventional sign or symbol.

There is an apparent seasonal high water table in the upper part of the subsoil early in spring or during other wet periods. Permeability is rapid in the subsoil and substratum. Rooting depth is limited by the seasonal high water table. The available water capacity is low to very low. Runoff is slow. In unlimed areas, the surface layer is medium acid to neutral and the subsoil is slightly acid to mildly alkaline.

If drained, this soil has fair potential for farming; without artificial drainage, its potential is poor. Most of the acreage is cultivated or is pasture or woodland.

Without artificial drainage, this soil is poorly suited to cultivated crops. If adequately drained, it is well suited to most crops grown in the county except early-market and long-season varieties. It can be especially productive of certain vegetable crops. The seasonal wetness and very low or low available water capacity are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available. Careful design and installation are necessary. If the soil is adequately drained, row crops can be grown almost continuously. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content. In some areas, land smoothing helps eliminate the wetter low spots. The response to fertilizer is excellent in drained areas, and frequent applications are desirable.

If adequately drained and managed, this soil can be very productive of certain vegetable crops such as tomatoes, cabbage, sweet corn, cucumbers, squash, and other vine crops. It is well suited to irrigation for high-value crops.

Without artificial drainage, this soil is poorly suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruit trees with similar soil requirements. The main limitations are a seasonal high water table, lack of good air drainage, and very low or low available water capacity. Because this soil tends to be droughty in late summer, irrigation is needed, especially for fruit crops that have shallow root systems. Nutrients, including lime, tend to be rapidly leached from this soil. Frequent additions of fertilizer and regular additions of organic materials can increase yields.

Overgrazing and grazing when the pasture is wet are major concerns of pasture management on this soil. If the pasture is grazed when wet, compaction occurs, growth is restricted, and a loss of pasture plants may result. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are moderate. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a prolonged seasonal high water table, rapid permeability of the subsoil and substratum, and sandy texture.

Drainage is needed for most kinds of urban use. Basements need to be protected from underground seepage. Septic tank filter fields should be specially designed. Frequent additions of fertilizer help to maintain grass and shrubs. Capability subclass IIIw.

LdB—Lairdsville and Riga silty clay loams, 2 to 6 percent slopes. These gently sloping, well drained to moderately well drained soils formed in glacial till that is 20 to 40 inches deep to shale bedrock. The soils are similar except for color. The Lairdsville soils are reddish and the Riga soils are gray or olive. Either or both of these soils can occur in a given area. They are in slightly convex, sloping areas on till plains controlled by shale bedrock. Areas of this undifferentiated group are oriented in an east-west direction and are roughly rectangular in shape. The areas are mostly 10 to 50 acres in size.

In a typical profile of the Lairdsville soil, the surface layer is friable, dark brown silty clay loam 8 inches thick. The subsoil is 18 inches thick. In the upper part it is firm, reddish brown silty clay loam 4 inches thick. In the lower part it is firm, dark reddish brown silty clay 14 inches thick. The substratum, to a depth of 32 inches, consists of very firm, dark reddish brown shaly silty clay. Slightly weathered dusky red shale bedrock is at a depth of 32 inches.

Typically, the surface layer of the Riga soil is friable, dark grayish brown silty clay loam 8 inches thick. The subsoil is 22 inches thick. In the upper part it is firm, light olive brown silty clay 9 inches thick. In the lower part it is firm, mottled, pale olive silty clay 13 inches thick. Olive, slightly weathered shale bedrock is at a depth of 30 inches.

Included with these soils in mapping are areas of wetter Lockport and Brockport soils in depressions and drainageways. Wet spots, sand spots, stony spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is silt loam, loam, and clay loam.

In both Lairdsville and Riga soils, a seasonal high water table is commonly perched above the bedrock or substratum for brief periods in spring. Coarse fragments range from 2 to 15 percent in the surface layer and consist mostly of sandstone and shale fragments. Permeability is very slow in the subsoil and substratum of both soils. Rooting depth is limited by the bedrock. The available water capacity is moderate to low. Runoff is medium. In unlimed areas of both soils, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

The soils in this undifferentiated group have good to fair potential for farming, depending upon the depth to bedrock. Most of the acreage is cultivated or pastured.

These soils are fairly well suited to cultivated crops except early-market and long-season varieties. Temporary seasonal wetness, moderate depth to bedrock, fine textured subsoil, medium to low available water capacity, and susceptibility to erosion are the main limitations.

The fine textured subsoil and the underlying shale bedrock restrict the movement of water through the soils and cause them to be slightly wet, briefly delaying planting in spring. Because of the moderately fine textured surface layer, tilth is hard to maintain and these soils tend to crust and form hard clods when cultivated. Fall plowing, cultivating at a proper moisture level, and using a deep-rooted sod crop in the cropping system can help prevent this condition. Maintaining organic-matter content improves the tilth, structure, and workability of these soils. Erosion is a hazard, especially where slopes are long and frequently cultivated. Maintaining winter cover crops, cross-slope tillage, returning crop residues to the soil, using sod crops in the cropping system, and keeping tillage to a minimum generally can control erosion. Irrigation of these soils is difficult because they crust and puddle and their slow permeability results in increased runoff and erosion.

These soils are fairly well suited to poorly suited to fruit crops. The main limitations are temporary seasonal wetness, moderate depth to rock, moderate to low available water capacity, and susceptibility to erosion.

Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem. Late-season droughtiness is a problem in some years.

Overgrazing and grazing when wet are major concerns of pasture management on these soils. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It generally results in the loss of soil by erosion. Grazing when the soil is wet can be a particular problem on these soils. Compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on these soils is moderately high. Erosion can be a problem along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

These soils have serious limitations for many urban uses. The main limitations are a moderate depth to bedrock, brief seasonal high water table, susceptibility to erosion, and very slow permeability in the subsoil and substratum.

Underground excavations can be costly because of the bedrock. Basements need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Septic tank filter fields may function poorly because of the fine textured, very slowly permeable subsoil and substratum. Capability subclass IIe.

LdC3—Lairdsville and Riga silty clay loams, 6 to 20 percent slopes, severely eroded. These sloping to moderately steep, well drained to moderately well drained soils formed in glacial till that is 20 to 40 inches deep over shale bedrock. The soils are similar except for color. The Lairdsville soils are reddish, and the Riga soils are gray or olive. Either or both of these soils may occur within a given area. This undifferentiated group is on slightly convex areas of till plains controlled by bedrock. Gullies and rills dissect many areas because of past erosion. Areas of these soils are irregular in shape and in many places occur near the base of drumlins or lateral moraines. The areas are mostly 5 to 25 acres in size.

Typically the surface layer of Lairdsville soil is friable dark brown silty clay loam 6 inches thick. The subsoil is 16 inches thick. In the upper part it is firm, reddish brown silty clay loam 2 inches thick. In the lower part it is firm, dark reddish brown silty clay about 14 inches thick. The substratum, to a depth of 28 inches, consists of very firm, dark reddish brown shaly silty clay about 6 inches thick. Slightly weathered dusky red shale bedrock is at a depth of 28 inches.

A typical profile of Riga soil has a surface layer of friable, dark grayish brown silty clay loam 6 inches thick. The subsoil is 20 inches thick. In the upper part it is firm, light olive brown silty clay 7 inches thick. In the lower part it is firm, mottled, pale olive silty clay 13 inches thick. Olive, slightly weathered shale bedrock is at a depth of 26 inches.

Included with these severely eroded soils in mapping are areas that are noneroded and eroded. Somewhat poorly drained Lockport and Brockport soils are included in depressions and drainageways. Wet spots, sand spots, stony spots, gravel spots, drainageways, and springs are indicated on the soil map by the appropriate conventional sign or symbol. Included are areas where the surface layer is of silt loam, silty clay, and clay loam.

In both Lairdsville and Riga soils, a brief seasonal high water table is perched above the substratum on bedrock early in spring. Past erosion has removed much of the original surface layer, and many areas are dissected by shallow rills and gullies.

Bedrock is at a depth of 20 to 40 inches. Coarse fragments range from 2 to 15 percent in the surface layer and are mostly sandstone and shale fragments. Permeability is very slow in the subsoil and substratum of both soils. Rooting depth is limited by the bedrock and the heavy textured subsoil. The available water capacity is moderate to low. Runoff is medium to rapid. In unlimed areas of this undifferentiated group, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

The soils in this undifferentiated group have poor potential for farming. Most of the acreage is idle or pastured, and few areas are still cultivated.

These soils are poorly suited to cultivated crops. They have been severely eroded and are very susceptible to further erosion. The moderate depth to bedrock, fine textured subsoil, medium to low available water capacity, susceptibility to serious erosion, and moderately steep slopes in some areas are the main limitations.

Erosion and slope limit the use of these soils for crops. The soils are very erodible, and machinery may be difficult to operate because of the rills and gullies. If cultivation is possible, the cropping system needs to include several years of sod crops. Row crops can be grown more frequently if they are planted directly in a minimum tillage or a no-plow system of management. These soils need protective cover all year. They should be cultivated in narrow strips across the general slope. Building up organic-matter levels is important for improving tilth and reducing the hazard of clodding and crusting.

These soils are poorly suited to fruit crops. The main limitations are moderate depth to rock, moderate to low available water capacity, susceptibility to erosion, and moderately steep slopes in some areas.

Prevention of soil compaction, operation of spray and other equipment, and erosion are continuous problems. Because the crops are often sprayed during wet periods, the heavy equipment used causes traffic pans to form and creates a serious erosion hazard. Draining wet spots, maintaining good sod cover, keeping traffic lanes across the slope, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent these problems.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on these soils. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It generally results in loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on these soils is moderately high. The erosion hazard is moderate. Erosion can be a very serious problem along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are slight to moderate. Slope interferes with machine harvesting and planting of trees. Seedling mortality is slight to moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

These soils have serious limitations for most urban uses. The main limitations are a moderate depth to bedrock, some moderately steep slopes, susceptibility to erosion, very slow permeability in the subsoil and substratum, and brief seasonal wetness.

Underground excavations can be costly because of the bedrock. Basements need protection from underground seepage. Construction costs are high, and maintenance of roads is difficult. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Large construction sites need some form of sediment contol, such as sediment basins. In many places septic tank filter fields function poorly because of the dense, fine texture subsoil and substratum. Capability subclass IVe.

LEE—Lairdsville and Riga silty clay loams, hilly. These moderately steep and steep, well drained to moderately well drained soils formed in glacial till that is 20 to 40 inches deep over shale bedrock. The soils are similar except for color. The Lairdsville soils are reddish, and the Riga soils are gray or olive. Either or both of these soils may occur within a given area. They generally are associated with drumlins or lateral moraines. Slope ranges from 20 to 40 percent. Areas of these soils occur as low complex sloping hills or as narrow strips on the sides of drumlins and lateral moraines. The areas are mostly 5 to 10 acres in size.

Typically the surface layer of Lairdsville soil is friable, dark brown silty clay loam 6 inches thick. The subsoil is 16 inches thick. The upper part is firm, reddish brown silty clay loam 3 inches thick. The lower part is firm, dark reddish brown silty clay 13 inches thick. The substratum, to a depth of 28 inches, consists of very firm, dark reddish brown shaly silty clay 6 inches thick. Slightly weathered dusky red shale bedrock is at a depth of 28 inches.

Typically the surface layer of Riga soil is friable, dark grayish brown silty clay loam 6 inches thick. The subsoil is 20 inches thick. The upper part is firm, light olive brown silty clay 7 inches thick. The lower part is firm, mottled, pale olive silty clay 13 inches thick. Olive, slightly weathered shale bedrock is at a depth of 26 inches.

Included with these soils in mapping are many areas of severely eroded and eroded soils and a few areas that are steep or very steep. Included wet spots, sand spots, shale rock outcrops, gravel spots, drainageways, and springs are indicated on the soil map by the appropriate conven-

tional sign or symbol. Also included are areas where the surface layer is silt loam, silty clay, and clay loam.

Free water commonly seeps across the top of the substratum or bedrock very early in spring in both soils. Bedrock is at a depth of 20 to 40 inches. Coarse fragments range from 2 to 15 percent in the surface layer and consist mostly of sandstone and shale fragments. In both soils, permeability is very slow in the subsoil and substratum. Rooting depth is limited by the bedrock. The available water capacity is moderate to low. Runoff is very rapid. In unlimed areas, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

The soils of this undifferentiated group have poor potential for farming. Most of the acreage is idle land, pasture, or woodland.

These soils generally are not suited to cultivated crops. The moderate depth to bedrock, susceptibility to erosion, and moderately steep and steep slopes are the main limitations. Where moderately steep slopes are dominant, cultivated crops can be grown infrequently in cropping systems that consist mainly of sod crops. Tillage should be held to a minimum and done in narrow strips across the slope.

These soils are not suited to fruit crops. The main limitations are moderate depth to rock, susceptibility to erosion, and moderately steep to steep slopes.

Overgrazing and grazing when the pasture is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. It generally results in the loss of soil by erosion. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants can occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Applying lime and fertilizer and reseeding are difficult because of steepness of slope.

Timber production on these soils is moderately high. The erosion hazard is severe. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope interferes with machine harvesting and the planting of trees. Seedling mortality is moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

These soils have very serious limitations for most urban uses. The main limitations are a moderate depth to bedrock, steepness of slope, susceptibility to erosion, and very slow permeability in the subsoil and substratum.

Excavation is difficult because of the bedrock. All construction is much more difficult than on the less sloping Lairdsville and Riga soils. Streets or roads are difficult to maintain. Removal of vegetation should be held to a minimum, and plant cover should be established as quickly as possible. Some areas may best be used as habitat for wildlife. Capability subclass VIe.

Lk—Lakemont silty clay loam, shale bedrock substratum. This nearly level, poorly drained and very poorly drained soil formed in clayey and silty glacial lake sediments, which overlie shale bedrock at depths of 40 to 72 inches. It is on flats and in depressions of bedrock-controlled lake plains. Slope ranges from 0 to 3 percent. Areas of this soil are oriented in an east-west direction and are irregular in shape. Individual areas mainly range from 10 to 50 acres in size.

In a typical profile the surface layer is friable, very dark gray silty clay loam 9 inches thick. The subsurface layer is firm, mottled, dark gray silty clay loam 5 inches thick. The subsoil, which extends to a depth of 28 inches, is firm, mottled, reddish gray silty clay. The substratum, extending to 42 inches, is very firm, gray and reddish brown silty clay. Interbedded dusky red and greenish gray shale bedrock is at a depth of 42 inches.

Included with this soil in mapping are a few areas of slightly better drained Lockport and Brockport soils at a higher elevation. Marshy spots are indicated by the appropriate conventional sign or symbol. Areas of a similar soil that has a mucky surface layer are also included.

An apparent prolonged high water table is at or near the surface in spring or during other wet periods. Bedrock is at a depth of 40 to 72 inches. This soil is susceptible to occasional ponding. In most places, there are no coarse fragments but they range from 0 to 2 percent in the surface layer. Permeability is very slow in the subsoil and substratum. Rooting depth is limited by the prolonged high water table. Available water capacity is high and runoff is very slow to ponded. In unlimed areas, the surface layer is slightly acid to neutral and the subsoil is slightly acid to mildly alkaline.

This soil has poor potential for farming because of wetness. If adequately drained, it is suitable for some crops grown in the county. Most of the acreage is idle land, pasture, or woodland.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to limited cultivation. Prolonged seasonal wetness, susceptibility to ponding, a clayey subsoil, and the moderately fine textured surface layer are the main limitations.

Because of the fine textured subsoil, very slow permeability, and an occasional lack of suitable outlets, this soil is difficult to drain. It generally receives runoff or seepage water from surrounding higher lying soils. The interception and safe removal of this water helps drain this soil. The response to tile drainage is slow, and a pattern of closely spaced drains is required if tile is used. Surface drainage by land smoothing or a bedding system of land management is effective. Intensive management is needed to maintain good tilth and prevent surface crusting and clodding. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and cropping systems that include sod crops, should be used to improve tilth and maintain organic-matter content.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it can be used for growing apples, pears, and other fruits that have similar soil requirements. The main limitations are a prolonged high water table, susceptibility to ponding, and the lack of good air drainage. This soil can be partly drained by shallow ditches and land smoothing if suitable outlets are available.

Preventing soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Artificial drainage, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are serious concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, the soil compacts and growth is restricted. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, and very slow permeability of the subsoil and substratum.

Municipal sewers generally are needed for development. Special drainage measures are needed to protect against ponding and wet basements. Soil compaction and workability, frost heaving, and soil expansion are constant problems. Bedrock hinders deep excavations. Capability subclass IVw.

Lm—Lamson very fine sandy loam. This nearly level, poorly drained and very poorly drained soil formed in glacial lake sediments that have a high content of sand. It occupies broad flats and slight depressions on lake plains and deltas. Slope ranges from 0 to 3 percent. Areas of this soil are oriented in a north-south direction and are irregular in shape. The areas range from 5 to 100 acres in size.

In a typical profile the surface layer is very friable, very dark gray very fine sandy loam 10 inches thick. The subsoil is 23 inches thick. It consists of friable, mottled, pinkish gray fine sandy loam in the upper part and friable, mottled grayish brown fine sandy loam in the lower part. The substratum, to a depth of 50 inches, consists of friable, gray very fine sandy loam.

Included with this soil in mapping are small areas of similar, better drained Minoa soils and similar, finer textured Canandaigua soils. Gravel spots or drainageways are indicated on the soil map by the conventional sign or symbol. Included are areas where the surface layer is mucky.

There is an apparent prolonged high water table at or near the soil surface in spring or during other wet periods. This soil is susceptible to occasional ponding. In most places there are no coarse fragments, but they range from 0 to 5 percent in the surface layer. Permeability is moderately rapid in the subsoil and in the substratum. Rooting depth is limited by the prolonged high water table. The available water capacity is moderate. Runoff is very slow to ponded. In unlimed areas, the surface layer is slightly acid to neutral, and the subsoil is neutral to mildly alkaline.

If drained, this soil has fair potential for farming. Without artificial drainage, its potential is poor. Most of the acreage is cultivated, pastured, or in woods.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is well suited to most crops grown in the county except early-market and long- season varieties. It can be especially productive of certain vegetable crops. Prolonged wetness and susceptibility to ponding are the main limitations.

This soil can be tile drained if suitable outlets are available. Drainage should be carefully designed and installed to prevent sand from clogging drains. Drainage outlets need to be maintained. Response to drainage is excellent, and row crops can be grown almost continuously. This soil generally is free of coarse fragments in the surface layer and is easily tilled. Organic-matter content is initially very high. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and cropping systems that include sod crops, should be used to improve tilth and maintain the organic-matter content.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits that have similar soil requirements. The main limitations are prolonged wetness, susceptibility to ponding, and the lack of good air drainage.

Preventing soil compaction is a slight problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs, growth is restricted, and the loss of pasture plants may occur. Proper stocking rates to maintain key plants, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderate. Equipment limitations are severe. Wetness interferes with machine harvesting and the planting of trees. Seedling mortality is also severe because of wetness. Brush removal and careful planting improve seedling survival. Wetness-tolerant varieties are desirable.

This soil has serious limitations for many urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, and poor stability.

Drainage is needed for most urban uses. Basements need to be protected from underground seepage. Basements also need to be reinforced because the soil has poor stability. Ponding is a constant hazard. The installation and design of septic tank filter fields is particularly difficult, and most areas are better suited to municipal sewers. Capability subclass IVw.

LoA—Lockport and Brockport silty clay loams, 0 to 3 percent slopes. Areas of this undifferentiated group include either or both Lockport and Brockport soils. These nearly level, somewhat poorly drained soils formed in glacial till that overlies shale bedrock at a depth of 20 to 40 inches. These soils are similar except for color. The Lockport soil is reddish, and the Brockport soil is gray or olive. This map unit occupies moderately low areas on bedrock-controlled landscapes. Areas of this unit are oriented in an east-west direction and are roughly oblong or rectangular in shape. The areas range from 5 to more than 100 acres in size.

In a typical profile of the Lockport soil the surface layer is friable, dark brown silty clay loam 6 inches thick. The subsoil is 19 inches thick. It is firm, mottled, reddish brown silty clay in the upper 10 inches and firm, mottled, dark reddish brown silty clay in the lower 9 inches. The substratum is very firm, dark reddish brown shaly silty clay. Extremely firm, partially weathered reddish gray and dark reddish brown shale bedrock is at a depth of 30 inches.

In a typical profile of the Brockport soil the surface layer is friable, very dark grayish brown silty clay loam 7 inches thick. The subsurface layer is a firm, mottled, gray silty clay loam 5 inches thick. The subsoil is 18 inches thick. It is firm, mottled, pale olive silty clay in the upper 8 inches and firm, mottled, pale olive and greenish gray silty clay in the lower 10 inches. Bedrock starts at a depth of 30 inches and consists of extremely firm, pale olive and greenish gray shale.

Included with these soils in mapping are better drained Riga and Lairdsville soils on higher, drier spots and areas of wetter Lakemont or Madalin soils in depressions or drainageways. Marshy areas, wet spots, sand spots, gravel spots, and drainageways are indicated on the soil map by the conventional sign or symbol. Also included are areas where the surface layer is loam, clay loam, and silt loam. Similar but slightly coarser textured and deeper Ovid soils are included in some areas.

A perched seasonal high water table rises into the upper part of the subsoil in spring or during other wet periods in both soils. Bedrock is at a depth of 20 to 40 inches. In most places there are few coarse fragments, but they range up to 15 percent in the surface layer and consist mostly of glacial erratics of granite or sandstone. Permeability of the subsoil and substratum is very slow in the Lockport soil and slow in the Brockport soil. The rooting depth is limited by the seasonal high water table and by bedrock. Available water capacity is moderate. Runoff is slow. In unlimed areas of both soils, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

If drained, these soils have fair to poor potential for farming; without artificial drainage, the potential is poor. Most of the acreage is cultivated, idle, or pastured.

Without artificial drainage, these soils are poorly suited to cultivated crops. If adequately drained, they are moderately suited to some crops grown in the county except early-market and long-season varieties. Seasonal wetness, moderate depth to bedrock, clayey subsoil, and a moderately fine textured surface layer are the main limitations.

Because of the fine textured, slowly or very slowly permeable subsoil, and underlying shale bedrock, these soils are difficult to drain with tile. Tile or subsurface drains usually require close spacing. A combination of land smoothing and surface ditches are beneficial drainage practices in many areas. Runoff water from surrounding higher soils should be intercepted and diverted. Because of the high clay content, these soils tend to puddle, then crust and form hard clods when they are cultivated. Maintenance of tilth is a continuous problem. Management practices such as minimum tillage, use of cover crops, incorporating crop residues into the soil, fall plowing, tillage at proper moisture levels, and crop rotations that include sod crops, should be used to improve tilth and maintain organic-matter content.

These soils are droughty in some years, especially for shallow rooted crops. If they are irrigated, water should be carefully controlled to prevent damage and sealing of the soil surface.

These soils are poorly suited to fruit crops. If adequately drained, they are suited to apples, pears, and other fruits with similar soil requirements. The main limitations are seasonal wetness, moderate depth to rock, and lack of good air drainage. Prevention of soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on these soils. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction is a serious problem and growth is restricted, which may result in loss of pasture plants. Proper stocking rates to maintain key plant species, rotation of

pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production is moderately high. The equipment limitations are moderate. Wetness and the clayey nature of these soils interfere with machine harvesting and planting of trees. Seedling mortality is moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

These soils have serious limitations for many urban uses. The main limitations are the moderate depth to bedrock, a seasonal high water table, and slow or very slow permeability in the subsoil and substratum.

Underground excavations can be costly because of the bedrock. Basements may need protection from underground seepage. The clayey nature of the soil is a problem in areas of heavy foot traffic. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIIw.

LoB—Lockport and Brockport silty clay loams, 3 to 8 percent slopes. Areas of this undifferentiated group include either or both Lockport and Brockport soils. These gently sloping, somewhat poorly drained soils formed in glacial till that overlies shale bedrock at a depth of 20 to 40 inches. These soils are similar except for color. The Lockport soil is reddish, the Brockport soil is gray or olive. Slopes are slightly concave, and the landscape is controlled by shale bedrock. Areas of this unit are oriented in an east-west direction and are roughly oblong or rectangular in shape. The areas range from 5 to 25 acres in size.

Typically, the surface layer of the Lockport soil is friable, dark brown silty clay loam 6 inches thick. The subsoil is 17 inches thick. It is firm, mottled, reddish brown silty clay in the upper 9 inches and firm, mottled, dark reddish brown silty clay in the lower 8 inches. The substratum, is very firm, dark reddish brown shaly silty clay. Extremely firm, partly weathered reddish gray and dark reddish brown shale bedrock is at a depth of 28 inches.

Typically the surface layer of the Brockport soil is friable, very dark grayish brown silty clay loam 7 inches thick. The subsurface layer is firm, mottled, gray silty clay loam 3 inches thick. The subsoil is 18 inches thick. It is firm, mottled, pale olive silty clay in the upper 8 inches and firm, mottled pale olive and greenish gray shaly silty clay in the lower 10 inches. Bedrock is at a depth of 28 inches and consists of extremely firm, pale olive and greenish gray shale.

Included with these soils in mapping are better drained Riga or Lairdsville soils on higher, drier spots and areas of wetter Lakemont or Madalin soils in depressions or drainageways. Nearly level or sloping soils are included in a few areas. Marshy areas, wet spots, sand spots, stony spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam, clay loam, and silt loam. Similar but slightly coarser textured and deeper Ovid soils are included in a few areas.

There is a perched seasonal high water table in the upper part of the subsoil in spring or during other wet periods. Bedrock is at a depth of 20 to 40 inches. There are generally no coarse fragments, but they range up to 15 percent in the surface layer and consist mostly of glacial erratics of granite or sandstone. Permeability of the subsoil and substratum is very slow in the Lockport soil and slow in the Brockport soil. The rooting depth is limited by the seasonal high water table and by bedrock. Available water capacity is moderate. Runoff is medium. In unlimed areas of both soils, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

If drained, the soils have fair to poor potential for farming; without artificial drainage, the potential is poor. Most of the acreage is cultivated, idle, or pastured.

Without artificial drainage, these soils are poorly suited to cultivated crops. If adequately drained, they can be used for some crops grown in the county except early-market and long-season varieties. Seasonal wetness, moderate depth to bedrock, clayey subsoil, moderately fine textured subsoil, and susceptibility to erosion are the main limitations.

Because of the fine textured, slowly or very slowly permeable subsoil and the underlying shale bedrock, these soils are somewhat difficult to drain with tile. However, drainage is usually less difficult than on the nearly level Lockport and Brockport soils. A combination of land smoothing and surface ditches is needed for adequate drainage in some areas. Diversion of the runoff and subsurface seepage received from higher adjacent areas is important. Because of the rather high clay content, these soils tend to puddle, then crust and form hard clods when cultivated. Maintenance of tilth is a continuous problem. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, fall plowing, tillage at proper moisture levels, and crop rotations that include sod crops, should be used to improve tilth and maintain organic-matter content. These practices and cross-slope tillage help to control the erosion hazard.

Droughtiness can be a problem in dry years, especially for shallow-rooted crops. If the soils are irrigated, irrigation water should be controlled carefully to prevent damage and sealing of the soil surface.

These soils are poorly suited to fruit crops. If adequately drained, they are suited for apples, pears, and other fruits that have similar soil requirements. The main limitations are seasonal wetness, moderate depth to rock, lack of good air drainage, and susceptibility to erosion. Prevention of soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, using lighter machinery that has wider treads or other specially designed equipment will help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on these soils. Overgraz-

ing can cause the reduction or complete loss of desirable pasture plants and usually results in loss of soil by erosion. If the pasture is grazed when wet, compaction occurs and growth is restricted, resulting also in loss of pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production is moderately high. Erosion is a hazard in traffic areas. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Wetness and the clayey nature of soils in this map unit may interfere with machine harvesting and planting of trees. Seedling mortality is moderate. Seedlings should be planted when the soil is moist in spring. Brush removal and careful planting improve seedling survival.

These soils have serious limitations for many urban uses. The main limitations are moderate depth to bedrock, seasonal high water table, susceptibility to erosion, and slow or very slow permeability in the subsoil and substratum.

Excavation can be costly because of the bedrock. Basements may need protection from underground seepage. Removal of vegetation should be held to a minimum, and plant cover should be established as soon as possible. The clayey nature of the soil is a continuous problem in areas of heavy foot traffic. Septic tank filter fields or municipal sewers should be specially designed. Capability subclass IIIw.

Ls—Lyons mucky silt loam. This nearly level, poorly drained and very poorly drained soil formed in glacial till. It is on low flats and in depressions on till plains. Areas of this soil are generally oriented in a north-south direction and are roughly oblong in shape or occur as long, narrow areas along natural drainageways. The areas range from 5 to 25 acres in size.

In a typical profile the surface layer is very friable, very dark brown mucky silt loam 8 inches thick. The subsurface layer is friable, light gray loam 10 inches thick. The subsoil is 20 inches thick. It is friable, mottled, brown gravelly loam in the upper 6 inches and firm, mottled, dark brown heavy gravelly loam in the lower 14 inches. The substratum to a depth of 54 inches is firm, mottled, dark brown gravelly loam.

Included with this soil in mapping are Appleton, Massena, and Hilton soils in small higher, drier areas and Palms soils in deeper depressions. Sand spots, stony spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam or silt loam.

There is a perched prolonged high water table at or near the surface during much of the year. This soil is susceptible to occasional ponding. Coarse fragments range from 5 to 15 percent in the surface layer and are mostly glacial erratics of limestone or sandstone. Permeability is moderate or moderately slow in the subsoil and slow or very slow in the substratum. The rooting depth is limited by the prolonged high water table. The available water capacity is moderate to high. Runoff is very slow or ponded. The surface layer in unlimed areas is medium acid to neutral, and the subsoil is slightly acid to neutral.

This soil has poor to fair potential for farming. Most of the acreage is idle land, pasture, or woodland.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to some crops grown in the county except early-market and long-season varieties. Prolonged wetness and susceptibility to ponding are the main limitations.

This soil can be drained by tile drains and open ditches if suitable outlets are available. Careful design and installation of drainage is necessary. Drainage outlets need to be maintained. Response to drainage is good. This soil usually receives runoff or subsurface seepage water from the higher surrounding soils. The interception and safe removal of this water by tile or diversions should be considered as part of the drainage plan. If the soil is adequately drained, row crops can be grown almost continuously. Organic-matter content is initially very high. Management practices, such as minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at proper moisture levels, and crop rotation should be used to improve tilth and maintain organic-matter content.

This soil is poorly suited to fruit crops. If adequately drained, it is somewhat suited to apples, pears, and other fruits that have similar soil requirements. The main limitations are a prolonged high water table, susceptibility to ponding, and the lack of good air drainage.

This soil can be drained with tile if suitable outlets are available. Prevention of soil compaction is a continuous problem. Because the crops are often sprayed during wet periods, the heavy equipment used causes the formation of potholes and traffic pans. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when the soil is wet are major concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants. If the pasture is grazed when wet, compaction occurs and growth is restricted, and there may be a loss of pasture plants. Because of wetness, reseeding and applying fertilizers is difficult. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is also severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, and slow or very slow substratum permeability.

Underground excavations are difficult because of wetness. Municipal sewers generally are needed. Extensive drainage measures are needed to protect against ponding and wet basements. Maintaining lawns and shrubs is difficult. Frost heaving is a constant problem. Capability subclass IVw.

Ly—Lyons very stony silt loam. This nearly level, poorly drained and very poorly drained soil formed in glacial till. It is on low flats and in depressions on till plains. Stones and a few boulders are about 5 to 30 feet apart on the surface. Areas of this soil are generally oriented in a north-south direction and are roughly oblong in shape or occur as long, narrow strips at the edge of large swamps or bogs. The areas range from 5 to 25 acres in size.

Typically the surface layer is very friable, very dark brown very stony silt loam 8 inches thick. The subsurface layer is friable, light gray loam 8 inches thick. The subsoil is 20 inches thick. It is friable, mottled, brown gravelly loam in the upper 6 inches and firm, mottled, dark brown heavy gravelly loam in the lower 14 inches. The substratum, to a depth of 54 inches, is firm, mottled, dark brown gravelly loam.

Included with this soil in mapping are better drained areas of Appleton, Massena or Hilton soils and some areas of nonstony Canandaigua or Lamson soils. Palms soils are included in small, deep depressions or along drainageways. Marshy areas or drainageways are indicated on the soil map by the appropriate conventional sign or symbol. A few areas of soils that have a nonstony surface layer are also included.

There is a perched prolonged high water table at or near the surface during much of the year. This soil is susceptible to ponding. Coarse fragments range from 5 to 15 percent in the surface layer and are mostly glacial erratics of limestone and sandstone. Large stones are less than 30 feet apart on the surface. Permeability is moderate or moderately slow in the subsoil and slow or very slow in the substratum. The rooting depth is limited by the prolonged high water table. Available water capacity is moderate. Runoff is very slow or ponded. The surface layer in unlimed areas is medium acid to neutral, and the subsoil is slightly acid to neutral.

This soil has poor potential for farming. Most of the acreage is idle land, pasture, or woodland.

This soil is not suited to cultivated crops. Prolonged wetness, susceptibility to ponding, and the very stony surface are the main limitations. Cultivating large areas of this soil is not feasible because of the difficulty in drainage and removing large stones.

This soil is not suited to fruit crops. The main limitations are a prolonged high water table, susceptibility to ponding, lack of good air drainage, and a very stony surface layer. Large stones interfere greatly with the operation of large equipment.

This soil is too wet and too stony for good quality pasture. Pasture management is difficult.

Timber production on this soil is low. Equipment limitations are severe. Wetness and stones interfere with machine harvesting and planting of trees. Seedling mortality is severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for many urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, and a very stony surface.

Excavation of this soil is costly. Municipal sewers are usually needed, and extensive drainage measures are needed to prevent ponding and wet basements. Stones are a constant problem on lawns or fairways. Capability subclass VIIs.

Ma—Madalin silty clay loam. This nearly level, poorly drained and very poorly drained soil formed in glacial lake sediments that are dominantly clay and silt. It is on low flats and in slight depressions on lake plains. The slope ranges from 0 to 3 percent. Areas of this soil are generally oriented in a north-south direction and are oblong shaped or occur as long, narrow strips along drainageways. The areas range from 10 to 30 acres in size.

In a typical profile the surface layer is friable, very dark gray silty clay loam 6 inches thick. The subsoil is 24 inches thick. The upper part is friable, mottled, dark grayish brown silty clay loam 4 inches thick; the middle part is firm, mottled, grayish brown silty clay 7 inches thick; and the lower part is firm, mottled, gray heavy silty clay 13 inches thick. The substratum, to a depth of 42 inches, is firm, gray, varved clay and silt.

Included with this soil in mapping are Rhinebeck and Collamer soils on small higher, drier spots and a few areas of Canandaigua soils that contain less clay. Sand spots and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is muck.

There is an apparent prolonged high water table at or near the surface in winter and spring and during other wet periods. This soil is susceptible to occasional ponding. Coarse fragments range from 0 to 3 percent in the surface layer. Permeability is slow in the subsoil and substratum. The rooting depth is limited by the prolonged high water table. The available water capacity is high. Runoff is very slow or ponded. The surface layer and subsoil in unlimed areas are medium acid to mildly alkaline.

This soil has poor potential for farming. Most of the acreage is pasture or woodland.

Without artificial drainage, this soil is not suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except early-market and long-season varieties. Prolonged wetness, susceptibility to ponding, a clayey subsoil, and a moderately fine textured surface layer are the main limitations.

If adequately drained, this soil can be used for corn, wheat, and other annual crops. Because of the fine textured subsoil and slow permeability, however, this soil is difficult to drain. The response to tile drainage is slow, and a pattern of closely spaced tile is required. This soil usually receives runoff or seepage water from surround-

ing higher soils. The interception and safe removal of this water helps drain this soil. Surface drainage by land smoothing or a bedding system of land management is effective in some areas. Intensive management is needed to maintain good tilth. Management practices, such as minimum tillage, use of cover crops, applying fertilizer according to soil test, incorporating crop residue into the soil, tillage at the proper moisture levels, and crop rotation, should be used to improve tilth, maintain organic-matter content, and reduce the threat of surface crusting and clodding.

Without artificial drainage, this soil is not suited to fruit crops. If adequately drained, it can be used for apples, pears, and other fruits with similar soil requirements. The main limitations are prolonged wetness, susceptibility to ponding, and lack of good air drainage.

Preventing soil compaction is a serious problem on this soil. Because the crops are often sprayed during wet periods, the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent this problem.

Overgrazing and grazing when wet are major concerns of pasture management on this soil. If the pasture is grazed when wet, compaction is a serious problem and growth is restricted; it may even result in a reduction or loss of desirable pasture plants. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is low. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees. Seedling mortality is also severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has serious limitations for most urban uses. The main limitations are a prolonged high water table, susceptibility to ponding, slow permeability of the subsoil and substratum, and heavy texture of the soil.

Municipal sewers are usually needed for urban developments, and extensive drainage measures are needed to protect against ponding and wet basements. Maintaining lawns and shrubs is difficult. Frost heaving is a constant problem. Many areas have potential for wetland wildlife habitat or for excavated ponds. Capability subclass IVw.

MdB—Madrid gravelly fine sandy loam, 2 to 8 percent slopes. This gently sloping, well drained soil formed in glacial till. It is on till plains, moraines, and drumlins on the convex, higher parts of the landscape. Some areas are undulating. Areas of this soil generally are oriented in a north-south direction. They are roughly oblong in shape and mostly 20 to 80 acres in size.

In a typical profile, the surface layer is friable, dark grayish brown gravelly fine sandy loam 8 inches thick. The subsoil extends to a depth of 51 inches. It is 16 inches of friable, yellowish brown loam, 10 inches of friable, pale brown very fine sandy loam, 7 inches of friable, brown loam, and 10 inches of firm, reddish brown gravelly loam. The substratum, to a depth of 62 inches, is friable, brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Bombay soils in concave areas and along drainageways and small areas of Ontario soils, which are slightly finer textured. Wet spots, sand spots, stony spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

The seasonal high water table is always at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone or limestone gravel. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. The available water capacity is moderate. Runoff is medium. In areas that have not been limed, reaction ranges from strongly acid to slightly acid in the surface layer and from strongly acid to neutral in the subsoil.

This soil has good potential for farming. It is suitable for most crops grown in the county. Most of the acreage is cultivated or is in fruit crops.

This soil is well suited to cultivated crops. The gravelly surface layer and the hazard of erosion are the main problems or limitations to use of this soil. In a few places, stones and gravel on the surface can make the planting and cultivation of small seeded crops difficult and can cause excessive wear of machinery. Where slopes are short, this soil can be continuously cropped if management includes minimum tillage, return of crop residue to the soil, and winter cover crops. Where slopes are fairly long, contour strips, grassed waterways, and other erosion control measures are needed. Tile drainage is often needed on the wetter included soils if row crops are grown. The response to irrigation is excellent, particularly in dry years.

This soil is well suited to fruit crops including cherries and peaches and other pitted fruits. The main limitation is the hazard of erosion. Wet spots may need tile drainage. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment can help prevent compaction of the soil.

Overgrazing is a major concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants and usually result in loss of soil erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight; however, erosion may need to be controlled along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has minor limitations for some urban uses. The principal limitations are the hazard of erosion, the moderately slow permeability of the substratum, and the gravelly surface.

Stripping this soil of vegetation should be kept to a minimum, and plant cover should be reestablished quickly to prevent erosion. Specially designed septic tank filter fields or municipal sewers may be needed. Frequent application of fertilizer and irrigation water help maintain grasses and shrubs. Some areas are excellent sites for houses. Capability subclass IIe.

MdC—Madrid gravelly fine sandy loam, 8 to 15 percent slopes. This sloping, well drained soil formed in glacial till. It is in convex areas on till plains, moraines, and drumlins that receive little or no runoff. Some areas are rolling. Areas of this soil generally are oriented in a north-south direction. They are roughly oblong in shape, or they occur as narrow strips in drumlin areas. Individual areas are mostly 20 to 80 acres in size.

Typically the surface layer is friable, dark grayish brown gravelly fine sandy loam 8 inches thick. The subsoil is 40 inches thick. It is 13 inches of friable yellowish brown loam; 10 inches of friable, pale brown very fine sandy loam; 7 inches of friable brown loam; and 10 inches of firm, reddish brown gravelly loam. The substratum, to a depth of 62 inches, is friable, brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Bombay soils in depressions and along drainageways and small areas of Ontario soils, which are slightly finer textured. Wet spots, sand spots, stony spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam or fine sandy loam.

The seasonal high water table stays below a depth of 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer; they are mostly sandstone or limestone gravel. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. The available water capacity is moderate. Runoff is medium. In areas that have not been limed, the surface layer is strongly acid to slightly acid and the subsoil is strongly acid to neutral.

This soil has fair potential for farming. Most of the acreage is used for cultivated crops, pasture, or fruit crops.

This soil is fairly well suited to cultivated crops. The hazard of erosion and the gravelly surface layer are the main problems or limitations.

In places, stones and gravel on the surface make the planting and cultivation of small seeded crops difficult and cause excessive wear of machinery. Erosion control measures are needed to prevent loss of soil, water, and nutrients. Contour tillage, stripcropping, minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at the proper moisture level, and crop rotations that include grasses and legumes help reduce runoff and control erosion in cultivated areas. This soil can be used more intensively for row crops if a no-plow system of management is used in which crops are planted directly in killed sod, crop residue, or cover crops.

Because of slope, some farm machinery is difficult to use in places and irrigation for specialized crops is restricted or is not practical. It is generally important to intercept both seepage and runoff on this soil and carry it safely from the field by use of permanent grass waterways. This helps prevent erosion and wetness in downslope areas. Tile should be used to drain the wet included soils.

This soil is suited to fruit crops including cherries and peaches and other pitted fruits. The main limitation is the hazard of erosion. The wetter soils may need tile drainage. Erosion may occur along traffic lanes. Construction of traffic lanes and cultivation should be across the slope if possible. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using light machinery with wider treads or other specially designed equipment can help prevent soil compaction.

Overgrazing is the main concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of desirable pasture plants and usually results in loss of erosion. Proper stocking rates to maintain key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion may need to be controlled along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting will improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the hazard of erosion, the moderately slow permeability of the substratum, the gravelly surface layer, and the slope.

Stripping this soil of vegetation should be kept to a minimum and plant cover should be established quickly to prevent erosion. Large construction sites need sediment control, for example the use of sediment basins. Special design of septic tank filter fields or municipal sewers may be needed for effective waste disposal. Frequent applications of fertilizer and irrigation help maintain grass and shrubs. Some areas are good sites for houses. Capability subclass IIIe.

MdD—Madrid gravelly fine sandy loam, 15 to 25 percent slopes. This moderately steep, well drained soil formed in glacial till. It occupies convex side slopes of moraines and drumlins. Areas of this soil generally are oriented in a north-south direction. They occur as narrow strips or horseshoe-shaped areas, and some areas occur as a series of low hills. Individual areas are mostly 10 to 50 acres in size.

Typically the surface layer of this soil is friable, dark grayish brown gravelly fine sandy loam 6 inches thick.

The subsoil is 38 inches thick. It is 13 inches of friable, yellowish brown loam, 8 inches of friable, pale brown very fine sandy loam, 7 inches of friable brown loam, and 10 inches of firm, reddish brown gravelly loam. The substratum, to a depth of 62 inches, is friable, brown gravelly fine sandy loam.

Included with this soil in mapping are areas of finer textured Ontario soils and eroded areas of Madrid soils. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

The seasonal high water table stays below a depth of 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone and limestone gravel. Permeability is moderate to moderately slow in the subsoil and moderately slow in the substratum. The available water capacity is moderate. Runoff is rapid. In unlimed areas, the surface layer is strongly acid to slightly acid and the subsoil is strongly acid to neutral.

This soil has poor potential for farming. Most of the acreage is idle land or woodland or is used for pasture.

This soil is poorly suited to cultivated crops. The hazard of erosion, the gravelly surface layer, and the moderately steep slopes are the main problems or limitations.

Slope and the severe erosion hazard limit the use of this soil. Cultivated crops can be grown, but only in combination with sod crops. Row crops can be grown more frequently if they are planted directly by a no-plow system of management. Crops should be grown in narrow strips alternated with sod crops and they should be planted across the slope. Runoff is rapid on this soil, especially during heavy rainfall. The loss of soil, water, and nutrients is a constant hazard. Cover crops, return of crop residues to the soil, and sod crops help maintain good tilth. Because of the moderately steep slopes, the use of certain kinds of machinery is limited. Gravel in the surface layer interferes with the planting and cultivation of small seed crops and causes excessive wear of machinery.

This soil can be used for fruit crops. The main limitations are the hazard of erosion and the moderately steep slopes. Operation of spray equipment is limited because of slope. Traffic lanes should run across the slope if possible. If water accumulates in traffic lanes, the water should be diverted off the downslope side to prevent the formation of gullies. Drainage of wet spots or springs may be needed to prevent wetness in downslope areas.

Overgrazing is the main concern of pasture management on this soil. The loss of pasture seeding, and thus the loss of soil by erosion can result from overgrazing. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is moderate. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. The slope makes machine harvesting and planting of trees difficult. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are the moderately steep slope and the hazard of erosion. The moderately slow permeability in the substratum and the gravelly surface layer are also limitations.

Construction costs are generally high on this soil, and maintenance of streets and roads is difficult. Removing vegetation should be held to a minimum, and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example the use of sediment basins. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Most areas are poor sites for houses. Capability subclass IVe.

Me—Martisco muck. This is a nearly level, very poorly drained soil that formed in organic deposits, 8 to 16 inches thick, over marl. It occupies low, level, or depressional areas. The areas are oblong and are mostly 10 to 50 acres in size.

In a typical profile, friable, black muck extends to a depth of 12 inches. Below that, nonsticky grayish brown marl extends to a depth of 34 inches. The underlying mineral soil, at a depth of 42 inches, is slightly sticky gray silt.

Included with this soil in mapping are small areas of Edwards soils that have thicker organic material and Palms soils that have no marl. Drainageways included in the mapped areas are indicated on the map by the appropriate conventional sign or symbol. Areas where the surface layer is mucky silt loam are also included.

Unless the soil is drained, an apparent prolonged high water table is at or near the surface during much of the year. Marl is at a depth of 8 to 16 inches. This soil is susceptible to flooding and ponding. Permeability is moderate to moderately rapid in the organic part and generally is slow in the underlying marl. Rooting depth is limited by the high water table. The available water capacity is low to moderate. Runoff is very slow or ponded. In unlimed areas, reaction ranges from slightly acid to moderately alkaline in the organic part; the marl is moderately alkaline.

This soil has poor potential for farming. Most of the acreage is idle land or woodland. Some areas are cultivated.

If this soil is not drained artificially, it is not suited to cultivated crops. If adequately drained, it is suited to the vegetable crops grown in the county except early-market and long-season varieties. Prolonged wetness, shallow depth of marl, and susceptibility to flooding and ponding are the main limitations.

This soil can be drained with tile and open ditches if suitable outlets are available or if pumping systems can be used. Regulating the water table helps prevent excessive subsidence and wind erosion. If drained, this soil

gradually subsides because of oxidation and settling of the organic material. Drainage may not be feasible, however, because of the relatively short productive life of the thin organic mantle. Excessive tillage should be avoided because it induces oxidation of the organic material and can result in the formation of traffic pans. Because this soil is low in such nutrients as phosphorus and potassium, fertilizer applications should be based on the crop grown. When the surface of this soil is dry, it is susceptible to wind erosion. Windbreaks, cover crops, and irrigation are needed to prevent the loss of soil by wind. This soil is in the lowest part of the landscape and is susceptible to early-and late-season frosts.

If artificially drained, this soil is suited to fruit crops, and if adequately drained, it is suited to some shallow-rooted fruit crops. The main limitations are prolonged wetness, shallowness to marl, susceptibility to flooding and ponding, lack of good air drainage, hazard of frost damage, and hazard of wind erosion.

If it is not drained, this soil is not suited to pasture, and if adequately drained, it is only poorly suited.

Timber production on this soil is low. Equipment limitations are severe. Wetness interferes with machine harvesting and the planting of trees. Seedling mortality is severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has very serious limitations for most urban uses. The main limitations are shallow depth to marl, prolonged high water table, susceptibility to flooding and ponding, poor stability, and low bearing strength. In most areas, this soil is best suited to open space and wildlife habitat. The underlying marl is a potential source of lime for farm use. Capability subclass IVw.

MfA—Massena gravelly loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained to poorly drained soil formed in glacial till. It is in moderately low areas on foot slopes on till plains. Many areas receive runoff from higher adjacent soils. Areas of this soil generally are oriented in a north-south direction. They are roughly oblong in shape or occur as narrow strips between drumlins. Individual areas are mostly less than 10 acres in size.

In a typical profile, the surface layer is friable, very dark grayish brown gravelly loam 7 inches thick. The subsoil is 26 inches thick. The upper part is friable, mottled, brown gravelly fine sandy loam 6 inches thick, and the lower part is firm, mottled, dark brown gravelly fine sandy loam 20 inches thick. The substratum, to a depth of 48 inches is firm, brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Bombay soils that are higher and better drained and areas of Lyons soils in depressions and along drainageways. Sand spots, stony spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

There is a perched seasonal high water table in the upper part of the subsoil in spring and in other wet periods. Coarse fragments make up 15 to 35 percent of the surface layer and are mostly limestone and sandstone gravel. Permeability is moderately slow to slow in the subsoil and in the substratum. Rooting depth is limited by the seasonal high water table. The available water capacity is moderate. Runoff is slow. In unlimed areas, the surface layer and subsoil are medium acid to neutral.

This soil has fair potential for farming. Most of the acreage is used for cultivated crops or as pasture, or is in woods or is idle.

If not artificially drained, this soil is poorly suited to cultivated crops, but with adequate drainage, it is suited to most crops grown in the county except for the early-market and long-season varieties. Seasonal wetness and the gravelly surface layer are the main problems or limitations.

Gravel on the surface makes the planting and cultivation of small seeded crops difficult and can cause excessive wear of machinery. This soil can be drained by tile and open ditch drainage, if suitable outlets are available. Careful design and installation of drainage systems is needed. If this soil is adequately drained, row crops can be grown almost continuously. Management practices including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations should be used to improve tilth and maintain organic-matter content. Crops respond well to irrigation in dry years. Irrigation water should be carefully applied to prevent crusting or sealing of the soil surface.

If not artificially drained, this soil is not suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness, lack of good air drainage, and susceptibility to frost action. This soil can be drained by tile if a suitable outlet is available.

Spraying is often done in wet periods, and the heavy equipment used causes pot holes and traffic pans to form. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when wet are the main concerns in pasture management. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness can make the machine harvesting and planting of trees difficult. Seedling mortality is moderate. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, the slow or moderately slow permeability in the subsoil and substratum, and a gravelly surface layer.

Basements need to be protected from underground seepage. Surface drainage is needed to prevent ponding around buildings. Special design of septic tank filter fields or municipal sewers is needed. Capability subclass IIIw.

MfB—Massena gravelly loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained to poorly drained soil formed in glacial till. It is in concave areas on foot slopes on till plains. It generally receives runoff from higher adjacent soils. Areas of this soil are generally oriented in a north-south direction. They occur as rather narrow strips between drumlins. Individual areas are mostly less than 10 acres in size.

Typically, the surface layer is friable, very dark grayish brown gravelly loam about 7 inches thick. The subsoil is 24 inches thick. The upper part is friable, mottled, brown gravelly fine sandy loam 5 inches thick, and the lower part is firm, mottled, dark brown gravelly fine sandy loam 19 inches thick. The substratum, to a depth of 48 inches, is firm, brown gravelly fine sandy loam.

Included with this soil in mapping are Bombay soils in a few higher, better drained areas and Lyons soils in small depressions and drainageways. Sand spots, stony spots, and drainageways are indicated on the map by the conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

There is a perched seasonal high water table in the upper part of the subsoil in spring and in other wet periods. Coarse fragments make up 15 to 35 percent of the surface layer and are mostly limestone and sandstone gravel. Permeability is moderately slow or slow in the subsoil and in the substratum. The rooting depth is limited by the seasonal high water table. The available water capacity is moderate. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, used as pasture, or is in woods.

If not artificially drained, this soil is poorly suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except for the early-market and long-season varieties. The seasonal wetness, the erosion hazard, and the gravelly surface layer are the main problems or limitations.

Surface gravel makes the planting and cultivation of small-seeded crops difficult and can cause excessive wear of machinery. This soil responds well to tile drainage. Interceptor tile or diversions may be needed to intercept runoff from surrounding higher elevations. Careful design and installation of tile is needed. If adequately drained and protected from erosion, this soil can be used nearly continuously for row crops. Erosion control measures are needed to prevent loss of soil, water, and nutrients. Stripcropping, minimum tillage, use of cover crops, cross-slope tillage, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations that include grasses and legumes help reduce runoff and control erosion in cultivated areas and help maintain good tilth and improve organic-matter content.

If the soil is irrigated, irrigation water should be applied carefully to prevent erosion and crusting or sealing of the soil surface.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are seasonal wetness, lack of good air drainage, and susceptibility to frost action.

This soil can be drained by tile if a suitable outlet is available. Because spraying is often done during wet periods, the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment can help prevent soil compaction.

Overgrazing and grazing when wet are the main concerns in pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness can make the machine harvesting and planting of trees difficult. Seedling mortality is moderate, but brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, the hazard of erosion, the slow or moderately slow permeability in the subsoil and substratum, and the gravelly surface layer.

Basements need to be protected from underground seepage. Interceptor drains help in many areas. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Capability subclass IIIw.

Mg—Massena very stony loam. This nearly level, somewhat poorly drained to poorly drained soil formed in glacial till. It is in moderately low areas on till plains. Slope ranges from 0 to 3 percent. Stones and a few boulders are about 5 to 30 feet apart on the surface. Areas of this soil generally are oriented in a north-south direction. They are irregular in shape and mostly 5 to 20 acres in size.

Typically the surface layer is friable, very dark grayish brown very stony loam 7 inches thick. The subsoil is 26 inches thick. The upper part is friable, mottled, brown gravelly fine sandy loam 6 inches thick, and the lower part is firm, mottled, dark brown gravelly fine sandy loam. The substratum to a depth of 48 inches is firm, brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of stony Madrid or Bombay soils that are better drained and areas of Lyons soils in depressions and drainageways.

Drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nonstony loam and fine sandy loam.

There is a perched seasonal high water table in the upper part of the subsoil in spring and in other wet periods. Coarse fragments make up 15 to 35 percent of the surface layer and are mostly sandstone and limestone gravel. About 1 to 3 percent of these fragments are stone-sized and more than 10 inches in diameter. Permeability is moderately slow or slow in the subsoil and substratum. The rooting depth is limited by the seasonal high water table. The available water capacity is moderate. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has poor potential for farming. Most of the acreage is used as pasture or is in woods.

This soil is not suited to cultivated crops. It is suited mainly to pasture and woods. Seasonal wetness and excessive stones on the surface are the main problems or limitations. The soil cannot be cultivated unless the stones are cleared away. Because of the seasonal wetness it may not always be practical to remove the stones.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are seasonal wetness, lack of good air drainage, susceptibility to frost action, and excessive stones on the surface. Because of the high cost of drainage and removing stones, this soil may best be left in pasture or woods.

Overgrazing and grazing when wet are the main concerns in pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are severe. Wetness and stones interfere with machine harvesting and planting of trees. They usually need to be hand planted. Seedling mortality is moderate. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for most urban uses. The main limitations are a seasonal high water table, slow or moderately slow permeability in the subsoil and substratum, and the very stony surface.

Underground excavations can be costly. Basements need protection from underground seepage. Surface drainage is needed to prevent ponding around buildings. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Many areas are best used as habitat for wildlife or as natural open-space areas. Capability subclass VIs.

Mn—Minoa very fine sandy loam. This nearly level, somewhat poorly drained soil formed in glacial lake sediments that are dominantly sand. It is on lake plains and deltas. Slope ranges from 0 to 3 percent. Areas of this soil are broad and irregular in shape and are mostly more than 50 acres in size.

In a typical profile, the surface layer is friable, dark grayish brown very fine sandy loam 12 inches thick. The subsoil is 20 inches thick. The upper 10 inches is friable, distinctly mottled, brown very fine sandy loam. The lower 10 inches is friable, mottled, brown loamy very fine sand with a few, firm, horizontal bands. The substratum, to a depth of 72 inches, is firm, brown very fine sandy loam.

Included with this soil in mapping are Elnora soils in a few higher, better drained areas, and Lamson and Canandaigua soils in depressions or drainageways. Some gently sloping areas are also included. Gravel spots and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine sandy loam and loamy fine sand.

There is an apparent seasonal high water table in the subsoil in spring or other wet periods. Coarse fragments make up 0 to 5 percent of the surface layer. Permeability is moderate in the subsoil and moderate to moderately rapid in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is moderate. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are strongly acid to neutral.

This soil has good potential for farming, but if not artificially drained its potential is only fair. Most of the acreage is used for cultivated crops, is idle, or is used as pasture.

If not artificially drained, this soil is only moderately suited to cultivated crops. If adequately drained, this soil is well suited to most crops grown in the county except for the early-market and long-season varieties. It is especially productive of certain vegetable crops. Seasonal wetness is the main problem or limitation.

This soil can be drained by tile and open ditch drainage if suitable outlets are available. Tile drains may need filters or wrapped joints to prevent being clogged by sand. If adequately drained, row crops can be grown almost continuously. Management practices including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations should be used to improve tilth and maintain organic-matter content. Because this soil is usually free of coarse fragments, it is easily tilled, but it is susceptible to formation of traffic pans. Crops respond well to irrigation during dry periods.

If not artificially drained, this soil is poorly suited to fruit crops, but if adequately drained, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are a seasonal high water table, the lack of good air drainage, and the moderate available water capacity.

This soil can be drained by tile if a suitable outlet is available. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes traffic pans to form. Maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Because this soil has a moderate available water capacity, irrigation is needed especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be rapidly leached from this soil. Frequent applications of fertilizer and regular additions of organic material help overcome losses from leaching.

Overgrazing and grazing when wet are the main concerns in pasture management. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness can make the machine harvesting and planting difficult. Seedling mortality is moderate. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitation is a seasonal high water table.

Basements need to be protected from underground seepage. Surface or subsurface drainage is usually needed. Deep footings are generally required in building construction. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs.

The tendency of cutbanks to cave and slough can make excavation difficult. Capability subclass IIIw.

Ne—Newstead gravelly fine sandy loam. This nearly level, somewhat poorly drained and poorly drained soil formed in glacial till that is 20 to 40 inches deep over bedrock. It is in moderately low areas on bedrock controlled till plains. Slope ranges from 0 to 3 percent. Areas of this soil generally are oriented in an east-west direction. They are roughly rectangular or irregular in shape, and individual areas are mostly 5 to 20 acres in size.

In a typical profile the surface layer is friable, very dark gray gravelly fine sandy loam 10 inches thick. The subsoil is also 10 inches thick. It is friable, mottled, grayish brown fine sandy loam in the upper part and friable, mottled, brown very fine sandy loam in the lower part. The substratum, to a depth of 27 inches, is firm, mottled, brown and grayish brown gravelly fine sandy loam. Limestone bedrock is at a depth of 27 inches.

Included with this soil in mapping are areas of better drained, shallower Farmington soils, and areas of Wassaic soils that are similar, but are better drained. Some areas of deeper and slightly wetter Lyons soils are also included. Stony spots and drainageways are indicated on the map by the appropriate conventional sign or symbol. Some included areas are gently sloping. Also included are areas where the surface layer is nongravelly silt loam, fine sandy loam, and loam.

There is a seasonal high water table in the subsoil in spring or in other wet periods. It is perched above the bedrock which is at a depth of 20 to 40 inches. This soil is susceptible to occasional ponding. Coarse fragments make up 15 to 35 percent of the surface layer and are mostly sandstone and limestone. Permeability is moderate. The rooting depth is limited by the seasonal high water table and the bedrock. The available water capacity is moderate to low. Runoff is slow. In areas that have not been limed, the surface layer is slightly acid to mildly alkaline and the subsoil is neutral to moderately alkaline.

This soil has fair to poor potential for farming. Most of the acreage is used for cultivated crops, as pasture, or is idle.

If not artificially drained, this soil is poorly suited to cultivated crops. If adequately drained, this soil is suited to most crops grown in the county except for the early-market and long-season varieties. The seasonal wetness, moderate depth to bedrock, and medium to low available water capacity are the main problems or limitations. In a few places, stones and gravel on the surface make the planting and cultivation of small seeded crops difficult and cause excessive wear of machinery.

This soil is generally difficult to drain because of the shallowness to bedrock. Drainage outlets are usually poor. Intercepting and diverting runoff and seepage from higher adjacent areas helps improve drainage of this soil. Drainage can also be improved by land smoothing and grading operations. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations are management practices that should be used to improve tilth and maintain organic matter content.

This soil is poorly suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness, moderate depth to rock, lack of good air drainage, and medium to low available water capacity. Preventing soil compaction is a continuous problem. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment helps prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management. If the pasture is grazed when wet, the soil compacts, plant growth is restricted, and the reduction or complete loss of desirable pasture plants can result. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high or moderate. Equipment limitations are severe. Wetness interferes with machine harvesting and planting of trees.

Seedling mortality is severe because of wetness. Brush removal and careful planting improve seedling survival. Plant species that are tolerant to wetness are best suited to this soil.

This soil has very severe limitations for many urban uses. The main limitations are the moderate depth to bedrock, the seasonal high water table, the susceptibility to occasional ponding, and the gravelly surface layer.

Excavations are difficult because of the bedrock. Basements need protection from underground seepage. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Capability subclass IIIw.

Ng—Niagara silt loam. This nearly level, somewhat poorly drained soil formed in glacial lake sediments that are dominantly silt. It is in moderately low areas on lake plains. Slope ranges from 0 to 3 percent. Areas of this soil are irregular in shape and are mostly 5 to 20 acres in size.

In a typical profile, the surface layer is friable, dark grayish brown silt loam 9 inches thick. The subsoil extends to a depth of 38 inches. It is firm, mottled, dark grayish brown heavy silt loam in the upper 5 inches and firm, mottled, dark grayish brown light silty clay loam in the lower 16 inches. The substratum to a depth of 60 inches is firm, mottled, dark grayish brown silt loam.

Included with this soil in mapping are areas of higher and better drained Collamer or Williamson soils and areas of poorer drained Canandaigua soils in depressions and along drainageways. Wet spots, sand spots, clay spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine sandy loam or very fine sandy loam.

There is an apparent seasonal high water table in the upper part of the subsoil in spring or during other wet periods. Coarse fragments make up 0 to 5 percent of the surface layer, but are commonly absent. Permeability is moderately slow in the subsoil and substratum. The rooting depth is limited by the seasonal high water table. The available water capacity is high. Runoff is slow. In areas that have not been limed, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

If drained, this soil has fair to good potential for farming. If not artificially drained, its potential is poor. Most of the acreage is cultivated or is used for pasture or fruit crops.

If not artificially drained, this soil is poorly suited to cultivated crops. If adequately drained, this soil is suited to most crops grown in the county except for the early-market and long-season varieties. It can be an especially productive soil for certain vegetable crops. Seasonal wetness is the main problem or limitation.

This soil can be drained by tile and open ditch drainage if suitable outlets are available. Careful design and installation of drainage systems is needed. In some areas land smoothing helps remove excess surface water. If adequately drained, row crops can be grown almost continuously. Minimum tillage, use of cover crops, incorporating crop residues into the soil, tillage at the proper moisture level, and crop rotations are among management practices that should be used to improve tilth and maintain the organic-matter content.

If adequately drained, this soil can be productive for certain vegetable crops including tomatoes, cabbage, sweet corn, cucumbers, and squash. Crops respond well to irrigation in dry years. Irrigation water should be applied carefully to prevent crusting or sealing of the soil surface.

If not artificially drained, this soil is poorly suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness and lack of good air drainage. This soil can be drained by tile if a suitable outlet is available.

Preventing soil compaction is a continuous problem. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns of pasture management on this soil. If the pasture is grazed when wet, the soil compacts, plant growth is restricted, and the reduction or complete loss of the desirable pasture plants can result. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness interferes somewhat with machine harvesting and planting of trees. Seedling mortality is moderate. Brush removal and careful planting, improve seedling survival. Plant species that can tolerate the wetness in spring are desirable.

This soil has severe limitations for many urban uses. The main limitations are a seasonal high water table and the moderately slow permeability of the subsoil and substratum.

Basements need to be protected from underground seepage. Specially designed septic tank filter fields and municipal sewers are needed. Excavations are often difficult because cutbanks tend to cave or slough. Capability subclass IIIw.

OaB—Oakville loamy fine sand, 0 to 6 percent slopes. This deep, nearly level and gently sloping, well drained soil formed in glacial lake, outwash, or beach deposits that are dominantly fine sand. It is in slightly convex areas on lake plains, outwash plains, beaches and sand bars. Areas of this soil generally are oriented in an east-west direction. They are irregular in shape and individual areas are mostly 3 to 20 acres in size.

In a typical profile the surface layer is very friable, dark brown loamy fine sand 10 inches thick. The subsoil is 27 inches thick. The upper part is loose, strong brown fine sand 9 inches thick, and the lower part is loose, brown fine sand 18 inches thick. The substratum, to a depth of

56 inches, is loose, brown fine sand that has bands of yellowish red and very dark gray fine sand.

Included with this soil in mapping are areas of Elnora and Junius soils in small depressions and drainageways and small areas of Colonie soils that contain bands or lamellae. Wet spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine sand and sand and the subsoil is loamy fine sand.

The seasonal high water table stays at a depth of more than 6 feet. Permeability is very rapid in the subsoil and in the substratum. The available water capacity is low to very low. Runoff is slow. In areas that have not been limed, reaction ranges from medium acid to neutral in the surface layer and in the subsoil.

This soil has fair potential for farming, but generally needs irrigation. Most of the acreage is used for cultivated crops, as pasture, or is idle.

This soil is well suited to cultivated crops if it is irrigated. It is fairly well suited to early-market vegetable crops. The sandy surface, the low to very low available water capacity, and the hazard of wind erosion are the main problems or limitations.

This soil is suitable for most crops, including the early-market and late-season varieties, but it generally needs to be irrigated. Because of its low to very low available water capacity and very rapid permeability, it tends to be droughty, especially during extended dry periods. Because nutrients are leached rapidly, fertilizer should be applied more frequently and in smaller amounts than for most other kinds of soil. Wet spots may need tile drainage. This soil can be planted early in the season, is generally free of coarse fragments, is easily worked, and responds well to a high level of management. It can be irrigated frequently. There are few problems with tilth if management practices include minimum tillage, cover crops, incorporating crop residue into the soil, and crop rotations.

Wind erosion can be a hazard if the soil is left bare of vegetation. The hazard of soil blowing is particularly severe in dry periods.

This soil is fairly well suited to fruit crops, including cherries and peaches and other pitted fruits. If this soil is not irrigated, yields are low and crop failures are common during extended dry periods. The main limitations are the low fertility, low to very low available water capacity, and the hazard of wind erosion. Nutrients including lime tend to leach rapidly from this soil. Frequent applications of fertilizer and regular additions of organic material help overcome the losses from leaching.

Overgrazing is the main concern in pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in the loss of soil through wind erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during dry periods are the main management needs.

Timber production on this soil is moderate. Seedling mortality is severe. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the hazard of wind erosion, the very rapid permeability, and the sandy texture.

Removal of vegetation should be held to a minimum and plant cover should be established as soon as possible. Frequent applications of fertilizer and frequent irrigation help maintain grasses and shrubs. There is a hazard of pollution of water sources by effluent from septic tank filter fields. Capability subclass IVs.

OnB—Ontario gravelly loam, 3 to 8 percent slopes. This gently sloping, well drained soil formed in glacial till. It is in convex areas on till plains, moraines, and drumlins. Areas of this soil generally are oriented in a north-south direction. They are roughly oblong in shape, and individual areas are mostly 20 to 100 acres in size.

In a typical profile, the surface layer is friable, dark brown gravelly loam 10 inches thick. The subsurface layer is 12 inches thick. In the upper part it is very friable, brown gravelly loam 5 inches thick. The lower part is very friable, light brownish gray loam 7 inches thick. The subsoil extends to a depth of 37 inches. In the upper 4 inches it is firm, reddish brown loam that has leached light brownish gray coatings. The lower part is firm, reddish brown heavy loam 11 inches thick. The substratum, to a depth of 56 inches, is firm, brown gravelly loam.

Included with this soil in mapping are small areas of Hilton and Appleton soils in lower areas, depressions, and drainageways, and areas of coarser textured Madrid and Bombay soils. Wet spots, sand spots, stony spots, drainageways, and springs less than one-half acre in size are indicated on the map by the conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam or fine sandy loam.

There may be an apparent temporary seasonal high water table in the substratum for very brief periods late in winter or early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone or limestone gravel. Permeability is moderate in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are strongly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or used for fruit crops.

This soil is well suited to cultivated crops. The gravelly surface layer and the slight hazard of erosion are the main problems or limitations. Stones on the surface in places and gravel can make the planting and cultivation of small seeded crops difficult and can cause excessive wear of machinery.

Where slopes are short, this soil can be continuously cropped if management includes minimum tillage, return of crop residue to the soil, and winter cover crops. Where slopes are fairly long, contour strips, grassed waterways,

and other erosion control measures are needed. More uniform management of many fields is possible if the wetter soils are tile drained.

This soil is well suited to fruit crops. The main limitation is the hazard of erosion. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Drainage of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent the slight hazard of soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight. Erosion may occur along roads or trails, however, and logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the slow permeability of the substratum and the gravelly surface layer.

Basements may need to be protected from underground seepage. Removing vegetation should be held to a minimum, and plant cover should be established as soon as possible. Special design of septic tank filter fields or municipal sewers may be needed for effective waste disposal. Some areas are excellent sites for dwellings. Capability subclass IIe.

OnC—Ontario gravelly loam, 8 to 15 percent slopes. This sloping, well drained soil formed in glacial till. It is on convex, upper side slopes of moraines and drumlins. Areas of this soil generally are oriented in a north-south direction. They are usually oblong in shape or occur as rather narrow strips along the sides of drumlins or moraines. Individual areas are mostly 10 to 60 acres in size.

Typically, the surface layer is friable, dark brown gravelly loam 9 inches thick. The subsurface layer is 11 inches thick. The upper part is very friable, brown gravelly loam 4 inches thick. The lower part is very friable, light brownish gray loam 7 inches thick. The subsoil extends to a depth of 37 inches. The upper part is firm, reddish brown loam that has thin, leached light grayish brown coatings and is 5 inches thick. The lower part is firm reddish brown heavy loam 12 inches thick. The substratum, to a depth of about 37 inches, is firm, brown gravelly or stony loam.

Included with this soil in mapping are small areas of Hilton soils on foot slopes and in slightly lower areas and areas of coarser textured Madrid soils. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate sign or symbol. Also included are areas where the surface layer is nongravelly loam or fine sandy loam.

There may be an apparent temporary seasonal high water table in the substratum for brief periods late in winter or early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone and limestone gravel. Permeability is moderate in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are strongly acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated or is used for pasture or fruit crops.

This soil is fairly well suited to cultivated crops. The gravelly surface layer and the hazard of erosion are the main problems or limitations. Stones on the surface or gravel make the planting and cultivation of small seeded crops difficult and can cause excessive wear of machinery.

Erosion control measures are needed to prevent loss of soil, water, and nutrients. Contour tillage, stripcropping, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations that include grasses and legumes help to reduce runoff and control erosion in cultivated areas. Many of these practices also help to preserve good soil tilth. This soil can be used more intensively for row crops if a no-plow system of management is used in which the row crops are planted directly in killed sod, crop residue, or cover crops.

Because of slope, the use of precision farm machinery is somewhat difficult in places, and the use of irrigation on specialized crops is either reduced or not practical. Tile should be used to drain wet soils.

This soil is fairly well suited to fruit crops. The main limitation is the hazard of erosion. Traffic lanes should run across the slope if possible. If water accumulates in traffic lanes, it should be diverted off the downslope side to prevent the formation of channels or gullies. Drainage of wetter soils helps in the management of orchards. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Drainage of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight; however, erosion can be severe along roads or trails. Logging roads and skid trails should be on

the contour or across the slope wherever possible. Equipment limitations are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the hazard of erosion, the slow permeability of the substratum, and the gravelly surface layer.

Basements may need to be protected from underground seepage. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Special design of septic tank systems or municipal sewers may be needed for effective waste disposal. Some areas afford excellent views. Capability subclass IIIe.

OnD—Ontario gravelly loam, 15 to 25 percent slopes. This moderately steep, well drained soil formed in glacial till. It is on side slopes of moraines and drumlins. Some areas are hilly. Areas of this soil generally are oriented in a north-south direction. They occur as rather narrow strips or horseshoe shaped areas on drumlins or moraines (Fig. 5). Individual areas are mostly 5 to 50 acres in size.

Typically, the surface layer of this soil is friable, dark brown gravelly loam 7 inches thick. The subsurface layer is 10 inches thick. The upper part is very friable, brown gravelly loam 3 inches thick. The lower part is very friable, light brownish gray loam 7 inches thick. The subsoil extends to a depth of 36 inches. The upper part is firm, reddish brown loam with thin, leached light grayish brown coatings; it is 5 inches thick. The lower part is firm, reddish brown heavy loam 14 inches thick. The substratum, to a depth of 36 inches, is firm, brown gravelly or stony loam.

Included with this soil in mapping are small, severely eroded spots and spots of coarser textured Madrid soils. Wet spots, clay spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

There may be an apparent temporary seasonal high water table in the substratum for brief periods early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone and limestone gravel. Permeability is moderate in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is rapid. In areas that have not been limed, the surface layer and subsoil are strongly acid to neutral.

This soil has poor potential for farming. Most of the acreage is idle land, pasture, or woodland.

This soil is poorly suited to cultivated crops. The hazard of erosion and the moderately steep slopes are the main problems or limitations.

Slope and the erosion hazard are severe limitations in cultivated areas. Operating machinery on this soil can be difficult and possibly dangerous. Cultivation is possible, but only in combination with a high proportion of sod crops and a maximum of conservation practices. Row crops can be grown more frequently if they are planted directly by a no-plow system of management. Crops should be grown across the slope. Because runoff is rapid, nutrients, soil, and water are easily lost, especially during periods of high intensity rainfall. Maintaining good soil tilth is important. Many areas are best suited to pasture.

This soil can be used for some fruit crops. The main limitations are the hazard of erosion and the moderately steep slopes. Operating machinery on this soil can be difficult and often hazardous. Fruit trees should be planted across the slope. Traffic lanes should be on the contour or across the slope wherever possible. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a substantial loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is moderate. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope interferes with machine harvesting and planting of trees. Hand planting may be needed in some areas. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are the moderately steep slopes, the hazard of erosion, and the slow permeability in the substratum.

Slope makes most construction difficult, and streets and roads are difficult to maintain. Removing vegetation should be held to a minimum, and plant cover should be re-established as soon as possible. Construction sites need some form of sediment control, for example, sediment basins. Some areas can be used as recreation sites, especially for skiing. Capability subclass IVe.

OSE—Ontario soils, steep. These steep and very steep, well drained soils formed in glacial till. The surface layer is mainly gravelly loam but ranges in texture to gravelly fine sandy loam. Areas of these soils are on sides of moraines and drumlins. Slope ranges from 25 to 50 percent but is dominantly 25 to 35 percent. Areas of these soils generally are oriented in a north-south direction. They occur as rather narrow strips or horseshoe shaped areas on drumlins or moraines. Individual areas are mostly 5 to 50 acres in size.

Typically, the surface layer is friable, dark grayish brown gravelly loam 5 inches thick. The subsurface layer is 9 inches thick. The upper part is very friable, brown gravelly loam about 3 inches thick. The lower part is very friable, light brownish gray fine sandy loam 6 inches thick. The subsoil extends to a depth of 36 inches. The upper part is firm, reddish brown loam with thin, leached, light grayish brown coatings; it is 5 inches thick. The lower part is firm, reddish brown loam 17 inches thick. The substratum is firm brown gravelly or stony loam.

Included with these soils in mapping are a few small areas where slopes are more than 50 percent. Also included are spots of coarser textured Madrid soils and severely eroded spots. Wet spots, sand spots, clay spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

An apparent temporary seasonal high water table is occasionally in the substratum for brief periods early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone and limestone gravel. Permeability is moderate in the subsoil and slow in the substratum. The available water capacity is moderate to high. Runoff is very rapid. In areas that have not been limed, reaction ranges from strongly acid to neutral in the surface layer and subsoil.

These soils have poor potential for farming. Most of the acreage is idle land, pasture, or woodland.

These soils are not suited to cultivated crops or fruit crops. The severe hazard of erosion and the steep and very steep slopes limit the use of these soils to pasture, woods, and wildlife habitat. Equipment operation is extremely difficult and hazardous.

These soils are not suited to fruit crops because of the steep and very steep slopes.

Overgrazing and grazing when the pasture is wet are the main concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in severe losses of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Reseeding and applying lime and fertilizer are extremely difficult because of the steep slopes.

Timber production on these soils is high. The erosion hazard is moderate. Erosion can be a severe hazard along logging roads and skid trails. If water accumulates on roads, it should be diverted off the downslope. Equipment limitations are moderate. Slope makes the machine harvesting and planting of trees difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

These soils have very severe limitations for most urban uses. The main limitations are the steep and very steep slopes and the severe erosion hazard.

These soils are limited to extensive use only. Removing vegetation should be held to a minimum, and plant cover should be established as soon as possible. Some areas have potential for specialized recreational uses, use as wildlife habitat, or use as natural "open-space" areas. Capability subclass VIe.

OvA—Ovid silt loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil formed in glacial till. It is on moderately low flats on till plains. Areas of this soil are usually irregular in shape and are mostly 5 to 30 acres in size.

In a typical profile, the surface layer is friable, very dark grayish brown silt loam 8 inches thick. The subsurface layer is friable, mottled, brown silt loam 4 inches thick. The subsoil extends to a depth of 30 inches. The upper part is firm, mottled brown silty clay loam 6 inches thick, and the lower part is firm, mottled, reddish brown silty clay loam 12 inches thick. The substratum, to a depth of 40 inches, is firm, brown silty clay loam.

Included with this soil in mapping are small, higher areas of Cazenovia soils that are better drained and areas of Lyons soils in depressions and along drainageways. Wet spots, sand spots, clay spots, stony spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam or silty clay loam.

There is a perched seasonal high water table in the upper part of the subsoil in spring or other wet periods. Coarse fragments make up 2 to 15 percent of the surface layer and are mostly sandstone or shale fragments. Permeability is moderately slow in the subsoil and slow in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is high. Runoff is slow. In areas that have not been limed, the surface layer is medium acid to neutral and the subsoil is medium acid to mildly alkaline.

If drained, this soil has fair potential for farming. If not artificially drained, its potential is poor. Most of the acreage is cultivated or is used for pasture or fruit crops.

If not artificially drained, this soil is poorly suited to cultivated crops, but with the adequate drainage it is suited to most crops grown in the county except the early-market and long-season varieties. Seasonal wetness and the moderately fine textured subsoil are the main problems or limitations. In places, stones and gravel on the surface can make the planting and cultivation of small seeded crops difficult.

This soil can be drained by tile and open ditch drainage systems if suitable outlets are available. Drains generally need to be closely spaced because of the moderately slow movement of water through the subsoil. If the soil is adequately drained, row crops can be grown almost continuously. Management practices, including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotation, should be used to improve tilth and maintain organic-matter content. In some areas, land smoothing helps improve surface drainage.

If adequately drained and managed, this soil can be very productive, especially of certain vegetable crops including tomatoes, cabbage, and sweet corn. Surface crusting and clodding can be a problem if this soil is cultivated when wet.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness and lack of good air drainage. This soil can be drained by tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Drainage of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management on this soil. If the pasture is grazed when wet, this soil compacts and restricts plant growth, and it may result in the reduction or complete loss of pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness makes the machine harvesting and planting of trees difficult. Seedling mortality is moderate. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, moderately slow permeability of the subsoil and slow permeability of the substratum, and a moderately fine textured subsoil.

Soil should be graded away from buildings. Basements need to be protected from underground seepage. Specially designed septic tank filter fields or municipal sewers are needed for effective waste disposal. Frequent applications of fertilizer help maintain grasses and shrubs. Capability subclass IIIw.

OvB—Ovid silt loam, 3 to 8 percent slopes. This is a gently sloping, somewhat poorly drained soil that formed in glacial till. It is on foot slopes and on till plains and moraines that commonly receive runoff from higher adjacent soils. Areas of this soil are roughly oblong in shape and are mostly 5 to 20 acres in size.

Typically the surface layer of this soil is friable, very dark grayish brown silt loam 8 inches thick. The subsurface layer is friable, mottled, brown silt loam 2 inches thick. The subsoil extends to a depth of 28 inches. In the upper part it is firm, mottled, brown silty clay loam 6 inches thick; in the lower part it is firm, mottled, reddish brown silty clay loam 12 inches thick. The substratum to a depth of 40 inches is firm, brown silty clay loam.

Included with this soil in mapping are Cazenovia or Hilton soils in small, higher, better drained spots and Lyons soils and poorly drained Ovid-like soils in small depressions and along drainageways. Wet spots, sand spots, clay spots, stony spots, gravel spots, and drainageways are indicated on the soil map by the appropriate conventional sign or symbol. Also included are a few areas where the surface layer is loam and silty clay loam.

There is a perched seasonal high water table in the upper part of the subsoil during spring or other wet periods. Coarse fragments range from 2 to 15 percent in the surface layer and are mostly sandstone and shale. Permeability is moderately slow in the subsoil and slow in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is high. Runoff is medium. In unlimed areas, the surface layer is medium acid to neutral, and the subsoil is medium acid to mildly alkaline.

This soil has fair potential for farming. If not artificially drained, however, its potential is poor. Most of the acreage is cultivated or is used for pasture or fruit crops.

If not artificially drained, this soil is poorly suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except for the early-market and long-season varieties. The seasonal wetness, moderately fine textured subsoil, and hazard of erosion are the main problems or limitations. In a few places, stones and gravel on the surface can make the planting and cultivating of small seeded crops difficult.

This soil is fairly well suited to tile drainage. A tile drain or diversion may be needed to intercept runoff from surrounding higher soils. Drains often need to be closely spaced because of the moderately slow permeability in the subsoil. If adequately drained and protected from erosion, this soil can be used almost continuously for row crops. Erosion control measures are needed to prevent the loss of soil, water, and nutrients. Stripcropping, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations that include grasses and legumes are practices that help to reduce runoff, control erosion, and maintain good tilth. Crusting and clodding can be a problem where subsoil material is incorporated into the plow layer. Irrigation water should be applied carefully.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are seasonal wetness and hazard of erosion. This soil can be drained by tile if suitable outlets are available. If water accumulates in traffic lanes, it should be diverted off the lane into a vegetated area to prevent gullies from forming. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the pasture is wet are the main concerns in pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in the loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, but erosion can be a problem along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Wetness makes the machine harvesting and planting of trees difficult. Seedling mortality is moderate. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, the hazard of erosion, and the moderately slow permeability of the subsoil and slow permeability of the substratum.

The soil should be graded away from buildings. Basements need to be protected from underground seepage. Removing vegetation should be held to a minimum, and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example the use of sediment basins. Specially designed septic tank filter systems or municipal sewers are needed for effective waste disposal. Capability subclass IIIw.

Pa—Palms muck. This is a nearly level, very poorly drained soil that formed in organic deposits that are 16 to 50 inches thick over mineral soil deposits. Slope ranges from 0 to 3 percent, but is mostly less than 1 percent. The soil is on flats or in depressed areas in bogs or marshes. Areas of this soil are roughly round in shape and mostly 10 to 50 acres in size.

In a typical profile, friable, black muck extends to a depth of 22 inches. Below that, the substratum, to a depth of 50 inches, is firm, mottled, grayish brown heavy silt loam.

Included with this soil in mapping are a few small areas of mucky Lyons soils and mucky Canandaigua soils. Drainageways are indicated on the map by the conventional signs or symbols.

There is an apparent prolonged high water table at or near the surface most of the year. This soil is susceptible to flooding and ponding. Woody fragments make up 0 to 15 percent of the organic surface layer. Permeability is moderate to moderately rapid in the organic soil material and moderately slow to moderate in the underlying mineral soil material. The rooting depth is limited by the prolonged high water table. The available water capacity is high. Runoff is very slow or ponded. In areas that have not been limed, the organic material is strongly acid to neutral and the mineral soil substratum is slightly acid to moderately alkaline.

This soil has good potential for vegetable crops if adequately drained. If not artificially drained, it is suited only to woods and wildlife habitat. Most of the acreage is cultivated, idle, or in woods.

If not artificially drained, this soil is not suited to cultivated crops, but with adequate drainage, it is productive of certain vegetable crops. The prolonged wetness, the susceptibility to flooding or ponding, and the hazard of wind erosion are the main problems or limitations.

This soil can be drained by tile and open ditches if suitable outlets are available or if a pumping system is used. Careful design and installation of drains is needed. A regulated water table is desirable to prevent excessive subsidence and wind erosion. If drained, this soil gradually subsides because of oxidation and settling of the organic material. Where the organic mantle is less than 30 inches thick, drainage may not be practical. Excessive tillage should be avoided because it encourages oxidation of the organic material and traffic pans may form.

Because this soil is low in nutrients, including phosphorus and potassium, fertilizer should be applied that meets the needs of the crop grown. There is a hazard of wind erosion where the soil surface is dry. Windbreaks, cover crops, and irrigation prevent the loss of soil by wind. This soil is on the lowest part of the landscape and is very susceptible to early and late season frost action.

If not artificially drained, this soil is not suited to fruit crops, but with adequate drainage, it is suited to fruits that have a shallow root system. The main limitations are the prolonged wetness, susceptibility to flooding or ponding, lack of good air drainage, and susceptibility to frost damage.

If not drained, this soil is not suited to pasture, but if adequately drained, it is only poorly suited. Compaction and puncturing of the sod cover are serious hazards.

Timber production on this soil is moderate to poor. Equipment limitations are severe. Wetness makes the machine harvesting and planting of trees difficult. Seedling mortality is severe because of wetness. Brush removal and careful planting improve seedling survival.

This soil has very severe limitations for most urban uses. The main limitations are the prolonged high water table, the susceptibility to flooding or ponding, and the organic texture.

This soil is not suited to most kinds of construction. The high water table, susceptibility to flooding and ponding, poor stability, and low bearing strength limit the use of this soil for extensive recreation, open space areas, or as a habitat for wetland wildlife. Capability subclass IVw.

PcA—Palmyra gravelly loam, 0 to 3 percent slopes. This nearly level, well drained to excessively drained soil formed in glacial outwash deposits that are mostly sand and gravel.

It is in nearly flat or slightly undulating areas on outwash plains and terraces. Areas of this soil are elongated or irregular in shape. Individual areas are mostly 10 to 80 acres in size.

Typically, the surface layer is friable, dark grayish brown gravelly loam 9 inches thick. The subsurface layer is friable, grayish brown gravelly loam 3 inches thick. The subsoil extends to a depth of 27 inches. The upper part is 7 inches thick and is friable, dark brown to brown gravelly heavy loam with thin, leached coatings of grayish brown. The lower part is friable, brown gravelly sandy clay loam 8 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown, dark grayish brown, and very dark grayish brown gravel and sand.

Included with this soil in mapping are Phelps or Fredon soils in small depressions and drainageways. Some mapped areas include spots of a similar soil that has a loamy substratum. Wet spots, sand spots, clay spots, drainageways, and gravel pits are indicated on the map by the appropriate conventional signs or symbols. Also included are areas where the surface layer is loam or fine sandy loam.

The seasonal high water table generally is at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel sized sandstone and limestone fragments. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to medium. Runoff is slow. In areas that have not been limed, reaction ranges from medium acid to neutral in the surface layer and from slightly acid to mildly alkaline in the subsoil.

This soil has good potential for farming. Most of the acreage is cultivated.

This soil is well suited to cultivated crops, especially the early-market and long-season varieties. It is an especially productive soil if irrigated. The gravelly surface layer and low to moderate available water capacity are the main problems or limitations. Gravel on the surface can make the planting and cultivating of small-seeded crops difficult and can cause excessive wear of machinery.

Row crops can be grown year after year, but if sod crops are not grown, careful management is needed to maintain soil tilth. Management needs include growing cover crops, using crop residue, and keeping tillage to a minimum wherever possible. Because nutrients are more readily leached from this soil than from many other soils, lime and fertilizer should be added more frequently and in smaller amounts. This soil can be tilled early in spring and is especially good for growing early-market vegetable crops. Response to irrigation is good.

This soil is well suited to fruit crops including cherries and peaches and other pitted fruits. The main limitation is the low to moderate available water capacity. Irrigation is often needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer according to soil tests and regular additions of organic material help overcome losses from leaching.

Overgrazing is a major concern in pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. Seedling mortality is slight, but seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has few limitations for urban uses. The main limitations are the very rapid permeability of the substratum and the gravelly surface layer. Underground water pollution is a hazard. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. This soil is an excellent aquifer, and wells usually yield large quantities of water. Capability class I.

PcB—Palmyra gravelly loam, 3 to 8 percent slopes. This gently sloping, well drained to excessively drained soil formed in glacial outwash deposits of mostly sand and gravel. It is in slightly convex areas on outwash plains and terraces that are mostly undulating. Areas of this soil are oblong or irregular in shape and mostly more than 20 acres in size.

In a typical profile the surface layer is friable, dark grayish brown gravelly loam 9 inches thick. The subsurface layer is friable, grayish brown gravelly loam 2 inches thick. The subsoil extends to a depth of 24 inches. The upper part is friable, dark brown to brown gravelly heavy loam with thin, leached coatings of grayish brown; it is 7 inches thick. The lower part of the subsoil is friable, brown gravelly sandy clay loam 6 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown, dark grayish brown, and very dark grayish brown gravel and sand.

Included with this soil in mapping are Phelps and Fredon soils in a few small depressions or drainageways. Some mapped areas include spots of a similar soil that has a loamy substratum. Wet spots, sand spots, clay spots, drainageways, and gravel pits are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam or fine sandy loam or cobbly loam.

The seasonal high water table usually is at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel sized limestone and sandstone fragments. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to medium. Runoff is slow. In areas that have not been limed, the surface layer is medium acid to neutral and the subsoil is slightly acid to mildly alkaline.

This soil has good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is well suited to cultivated crops, especially the early-market and long-season varieties. It can be an especially productive soil if irrigated. The gravelly surface layer, the low to moderate available water capacity, and the hazard of erosion are the main problems or limitations. Gravel on the surface makes the planting and cultivating of small-seeded crops difficult and can cause excessive wear of machinery.

Row crops can be grown almost continuously where the slopes are short and if management includes minimum tillage, return of crop residue to the soil, and use of winter cover crops. These practices help to maintain the organic-matter content and good soil tilth. Contour tillage, or crops grown across the slope, prevents erosion where slopes are long. A no-plow system of management that includes corn planted directly into sod, cover crops, or crop residue controls erosion and permits more intensive cropping in undulating areas.

Irrigation generally is needed to maintain production in dry summers. This soil is well suited to irrigation. Because of the moderate permeability in the upper 2 feet of soil, irrigation water should be applied rather slowly to prevent runoff and the loss of soil, water, and nutrients.

This soil is well suited to fruit crops, especially cherries and peaches and other pitted fruits. The main limitations are the low to moderate available water capacity and the susceptibility to erosion. Irrigation frequently is needed, especially for fruit that has a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer according to soil tests and regular additions of organic material help overcome losses from leaching.

Overgrazing is a main concern in pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. Equipment limitations are slight. Seedling mortality is slight, but seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has few limitations for most urban uses. The main limitations are the susceptibility to erosion, the rapid permeability of the substratum, and the gravelly surface layer.

Removing vegetation should be held to a minimum, and plant cover should be established as soon as possible. Underground water pollution is a hazard. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Most areas are good as homesites. Capability subclass IIe.

PcC—Palmyra gravelly loam, 8 to 15 percent slopes. This sloping, well drained to excessively drained soil formed in glacial outwash deposits that are mostly sand and gravel. It is in convex areas on outwash plains, terraces, kames, and eskers. Some areas are rolling. Areas of this soil are irregularly shaped or occur as rather narrow strips adjacent to streams or drumlins. Individual areas are mostly 10 to 40 acres in size.

Typically, the surface layer is friable, dark grayish brown gravelly loam 9 inches thick. The subsurface layer is friable, grayish brown gravelly loam 2 inches thick. The subsoil extends to a depth of 23 inches. The upper part is 6 inches thick, and it is a friable, dark brown to brown gravelly heavy loam with thin, leached grayish brown coats. The lower part is friable, brown gravelly sandy clay loam 6 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown, dark grayish brown, and very dark grayish brown gravel and sand.

Included with this soil in mapping are small areas of less sloping or moderately steep Palmyra soils. Some mapped areas include spots of a similar soil that has a loamy substratum. Wet spots, sand spots, clay spots, stony spots, drainageways, springs, and gravel pits are indicated on the map by the appropriate conventional signs or symbols. Also included are areas where the surface layer is loam or fine sandy loam or cobbly loam.

The seasonal high water table stays at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel-sized sandstone or limestone fragments. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to moderate. Runoff is medium. In areas that have not been limed, the surface layer is medium acid to neutral and the subsoil is slightly acid to mildly alkaline.

This soil has fair potential for farming. Most of the acreage is cultivated, idle, used as pasture, or in fruit crops.

This soil is fairly well suited to cultivated crops, including early-market and long-season varieties. The gravelly surface, the low to moderate available water capacity, and the susceptibility to erosion are the main problems or limitations. Gravel on the surface makes the planting and cultivating of small-seeded crops difficult and can cause excessive wear of machinery.

Intensive use of this soil is limited by slope and the content of gravel or cobblestones. Conserving soil and moisture are the main concerns of management. Row crops can be grown intensively if the row crop is suitable for planting in killed sod, crop residue, or cover crops in a no-plow system of management. Stripcropping, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations that include grasses and legumes help to reduce runoff and control erosion in cultivated areas. They also help maintain good soil tilth and improve the organic matter content. This soil warms up early in spring. It can be used for early-market crops if protected from erosion. Fertilizer should be applied during the growing season to supply nutrients to crops. The loss of nutrients through leaching can be excessive.

This soil is fairly well suited to fruit crops, including cherries and peaches and other pitted fruits. The main limitations are the low to moderate available water capacity and susceptibility to erosion. Irrigation is often needed, especially for fruit crops that have a rather shallow root system. Careful application of irrigation water is needed because of the erosion hazard. Nutrients, including lime, tend to be leached from the soil. Frequent applications of fertilizer, according to soil tests, and regular

additions of organic material help overcome losses from leaching.

Overgrazing is a major concern in pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in loss of soil by erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard is slight, but erosion may occur along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the hazard of erosion, the slope, the rapid permeability of the substratum, and the gravelly surface layer.

Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Some areas are scenic and make good homesites, but careful installation of septic tank filter systems is needed. Some areas are potential sources of sand and gravel. Capability subclass IIIe.

PgA—Palmyra cobbly loam, 0 to 3 percent slopes. This nearly level, well drained to excessively drained soil formed in glacial outwash deposits that are mostly sand, gravel, and cobblestones. It is in nearly flat areas on outwash plains and terraces. Areas of this soil are oblong or irregular in shape. Individual areas are mostly 10 to 80 acres in size.

Typically, the surface layer of this soil is friable, dark grayish brown cobbly loam 9 inches thick. The subsurface layer is friable, grayish brown gravelly loam 3 inches thick. The subsoil extends to a depth of 27 inches. The upper part is 7 inches thick and is friable, dark brown to brown gravelly heavy loam with thin, leached coatings of grayish brown. The lower part of the subsoil is friable, brown gravelly sandy clay loam 8 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown, dark grayish brown, and very dark grayish brown gravel and sand and some cobblestones.

Included with this soil in mapping are Phelps and Fredon soils in a few small depressions and drainageways. Some mapped areas include spots of a similar soil that has a loamy substratum. Wet spots, sand spots, stony spots, drainageways, and gravel pits are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is gravelly loam, loam, and fine sandy loam.

The seasonal high water table generally stays at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly cobblestones 3 to 10 inches in diameter. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to moderate. Runoff is slow. In areas that have not been limed, reaction ranges from medium acid to neutral in the surface layer and from slightly acid to mildly alkaline in the subsoil.

This soil has fair to good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is moderately well suited to cultivated crops, especially early-market and long-season varieties. It can be an especially productive soil if irrigated. The cobbly surface layer and low to moderate available water capacity are the main problems or limitations. Cobblestones on the surface make the planting and cultivating of small-seeded crops difficult and cause excessive wear of machinery. Tillage and cultivation are more difficult where the surface is cobbly than on the gravelly textured Palmyra soils.

Row crops can be grown year after year, but if sod crops are not included, careful management is needed to maintain the organic-matter content and soil tilth. Management should include cover crops, using crop residue, and keeping tillage to a minimum wherever possible. Because nutrients are more readily leached from this soil than from many other soils, lime and fertilizer should be added more frequently and in smaller amounts than on other less permeable soils. This soil can be tilled early in spring and is especially good for growing early-market crops. Crops respond well to irrigation.

This soil is suited to fruit crops, especially cherries and peaches and other pitted fruits. The main limitations are the low to moderate available water capacity and the cobbly surface layer. Irrigation is needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer, according to soil tests, and regular additions of organic material help overcome losses from leaching.

Overgrazing is a main concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, and deferment of grazing during wet periods are the main management needs.

Timber production on this soil is high. Equipment limitations are slight, but cobblestones can make the machine planting of seedlings difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist.

This soil has few limitations for most urban uses. The main limitations are the rapid permeability of the substratum and the cobbly surface layer. Underground water pollution is a hazard. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Cobble-sized fragments can make landscaping, grading, and the establishment of lawns difficult. This soil has good potential as a source of well water. Capability subclass IIs.

PgB—Palmyra cobbly loam, 3 to 8 percent slopes. This gently sloping, well drained to excessively drained soil formed in glacial outwash deposits that are mostly sand, gravel, and cobblestones. It is in slightly convex or undulating areas on outwash plains and terraces. Areas of this soil are oblong or irregular in shape and are mostly 10 to 80 acres in size.

Typically, the surface layer of this soil is friable, dark grayish brown cobbly loam 9 inches thick. The subsurface layer is friable, grayish brown gravelly loam 2 inches thick. The subsoil extends to a depth of 24 inches. The upper part is 7 inches thick and it is friable, dark brown to brown gravelly heavy loam with thin leached coatings of grayish brown. The lower part of the subsoil is friable, brown gravelly sandy clay loam 6 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown, dark grayish brown, and very dark grayish brown gravel and sand and some cobblestones.

Included with this soil in mapping are Phelps and Fredon soils in a few small depressions and drainageways. Some mapped areas include spots of a similar soil that has a loamy substratum. Wet spots, sand spots, clay spots, stony spots, drainageways, and gravel pits are indicated on the map by the appropriate sign or symbol. Also included are areas where the surface layer is gravelly loam, loam, and fine sandy loam.

The seasonal high water table generally stays at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly cobblestones 3 to 10 inches in diameter. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to moderate. Runoff is slow. In areas that have not been limed, reaction ranges from medium acid to neutral in the surface layer and from slightly acid to mildly alkaline in the subsoil.

This soil has fair to good potential for farming. Most of the acreage is cultivated or in fruit crops.

This soil is moderately well suited to cultivated crops, including early-market and long-season varieties. It can be an especially productive soil if irrigated. The cobbly surface layer, the low to moderate available water capacity, and the susceptiblity to erosion are the main problems or limitations. Cobblestones on the surface make the planting and cultivating of small seeded crops difficult and cause excessive wear of machinery. Tillage and cultivation are more difficult where the surface is cobbly than on the Palmyra soils that have a gravelly surface layer.

Minimum tillage and the return of crop residue to the soil are needed to maintain the organic-matter content and good tilth. Row crops can be grown almost continuously where the slopes are short if management includes minimum tillage, the return of crop residue to the soil, and the use of winter cover crops. Contour tillage or crops planted in strips across the slope are needed to reduce erosion where slopes are long. A no-plow system of management that includes crops planted directly into sod, cover crops, or the use of crop residue controls erosion and permits more intensive cropping in undulating areas. This soil is ready for tillage early in spring.

Irrigation is often needed to maintain production in dry summers. The soil is well suited to irrigation, and there is little hazard of crusting or sealing. This soil can be cultivated soon after it is irrigated, with little risk of compaction.

This soil is suited to fruit crops, especially cherries and peaches and other pitted fruits. The main limitations are the low to moderate available water capacity, the susceptibility to erosion, and the cobbly surface layer. Irrigation is generally needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer according to soil tests and regular additions of organic material help overcome losses from leaching.

Overgrazing is a main concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. Equipment limitations are slight, but cobblestones can make machine planting difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has few limitations for some urban uses. The main limitations are the susceptibility to erosion, the rapid permeability of the substratum, and the cobbly surface layer.

Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Underground water pollution is a hazard. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Cobble-sized fragments can make landscaping, grading, and establishing lawns difficult. Many areas are good as homesites. Capability subclass IIs.

PhD—Palmyra soils, 15 to 25 percent slopes. These moderately steep, well drained to excessively drained soils formed in glacial outwash deposits that are mostly sand, gravel, and cobblestones. The surface layer is gravelly loam or cobbly loam. These soils are on terrace fronts, kames, and eskers. Some areas are hilly and have complex slopes. Other areas occur as rather narrow winding areas or strips. Individual areas are mostly 5 to 20 acres in size.

Typically, the surface layer is friable, dark grayish brown gravelly loam 8 inches thick. The subsurface layer is friable, grayish brown gravelly loam 2 inches thick. The subsoil extends to a depth of 22 inches. The upper part is 5 inches thick, and it is friable, dark brown to brown gravelly heavy loam with thin leached grayish-brown coatings. The lower part of the subsoil is friable, brown gravelly sandy clay loam 7 inches thick. The substratum, to a depth of 40 inches, is loose, grayish brown and dark grayish brown gravel and sand and some cobblestones.

Included with this soil in mapping are small spots of a similar soil that has a loamy substratum. Wet spots, sand spots, drainageways, springs, and gravel pits are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam and fine sandy loam.

The seasonal high water table stays at a depth of more than 6 feet. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel and cobblestone sized limestone and sandstone fragments. Permeability is moderate in the subsoil and very rapid in the substratum. The available water capacity is low to moderate. Runoff is medium to rapid. In areas that have not been limed, reaction ranges from medium acid to neutral in the surface layer, and from slightly acid to mildly alkaline in the subsoil.

These soils have poor potential for farming. Most of the acreage is idle, used as pasture, or in woods.

These soils are poorly suited to cultivated crops. The low to moderate available water capacity, the severe hazard of erosion, the moderately steep slopes, and the gravelly or cobbly surface layer are the main problems or limitations.

Slope and the erosion hazard limit the use of these soils. Cultivation is possible, but only in combination with sod crops. Row crops can be grown more frequently if they are planted directly in a minimum tillage or no-plow system of management. These soils need to be protected by a vegetative cover all year. If they are cultivated, a complete system of erosion control is needed, including the incorporation of crop residue into the soil and growing winter cover crops. Cultivation should be across the slope and in strips, except where slopes are short and complex. Where slopes are complex, cultivation should be infrequent. Droughtiness is a problem in most years. Slope limits the use of equipment.

These soils are suited to fruit crops, including cherries and peaches and other pitted fruits. The main limitations are the low to moderate available water capacity, the susceptibility to erosion, and the moderately steep slopes. Operating machinery is difficult because of the slope. These soils are better adapted to small homeowner fruit operations. Because these soils have a low to moderate available water capacity, irrigation is needed, especially for fruit crops that have a rather shallow root system. Irrigation water must, however, be applied carefully to prevent erosion. Frequent applications of fertilizer according to soil tests, and regular additions of organic material help overcome losses from leaching.

Overgrazing is a main concern of pasture management on these soils. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on these soils is high. The erosion hazard is slight, except in disturbed areas. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope makes the machine harvesting and planting of trees difficult. Hand planting is often needed. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

These soils have severe limitations for many urban uses. The main limitations are the moderately steep slope, the susceptibility to erosion, and the rapid permeability of the substratum. Most construction is difficult on these soils because of the slope. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Most areas are good sources of sand and gravel. Frequent applications of fertilizer help maintain grasses and shrubs. Capability subclass IVe.

PLE—Palmyra and Alton soils, steep. This undifferentiated group consists of areas of Palmyra soil or Alton soil or both. These steep, well drained to excessively drained soils formed in glacial outwash deposits of sand and gravel.

They are on terraces, kames, and eskers. Areas of these soils generally occur as rather narrow strips on the faces of terraces and the sides of eskers and kames. Some areas are hilly and have complex slopes. Slope ranges from 25 to 40 percent. The surface layer of the Palmyra soil is gravelly loam or cobbly loam, and the surface layer of the Alton soil is gravelly sandy loam. Individual areas are mostly 5 to 50 acres in size.

Typically, the surface layer of the Palmyra soil is friable dark grayish brown gravelly loam 7 inches thick. The subsoil extends to a depth of 20 inches. The upper part is 5 inches thick and is friable, dark brown to brown gravelly heavy loam with thin, leached grayish brown coatings. The lower part of the subsoil is friable, brown gravelly sandy clay loam 8 inches thick. The substratum, to a depth of 40 inches, is loose grayish brown, dark grayish brown, and very dark grayish brown gravel and sand.

Typically, the surface layer of the Alton soil is very friable, dark grayish brown gravelly sandy loam 6 inches thick. The subsoil, which is 26 inches thick, is loose, brown very gravelly sandy loam. The substratum, to a depth of 60 inches is loose, dark brown, very gravelly sand.

Included with these soils in mapping are small areas of less sloping Palmyra and Alton soils. Sand spots, springs, and gravel pits are indicated on the map by the appropriate sign or symbol. Also included are areas where the surface layer is not gravelly.

In these soils, the seasonal high water table remains at a depth of more than 6 feet. Coarse fragments make up 15 to 35 percent of the surface layer and are mostly gravel or cobble sized limestone and sandstone fragments. Permeability is moderate in the subsoil and very rapid in the substratum of the Palmyra and Alton soils. The available water capacity is low in both of these soils. Runoff is medium to rapid. In areas of Palmyra soils that have not been limed, the surface layer is medium acid to neutral and the subsoil is slightly acid to mildly alkaline.

In the Alton soil the surface layer is strongly acid to very strongly acid, and the subsoil is medium acid to neutral.

These soils have poor potential for farming. Most of the acreage is idle or is used as pasture or woodland.

These soils are not suited to cultivated crops. The steep slopes and severe erosion hazard are the main problems or limitations. Operating farm equipment is difficult and extremely hazardous because of slope.

These soils are not suited to fruit crops. The main limitation is the steep slope which makes the operation of equipment difficult.

Overgrazing is a main concern of pasture management on these soils. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. Proper stocking rates to maintain the key plant species, rotation of pasture, deferment of grazing, and restricted grazing in wet periods are the main management needs. Because of droughtiness in midsummer, pastures tend to be of poor quality.

Timber production on these soils is moderately high. The erosion hazard is slight except in disturbed areas. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope makes the machine harvesting and planting of trees extremely difficult. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

These soils have very severe limitations for many urban uses. The main limitation is the steep slope. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. These soils are generally a good source of sand and gravel. Some areas have potential for certain types of recreational uses and other areas have potential for wildlife habitat. Capability subclass VIe.

PoA—Phelps gravelly loam, 0 to 3 percent slopes. This nearly level, moderately well drained soil formed in glacial outwash and beach deposits of sand and gravel. It occurs on outwash plains, beaches, and terraces. Areas of this soil are irregularly shaped or occur as narrow winding strips. Individual areas are mostly 10 to 40 acres in size.

In a typical profile the surface layer is friable, very dark grayish brown gravelly loam 9 inches thick. The subsoil extends to a depth of 34 inches. The upper part of the subsoil is friable, dark yellowish brown gravelly loam that has thin, leached coatings of pale brown; it is 5 inches thick. The lower part of the subsoil is friable, mottled, dark reddish brown gravelly clay loam 20 inches thick. The substratum, to a depth of 50 inches, is loose, dark brown, stratified gravel and sand.

Included with this soil in mapping are Palmyra and Alton soils on small, higher, better drained spots and Fredon and Halsey soils in a few depressions and drainageways. Wet spots, sand spots, clay spots, stony spots, drainageways, and gravel pits are indicated on the map by the conventional signs or symbols. Also included are areas where the surface layer is nongravelly loam or silt loam and spots that have a cobbly loam surface layer.

There is an apparent temporary seasonal high water table in the subsoil early in spring or in other wet periods. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel-sized limestone and sandstone fragments. Permeability is moderate in the subsoil and moderately rapid to rapid in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is low to moderate. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has good potential for farming. If not artificially drained, its potential is fair. Most of the acreage is cultivated or used as pasture.

If not artificially drained, this soil is fairly well suited to cultivated crops. If adequately drained, it is well suited to most crops grown in the county except for early-market and long-season varieties. It can be especially productive if drained and irrigated. Row crops can be grown year after year if the soil is properly managed. The seasonal wetness, gravelly surface layer, and low to moderate available water capacity are the main problems or limitations. Gravel on the surface can make the planting and cultivating of small seeded crops difficult and can cause excessive wear of machinery.

In wet years, slight wetness briefly delays planting in spring and can make the harvesting of long-season crops difficult. Random drainage of wetter soils is needed to make management of fields more uniform. Management practices such as minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and crop rotations should be used to improve tilth and maintain the organic-matter content. The use of tile and irrigation are beneficial to high value crops.

If not artificially drained, this soil is moderately suited to fruit crops. If adequately drained, it is well suited to apples, pears, and other fruits with similar requirements. The main limitations are the temporary seasonal wetness, lack of good air drainage, and low to moderate available water capacity.

Drainage can usually be improved by the use of tile. Because this soil has a low to moderate available water capacity, irrigation is needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer and regular additions of organic material help overcome losses from leaching.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is high. Equipment limitations and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, the rapid or moderately rapid permeability in the substratum, and the gravelly surface layer.

Basements need to be protected from underground seepage. Artificial drainage is generally needed, especially at large construction sites. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal because of the temporary wetness. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Capability subclass IIw.

PoB—Phelps gravelly loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil formed in glacial outwash and beach deposits of sand and gravel. It is on foot slopes and toe slopes and undulating areas on outwash plains, beaches, and terraces. Areas of this soil usually occur as narrow strips adjacent to drainageways or steeper upland soils. Individual areas are mostly 5 to 20 acres in size.

Typically, the surface layer of this soil is friable, very dark grayish brown gravelly loam 9 inches thick. The subsoil extends to a depth of 30 inches. The upper part of the subsoil is friable, dark yellowish brown gravelly loam with thin, leached coatings of pale brown; it is 4 inches thick. The lower part of the subsoil is friable and sticky, mottled, dark reddish brown gravelly clay loam 17 inches thick. The substratum, to a depth of 50 inches, is loose, dark brown stratified gravel and sand.

Included with this soil in mapping are a few areas of Palmyra or Alton soils on higher better drained spots and Fredon and Halsey soils in small depressions or drainageways. Wet spots, sand spots, clay spots, stony spots, drainageways, and gravel pits are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly loam or silt loam and spots that have a cobbly loam surface layer. The nearly level Phelps soil is a common inclusion in small areas less than 2 acres in size.

There is an apparent temporary seasonal high water table in the subsoil early in spring or in other wet periods. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly gravel-sized limestone and sandstone fragments. Permeability is moderate in the subsoil and moderately rapid or rapid in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is low to moderate. Runoff is slow. In areas that are not limed, the surface layer and subsoil are medium acid to neutral.

If drained, this soil has good potential for farming. If not artificially drained, its potential is fair. Most of the acreage is cultivated or used as pasture.

If not artificially drained, this soil is fairly well suited to cultivated crops; but with adequate drainage, it is well suited to most crops grown in the county except for the early-market and long-season varieties. It can be especially productive if drained and irrigated. The seasonal wetness, the gravelly surface layer, the low to moderate available water capacity, and the susceptibility to erosion are the main problems or limitations. Gravel on the surface makes the planting and cultivating of small seeded crops difficult and can cause excessive wear of machinery.

Early in spring, planting may have to be briefly delayed because of wetness. Tile drainage of wetter soils is generally needed to make management of fields more uniform. If the cropping system includes more than 2 years of row crops, minimum tillage, not plowing when wet, disking before plowing, and using crop residue are essential management practices. Erosion can be a slight problem, especially where water concentrates. In most places, cross-slope tillage, contour stripcropping, and grassed waterways control erosion. Irrigation water should not be applied too rapidly or over too long a period because of erosion. Cultivating before irrigation helps break up any crust and to improve soil aggregation.

If not artificially drained, this soil is moderately suited to fruit crops; but with adequate drainage, it is well suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness and the low to moderate available water capacity. Drainage can be improved by subsurface drains.

Because this soil has a low to moderate available water capacity, irrigation is needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be readily leached from this soil. Frequent applications of fertilizer and regular additions of organic material help overcome losses from leaching.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and plant growth restricts. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. The erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, susceptibility to erosion, rapid to moderately rapid permeability in the substratum, and the gravelly surface layer.

Basements need to be protected from underground seepage. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Artificial drainage measures are needed, especially at large construction sites. Special design of septic

tank filter fields or municipal sewers is needed for effective waste disposal because of the temporary wetness. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Capability subclass IIe.

PpA—Phelps cobbly loam, 0 to 3 percent slopes. This nearly level, moderately well drained soil formed in glacial outwash and beach deposits of sand, gravel, and cobblestones. It is in nearly flat areas on outwash plains, beaches, and terraces. Areas of this soil are irregularly shaped or occur as narrow winding strips adjacent to drainageways or uplands. Individual areas are mostly 5 to 20 acres in size.

Typically, the surface layer is friable, very dark grayish brown cobbly loam 9 inches thick. The subsoil extends to a depth of 30 inches. The upper 4 inches is friable, dark yellowish brown gravelly loam with thin, leached coatings of pale brown. The lower 17 inches is friable, mottled, dark reddish brown gravelly clay loam. The substratum, to a depth of 50 inches, is loose, dark brown stratified gravel and sand.

Included with this soil in mapping are a few areas of Palmyra or Alton soils on higher, better drained spots, and Fredon and Halsey soils in small depressions or drainageways. Wet spots, sand spots, clay spots, stony spots, drainageways, and gravel pits are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is gravelly loam and silt loam.

There is an apparent temporary seasonal high water table in the subsoil early in spring or in other wet periods. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone and limestone fragments 3 to 10 inches in diameter. Permeability is moderate in the subsoil and moderately rapid or rapid in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is low to moderate. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated or used as pasture.

If not artificially drained, this soil is fairly well suited to cultivated crops. If adequately drained, it is suited to most crops grown in the county except for early-market and long-season varieties. It can be productive if drained and irrigated. The seasonal wetness, cobbly surface layer, and low to moderate available water capacity are the main problems or limitations. Cobblestones on the surface make the planting and cultivating of small seeded crops difficult and can cause excessive wear of machinery. Tillage is somewhat more difficult where the surface is cobbly than where the surface is gravelly.

Row crops can be grown year after year under good management. In some years, wetness briefly delays spring planting and can make the harvesting of long-season crops difficult. Random drainage of wetter soils is generally needed to make management of fields more uniform. Tile drainage generally works well in this soil. Management practices, such as minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotations, should be used to improve tilth and maintain the organic-matter content. The use of tile drains and irrigation is beneficial to high value crops.

If not artificially drained, this soil is moderately well suited to fruit crops, but with adequate drainage, it is well suited to apples, pears, and other fruits with similar requirements. The main limitations are the temporary wetness, lack of good air drainage, and low to moderate available water capacity. Tile drainage benefits many areas. Irrigation is generally needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil. Frequent applications of fertilizer and regular additions of organic material help overcome losses from leaching.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. Equipment limitations are slight, although cobblestones can interfere somewhat with the machine planting of trees. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are a temporary seasonal high water table, the rapid or moderately rapid permeability in the substratum, and the cobbly surface layer.

Basements need to be protected from underground seepage. Artificial drainage is needed, especially for large construction sites. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal because of the temporary wetness. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Cobblestones make the grading and reseeding of lawns and athletic fields difficult. Capability subclass IIw.

RaA—Rhinebeck silty clay loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil formed in glacial lake sediments that are dominantly clay and silt. It is on moderately low flats on lake plains. Areas of this soil are irregular in shape and are mostly 5 to 30 acres in size.

In a typical profile, the surface layer is friable very dark grayish brown silty clay loam 6 inches thick. The subsurface layer is friable, mottled, grayish brown silty clay loam 2 inches thick. The subsoil extends to a depth of 24 inches. The upper part is firm, mottled, brown silty clay loam 9 inches thick, and the lower part is firm, mottled, dark brown silty clay loam 7 inches thick. The substratum, to a depth of 60 inches, is firm, grayish brown varved silt and clay.

Included with this soil in mapping are Collamer soils on a few higher, better drained spots and Madalin soils in small depressions and along drainageways. Wet spots, sand spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is silt loam.

There is a perched seasonal high water table in the upper part of the subsoil early in spring or in other wet periods. Coarse fragments make up 0 to 3 percent of the surface layer. Permeability is slow in the subsoil and in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is slow. In areas that have not been limed, the surface layer and the subsoil are medium acid to neutral.

This soil has fair potential for farming. If not artificially drained, its potential is poor. Most of the acreage is cultivated, idle, or used as pasture.

If not artificially drained, this soil is poorly suited to cultivated crops, but with adequate drainage, it is suited to most crops grown in the county except for the early-market and long-season varieties. The seasonal wetness, the moderately fine textured surface layer, and the fine textured subsoil are the main problems or limitations.

Because of the fine textured, slowly permeable subsoil and the underlying slowly permeable substratum, this soil does not drain easily with tile. Tile drains should be closely spaced. A combination of land smoothing and surface ditches generally is needed for adequate drainage. Tile drainage is beneficial in areas of included coarser textured soils. Runoff from surrounding higher elevations should be intercepted and diverted away from areas of this soil.

Because of the relatively high clay content in the surface layer, this soil tends to puddle, crust, and form hard clods if cultivated. Maintaining tilth is a continuous problem. Management practices, including minimum tillage, use of cover crops, incorporating crop residue into the soil, fall plowing, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content. If this soil is droughty in midsummer, shallow-rooted crops are especially affected. If this soil is irrigated, irrigation water should be controlled carefully to avoid damage and sealing of the soil surface.

If not artificially drained, this soil is poorly suited to fruit crops. If adequately drained, it is suited to apples, pears, and other fruit crops that have similar requirements. The main limitations are the seasonal wetness and lack of good air drainage.

This soil can be drained by a combination of surface drainage and subsurface drainage. Land smoothing can be beneficial. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. If the pasture is grazed when wet, the soil compacts and restricts plant growth, and it may result in the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness makes the machine harvesting and planting of trees difficult. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, the slow permeability of the subsoil and substratum, and the clayey subsoil.

Care should be taken to grade soil away from all buildings. Basements need protection from underground seepage. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. The fine textured subsoil material is difficult to grade, particularly when it is wet. Capability subclass IIIw.

RaB—Rhinebeck silty clay loam, 2 to 6 percent slopes. This gently sloping, somewhat poorly drained soil formed in glacial lake sediments that are dominantly clay and silt. It is on foot slopes and toe slopes and in undulating areas. Areas of this soil are mostly narrow strips adjacent to the nearly level Rhinebeck soils. Individual areas are mostly 5 to 20 acres in size.

Typically, the surface layer of this soil is friable, very dark grayish brown silty clay loam 6 inches thick. The subsurface layer is friable, mottled, grayish brown silty clay loam about 2 inches thick. The subsoil extends to a depth of 23 inches. The upper part is firm, mottled, brown silty clay loam 8 inches thick, and the lower part is firm, mottled, dark brown silty clay loam 7 inches thick. The substratum, to a depth of about 60 inches is firm, grayish brown varved silt and clay.

Included with this soil in mapping are Collamer soils on a few higher, better drained spots and Madalin soils in small depressions and along drainageways. Wet spots, sand spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is silt loam.

There is a perched seasonal high water table in the upper part of the subsoil early in spring or in other wet periods. Coarse fragments make up 0 to 3 percent of the surface layer. Permeability is slow in the subsoil and in the substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is moderate to high. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

If drained, this soil has fair potential for farming. If not artificially drained, its potential is poor. Most of the acreage is cultivated, idle, or used as pasture.

If not artificially drained, this soil is poorly suited to cultivated crops, but with adequate drainage, it is suited to most crops grown in the county except for the early-market and long-season varieties. The seasonal wetness, the moderately fine textured surface layer, the fine textured subsoil, and the susceptibility to erosion are the main problems or limitations.

Wetness in this soil is generally caused by runoff or seepage from surrounding higher soils. An interceptor tile or diversion ditch may be needed to divert this runoff or seepage. Generally, surface drainage works best on this soil. Tile drains need close spacing because of the fine textured, slowly permeable subsoil. Maintaining tilth or workability is a continuous problem. Because of the rather high clay content, this soil tends to crust and form hard clods if cultivated. Management practices, including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain the organic-matter content. These practices and contour tillage and stripcropping help control erosion.

Because of the slow permeability of the subsoil, there is more runoff on this soil than on other more permeable soils. Droughtiness, therefore, is a problem in extended dry periods, especially for shallow-rooted crops. If irrigation is used to overcome droughty conditions, careful control is needed to prevent erosion and puddling.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage, it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness and susceptibility to erosion.

This soil can be drained by surface drainage. The combination of shallow ditches and sod waterways is generally most effective. Tile drainage can be beneficial, but the tile needs to be closely spaced. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent this problem.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth, which may result in a loss of desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production is moderately high. The erosion hazard is slight. Logging roads should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Wetness makes the machine harvesting and planting of trees difficult. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a seasonal high water table, the susceptibility to erosion, the slow permeability of the subsoil and substratum, and the clayey subsoil.

Care should be taken to grade soil away from all buildings. Basements need to be protected from underground seepage. Interceptor drains are generally beneficial. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. The fine textured subsoil is difficult to grade and backfill if it is wet. Capability subclass IIIw.

SdB—Sodus gravelly fine sandy loam, 3 to 8 percent slopes. This gently sloping, well drained soil has a fragipan and formed in glacial till. It is on convex ridges and hilltops and in undulating areas on till plains, moraines, and drumlins. Areas of this soil are generally oblong in shape and mostly 20 to 100 acres in size.

In a typical profile the surface layer is friable, brown gravelly fine sandy loam 9 inches thick. The upper part of the subsoil is friable, strong brown and brown gravelly fine sandy loam 15 inches thick. Next is a firm, leached, reddish gray fine sandy loam layer that is 4 inches thick. The lower part of the subsoil extends to a depth of 45 inches. It is a firm, brittle fragipan of dark reddish brown gravelly loam. The substratum, to a depth of 56 inches, is firm, reddish brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Ira and Bombay soils in depressions and along drainageways. Madrid soils are included in small spots that do not have a fragipan. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly fine sandy loam and loam.

The fragipan is at a depth of 18 to 30 inches. A water table is perched above the pan or substratum for short periods in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone. Permeability is moderate above the fragipan and slow in the fragipan and substratum. The rooting depth is limited by the fragipan. The available water capacity is moderate to low. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are strongly acid to medium acid.

This soil has good potential for farming. Most of the acreage is cultivated or is used as pasture or for fruit crops.

This soil is well suited to cultivated crops, including early-market and long-season varieties. The gravelly sur-

face layer, the moderate to low available water capacity, and the susceptibility to erosion are the main problems or limitations. In places, stones and gravel on the surface make the planting and cultivating of small-seeded crops difficult and can cause excessive wear of machinery.

Where slopes are short, this soil can be almost continuously cropped if management includes minimum tillage, cross-slope tillage, return of crop residue to the soil, and winter cover. Where slopes are fairly long, contour strips, grassed waterways, and other erosion control measures are needed. The response to lime and fertilizer is very good. Tile drainage of wetter soils is generally needed to make management of fields more uniform. The response to irrigation is excellent in dry years.

This soil is fairly well suited to fruit crops. The main limitations are the moderate depth to a fragipan, the moderate to low available water capacity, and the susceptibility to erosion.

Tile drainage of wet spots is needed in most areas. Traffic lanes should run across the slope if possible. If water accumulates in traffic lanes, the water should be diverted off the downslope side into permanently grassed areas to prevent the formation of gullies. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction. Irrigation generally is needed, especially for fruit crops that have a rather shallow root system. Nutrients, including lime, tend to be leached from this soil.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. If the pasture is grazed when wet, the soil compacts and plant growth is restricted resulting in the loss of desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, but erosion can be a problem in traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Although seedling mortality is slight, seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the slow permeability of the subsoil and substratum, the gravelly surface layer, and the susceptibility to erosion.

Basements may need to be protected from underground seepage. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Some areas that afford excellent views can be used as homesites. Capability subclass IIe.

SdC—Sodus gravelly fine sandy loam, 8 to 15 percent slopes. This sloping, well drained soil has a fragipan and formed in glacial till. It is in convex areas on till plains, moraines, and drumlins. Some areas are rolling. Areas of this soil generally are oriented in a north-south direction and are oblong shaped or occur as horseshoe-shaped areas on north ends of drumlins. Individual areas are mostly 10 to 60 acres in size.

Typically, the surface layer is friable, brown gravelly fine sandy loam about 9 inches thick. The upper part of the subsoil is friable, strong brown and brown gravelly fine sandy loam 15 inches thick. Next, is a firm, reddish gray gravelly fine sandy loam layer 4 inches thick. The lower part of the subsoil extends to a depth of 44 inches. It is a firm, brittle, fragipan of dark reddish brown gravelly loam. The substratum, to a depth of 56 inches, is firm, reddish brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Ira or Bombay soils in lower spots or along drainageways. Madrid soils are in a few areas that do not have a fragipan. Some areas have severely eroded spots. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly fine sandy loam and loam.

The fragipan is at a depth of 18 to 30 inches. A water table is perched above the pan or substratum for very brief periods early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone fragments. Permeability is moderate above the fragipan and slow in the fragipan and substratum. The rooting depth is limited by the fragipan. The available water capacity is moderate to low. Runoff is medium to rapid. In areas that have not been limed, the surface layer and subsoil are strongly acid to medium acid.

This soil has fair potential for farming. Most of the acreage is cultivated or is used as pasture or for fruit crops.

This soil is fairly well suited to cultivated crops, including the early-market and long-season varieties. The gravelly surface layer, medium to low available water capacity, and susceptibility to erosion are the main problems or limitations.

In places, stones and gravel make the planting and cultivating of small seeded crops difficult and can cause excessive wear of machinery. Erosion control measures are needed to prevent the loss of soil, water, and nutrients. Contour tillage, stripcroping, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at the proper moisture level, and cropping systems, which include sod crops, help to reduce runoff and control erosion in cultivated areas. This soil can be used more intensively for row crops if a no-plow system of management is used where the row crops are planted directly in killed sod, crop residue, or cover crops.

Because of slope, the use of precision farm machinery is somewhat difficult in places, and the use of irrigation for specialized crops is either reduced or not practical. It is generally important to intercept both seepage and surface runoff on this soil and carry it safely from the field by use of permanent grass waterways; this helps prevent erosion and wetness in downslope areas. Tile should be used to drain wet included soils to make management of fields more uniform.

This soil is fairly well suited to fruit crops. The main limitations are the moderate depth to the fragipan, the medium to low available water capacity, and the susceptibility to erosion.

Tile drainage of wet spots is needed in many areas. Traffic lanes should be across the slope if possible. If water accumulates in traffic lanes, the water should be diverted off the downslope side into permanently grassed areas to prevent the formation of gullies. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent this problem.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and growth is restricted. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight. But erosion can be a serious problem in traffic areas. Logging roads and skid trails should be on the contour or across the slope wherever possible. Although seedling mortality is slight, seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has limitations for some urban uses. The main limitations are the moderate depth to a fragipan, the susceptibility to erosion, the slow permeability of the fragipan and substratum, the gravelly surface layer, and the slope.

Basements may need protection from underground seepage. Removing vegetation during construction should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example the use of sediment basins. Special design of septic tank filter fields or municipal sewers is needed for effective waste disposal. Frequent applications of fertilizer help maintain grasses and shrubs. Some areas afford excellent views. Capability subclass IIIe.

SdD—Sodus gravelly fine sandy loam, 15 to 25 percent slopes. This moderately steep, well drained soil has a fragipan and formed in glacial till. It is on side slopes and valley sides on till plains, moraines, and drumlins in narrow strips or horseshoe-shaped areas on the north end of drumlins. The areas are mostly 5 to 50 acres in size. They are generally oriented in a north-south direction.

Typically, the surface layer of this soil is friable, brown gravelly fine sandy loam 7 inches thick. The upper part of the subsoil is friable, strong brown and brown gravelly fine sandy loam 14 inches thick. Next, is a layer of firm, reddish gray gravelly fine sandy loam 4 inches thick. The lower part of the subsoil extends to a depth of 42 inches, and is a firm, brittle fragipan of dark reddish brown gravelly loam. The substratum, to a depth of 56 inches is firm, reddish brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of Ira or Bombay soils along drainageways and in lower spots on foot slopes. Madrid soils are in a few areas that do not have a fragipan. Severely eroded spots are common. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is nongravelly fine sandy loam and loam.

The fragipan is at a depth of 18 to 30 inches. A perched water table is above the pan or substratum for very brief periods early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone. Permeability is moderate above the fragipan and slow in the fragipan and substratum. The rooting depth is somewhat limited by the fragipan. The available water capacity is moderate to low. Runoff is rapid. In areas that have not been limed, the surface layer and subsoil are strongly acid to medium acid.

This soil has poor potential for farming. Most of the acreage is idle or is used as pasture or for fruit crops.

This soil is poorly suited to cultivated crops. It can be cultivated if erosion is adequately controlled. The susceptibility to erosion, the gravelly surface layer, the medium to low available water capacity, and the moderately steep slopes are the main problems or limitations.

Slope and the erosion hazard limit the use of this soil. Cultivation is possible, but only if the cropping system is dominantly sod crops. Row crops can be grown more frequently if they are planted directly in a no-plow system of management. Erosion control practices including cross-slope tillage, stripcropping, and diversion ditches are essential. Because of slope, operating equipment is generally difficult and hazardous. Droughtiness is a problem in midsummer.

This soil is fairly well suited to fruit crops. The main limitations are the moderate depth to the fragipan, the medium to low available water capacity, the susceptibility to erosion, and the moderately steep slopes. The operation of equipment is limited by the moderately steep slope. Trees should be planted across the slope and traffic lanes should run across the slope where possible. If water accumulates in traffic lanes, the water should be diverted off the downslope side into permanently grassed areas to

prevent the formation of gullies. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing is the main concern of pasture management on this soil. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and growth is restricted resulting in a loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, although erosion can be a problem in disturbed areas. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations are moderate. Slope makes the machine harvesting and planting of trees difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are the moderate depth to the fragipan, the moderately steep slope, the susceptibility to erosion, the slow permeability of the fragipan and substratum, and the gravelly surface layer.

Construction costs are generally higher on this soil than on less sloping Sodus soils. Maintaining streets and roads is difficult. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Frequent applications of fertilizer help maintain grasses and shrubs. Capability subclass IVe.

SSE—Sodus soils, steep. These are steep and very steep, well drained soils that have a fragipan and formed in glacial till. The surface layer is mainly gravelly fine sandy loam but ranges to fine sandy loam and loam. Slope ranges from 25 to 50 percent but is dominantly 25 to 35 percent. Areas of these soils are generally oriented in a north-south direction and often occur as narrow strips or U-shaped areas on the sides and north slopes of drumlins. Individual areas are mostly 5 to 25 acres in size.

Typically, the surface layer is friable, brown gravelly fine sandy loam 6 inches thick. The upper part of the subsoil is friable, strong brown and brown gravelly fine sandy loam that is 14 inches thick. Next, is a layer of leached, firm, reddish gray gravelly fine sandy loam 3 inches thick. The lower part of the subsoil extends to a depth of 40 inches. It is a firm, brittle, fragipan of dark reddish brown gravelly loam. The substratum, to a depth of 56 inches, is firm, reddish brown gravelly fine sandy loam.

Included with this soil in mapping are small areas of moderately steep Sodus soils. Madrid soils are in small spots that do not have a fragipan. Severely eroded spots are common. Wet spots, sand spots, stony spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol.

The fragipan is at a depth of 18 to 30 inches. A water table occasionally is perched above the fragipan or substratum for very brief periods early in spring. Coarse fragments make up 15 to 30 percent of the surface layer and are mostly sandstone. Permeability is moderate above the fragipan and slow in the fragipan and substratum. The rooting depth is somewhat limited by the fragipan. The available water capacity is medium to low. Runoff is very rapid. In areas that are not limed, the surface layer and subsoil are strongly acid to medium acid.

This soil has poor potential for farming. Most of the acreage is idle land, pasture, for woodland.

These soils are not suited to cultivated crops. The susceptibility to erosion and the steep and very steep slopes are the main problems or limitations. The operation of equipment is very difficult and extremely hazardous on this soil.

These soils are poorly suited to fruit crops. The main limitations are the susceptibility to erosion and the steep slopes.

Because these soils are steep and very steep, most machinery cannot be used. Therefore, fruit growing is limited mainly to hand-operated systems.

Overgrazing and erosion are the main concerns of pasture management on these soils. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and growth is restricted. Proper stocking rates to maintain the key plant species, rotation of pasture, deferment of grazing, and restricted grazing during wet periods are the main management needs. These soils tend to be more droughty than the less sloping Sodus soils.

Timber production on these soils is moderately high. The erosion hazard is slight, but erosion can be very serious in disturbed areas. Logging roads and skid trails should be across the slope wherever possible. If water accumulates in roads, it should be diverted off the downslope areas. Equipment limitations are moderate. Slope makes the machine harvesting and planting of trees difficult. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

These soils have very severe limitations for many urban uses. The main limitations are the slope and susceptibility to erosion.

These steeply sloping soils are not suited to most urban uses. They have potential as open space areas, as woodland, or as extensive recreation areas. Capability subclass VIe.

Te—Teel silt loam. This nearly level, moderately well drained to somewhat poorly drained soil formed in silty

alluvial sediments. It is in nearly flat areas on flood plains. Slope ranges from 0 to 3 percent. Areas of this soil occur as rather narrow strips adjacent to creeks and rivers that are subject to overflow. Individual areas are mostly 5 to 30 acres in size.

In a typical profile the surface layer is friable, dark grayish brown silt loam 9 inches thick. The subsoil extends to a depth of 32 inches. It is friable, dark brown silt loam that has grayish brown mottles in the lower 14 inches. The substratum, to a depth of 50 inches, is friable, mottled, dark yellowish brown silt loam.

Included with this soil in mapping are Hamlin soils on higher, better drained spots and wetter Wayland soils in small depressions and remnant cross channels. Sand spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is very fine sandy loam.

There is an apparent temporary seasonal high water table in the subsoil early in spring or in other wet periods. This soil is susceptible to flooding. Coarse fragments make up 0 to 3 percent by volume of the surface layer but are not common. Permeability is moderate in the subsoil and substratum. The rooting depth is somewhat limited by the seasonal high water table. The available water capacity is high. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are slightly acid to neutral.

This soil has good potential for farming. Most of the acreage is cultivated or used as pasture.

If not artificially drained, this soil is fairly well suited to cultivated crops, but with adequate drainage and protection from flooding, it is well suited to most crops grown in the county except for the early-market and long-season varieties. This coarse, fragment-free soil can be especially productive for certain vegetable crops. The temporary seasonal wetness, susceptibility to flooding, and size and shape of individual areas are the main problems or limitations.

Because of its low position on the landscape, this soil is often difficult to drain. Most areas, even when drained, are susceptible to cross channeling, erosion, and detrimental deposition during flooding. The size and accessibility of individual soil areas generally determine the economic feasibility of drainage or flood protection measures. Good management practices, including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain organic-matter content.

If not artificially drained, this soil is fairly well suited to fruit crops except for cherries and peaches and other pitted fruits. The main limitations are the seasonal wetness, susceptibility to flooding, lack of good air drainage, and susceptibility to erosion or detrimental deposition by floods.

Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. If the pasture is grazed when wet, the soil compacts and growth is restricted, and it may result in the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is high. Streambank erosion is a problem in some areas. Equipment limitations are slight, but wetness of some included soils and lack of accessibility can make the machine harvesting and planting of trees difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are a temporary seasonal high water table and the susceptibility to flooding.

This soil is best suited to uses which are not disrupted by flooding and seasonal wetness. Any structure or building on this soil should be elevated above flood levels. Basements need to be protected from flooding and underground seepage. Some areas may be best used as natural open-space areas. Capability subclass IIw.

Wa—Wallington silt loam. This nearly level, somewhat poorly drained soil has a fragipan. It formed in glacial lake sediments that are mostly silt and very fine sand. It is in moderately low, nearly flat areas on lake plains. Slope ranges from 0 to 3 percent. Areas of this soil are generally oriented in a north-south direction and are irregular in shape. Individual areas are mostly 5 to 40 acres in size.

In a typical profile, the surface layer is friable, very dark grayish brown silt loam 8 inches thick. The subsurface layer is friable, mottled, pinkish gray silt loam 2 inches thick. The subsoil extends to a depth of 34 inches. The upper part of the subsoil is friable, mottled, brown silt loam 5 inches thick. The lower part of the subsoil is a firm, brittle fragipan of mottled, brown very fine sandy loam 19 inches thick. The substratum, to a depth of 58 inches, is friable, brown, laminated very fine sandy loam and loamy very fine sand.

Included with this soil in mapping are small areas of Williamson soils on higher, better drained spots and wetter Canandaigua soils in small depressions and along drainageways. Sand spots, clay spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine and very fine sandy loam.

There is a perched seasonal high water table in the upper part of the subsoil early in spring or in other wet periods. The fragipan is at a depth of 12 to 24 inches.

Coarse fragments make up 0 to 3 percent of the surface layer but are not common. Permeability is moderate above the fragipan and slow in and below the fragipan. The rooting depth is limited by the seasonal high water table and the fragipan. The available water capacity is moderate. Runoff is slow. In areas that have not been limed, the surface layer and upper part of the subsoil are very strongly acid to medium acid. The fragipan ranges from strongly acid to slightly acid.

This soil has fair potential for farming. If not artificially drained, its potential is poor. Most of the acreage is cultivated, used as pasture, or in fruit crops. Some areas are idle.

If not artificially drained, this soil is poorly suited to cultivated crops, but with adequate drainage, it is suited to most crops grown in the county except for the early-market and long-season varieties. It can be a productive soil of certain vegetable crops. The seasonal wetness and moderate depth to the fragipan are the main problems or limitations.

This soil can be drained by tile and open ditch drainage if suitable outlets are available. Because of the underlying fragipan, the tile may need to be fairly closely spaced. Careful design and installation is needed for it to be effective. If the soil is adequately drained, row crops can be grown almost continuously. Management practices, including minimum tillage, use of cover crops, applying fertilizer according to soil tests, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotation, should be used to improve tilth and maintain the organic-matter content. In some areas land smoothing will help remove excess water from the surface. Frequent additions of lime are beneficial to most crops.

If adequately drained and managed, this coarse, fragment-free soil can be very productive, especially of certain vegetable crops including tomatoes, cabbage, sweet corn, cucumbers, squash, and other vine crops. This soil is well suited to irrigation. Irrigation water should be carefully applied because of the slow permeability below a depth of 12 to 24 inches.

If not artificially drained, this soil is poorly suited to fruit crops, but with adequate drainage it is suited to apples, pears, and other fruits with similar requirements. The main limitations are the seasonal wetness, the moderate depth to the fragipan, and the lack of good air drainage. This soil can be drained by tile if suitable outlets are available. Preventing soil compaction is a continuous problem. Because spraying is often done during wet periods, the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment help prevent this problem.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. If the pasture is grazed when wet, the soil compacts and growth is restricted, and it may result in the reduction or complete loss of the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing in wet periods are the main management needs.

Timber production on this soil is moderately high. Equipment limitations are moderate. Wetness makes the machine harvesting and planting of trees difficult. Seedling mortality is moderate. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are a seasonal high water table and the slow permeability of the subsoil and substratum.

Basements need protection from underground seepage. Special design of septic tank filter fields or municipal sewers are needed for effective waste disposal.

Frost action is a hazard to some uses. Stability is a problem for underground excavations and for large structures. Capability subclass IIIw.

WcA—Wassaic silt loam, 0 to 3 percent slopes. This nearly level, well drained and moderately well drained soil formed in glacial till that is 20 to 40 inches deep over bedrock. It is in nearly flat areas on till plains that are controlled by bedrock. Areas of this soil are generally oriented in an east-west direction and are irregular or roughly rectangular in shape. Individual areas are mostly less than 20 acres in size.

Typically, the surface layer is friable, dark grayish brown silt loam 10 inches thick. The subsurface layer is friable, pinkish gray loam 6 inches thick. The subsoil extends to a depth of 31 inches. It is firm, reddish brown heavy loam interfingered in the upper 3 inches with thin, light reddish brown coatings. The bedrock, at a depth of 31 inches, is coarse textured dolomitic limestone (Fig. 6).

Included with this soil in mapping are a few spots of shallow Farmington soils and spots of deep Hilton soils. Wet spots, stony spots, gravel spots, rock outcrops, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam and gravelly loam.

A temporary seasonal high water table generally is perched in the lower part of the subsoil for brief periods early in spring. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 0 to 15 percent of the surface layer and are mostly limestone and sandstone. Permeability is moderate in the subsoil. The rooting depth is limited by the bedrock. The available water capacity is moderate. Runoff is slow. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated or used as pasture.

This soil is fairly well suited to cultivated crops. The brief seasonal wetness, the moderate depth to bedrock, and the moderate available water capacity are the main problems or limitations.

In places, stones or gravel on the surface can make the planting and cultivating of small seeded crops difficult and can also cause excessive wear of machinery. Row

crops can be grown year after year under good management. In wet years, a slight wetness problem briefly delays spring planting and can make the harvesting of long-season crops difficult. Good management practices, including minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and crop rotations, should be used to improve tilth and maintain the organic-matter content. Random drainage of wetter areas generally is needed to make management of fields more uniform. Installing a drainage system in this soil is more expensive than in other soils because of the shallowness to bedrock. If the soil is irrigated, water should not be applied too rapidly or over too long a period. Cultivating before irrigating helps to break up any crust and to improve soil aggregation.

This soil is fairly well suited to fruit crops. The main limitations are the brief seasonal wetness, moderate depth to rock, and moderate available water capacity. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery that has wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are the moderate depth to bedrock and a temporary seasonal high water table.

Excavations are costly. Basements often need to be protected from underground seepage. There is a hazard of pollution from waste disposal systems because of the jointed and fractured bedrock. Capability subclass IIw.

WcB—Wassaic silt loam, 3 to 8 percent slopes. This gently sloping, well drained and moderately well drained soil formed in glacial till that is 20 to 40 inches deep over bedrock. It is in slightly convex areas on till plains that are influenced by bedrock. Areas of this soil are generally oriented in an east-west direction and are irregular or roughly rectangular in shape. Individual areas are mostly less than 20 acres in size.

In a typical profile the surface layer is friable, dark grayish brown silt loam 10 inches thick. The subsurface layer is friable, pinkish gray loam 6 inches thick. The subsoil extends to a depth of 30 inches. It is firm, reddish brown heavy loam that has thin interfingers of light reddish brown coatings in the upper 3 inches. The bedrock, at a depth of 30 inches, is coarse textured dolomitic limestone.

Included with this soil in mapping are a few spots of shallow Farmington soils and spots of deep Hilton soils. Wet spots, stony spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is loam and gravelly loam.

There is commonly a temporary seasonal high water table perched in the lower part of the subsoil early in spring or in other wet periods. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 0 to 15 percent of the surface layer and are mostly limestone and sandstone. Permeability is moderate in the subsoil. The rooting depth is limited by the bedrock. The available water capacity is moderate. Runoff is medium. In areas that have not been limed, the surface layer and subsoil are medium acid to neutral.

This soil has fair potential for farming. Most of the acreage is cultivated or used as pasture.

This soil is fairly well suited to cultivated crops. The brief seasonal wetness, moderate depth to bedrock, moderate available water capacity, and susceptibility to erosion are the main problems or limitations. In places, stones or gravel on the surface can make the planting and cultivating of small-seeded crops difficult and can cause excessive wear of machinery. Planting may have to be slightly delayed early in spring because of wetness. Drainage of wetter soils is generally needed to make management of fields more uniform. Installing drainage is comparatively expensive because of the moderate depth to bedrock. Keeping cultivation to a minimum, not plowing when wet, disking before plowing, growing cover crops, and using crop residue are essential management practices if the cropping system includes mostly cultivated crops. Long slopes are common, and erosion is a problem, especially where water concentrates. In most places, contour stripcropping and diversions will control erosion. If the soil is irrigated, irrigation water should not be applied too rapidly or over too long a period. Cultivating before irrigating helps to break up any crust and to improve soil aggregation.

This soil is fairly well suited to fruit crops. The main limitations are the brief seasonal wetness, moderate depth to bedrock, moderate available water capacity, and susceptibility to erosion. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. Overgrazing can cause the reduction or complete loss of pasture seeding

and can result in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. Because erosion can occur, especially in traffic lanes, logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are the moderate depth to bedrock, temporary seasonal high water table, and susceptibility to erosion.

Underground excavations are extremely costly. Basements generally need to be protected from underground seepage. Removing vegetation during construction should be held to a minimum, and plant cover should be established as soon as possible. Because of the underlying jointed and fractured bedrock, there is a hazard of pollution of the water table from waste disposal systems. Capability subclass IIe.

Wd—Wayland silt loam. This nearly level, poorly drained and very poorly drained soil formed in silty alluvial sediments. It is in low areas or slack water areas on flood plains. Slope ranges from 0 to 3 percent. Areas of this soil parallel streams and occur as narrow winding areas, which are mostly 5 to 40 acres in size.

In a typical profile, the surface layer is friable, very dark gray silt loam 8 inches thick. The substratum is friable, dark gray silt loam to a depth of 23 inches; firm, dark gray silt loam to a depth of 35 inches; and firm, gray heavy silt loam to a depth of 50 inches.

Included with this soil in mapping are small areas of better drained Teel soils on slightly higher spots and wetter Palms soils in small depressions and marshy areas. Marshy areas, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is mucky silt loam.

There is an apparent prolonged high water table at or near the surface in spring and in other wet periods. The water table is somewhat regulated by the water level in the adjacent streams. This soil is susceptible to flooding. Coarse fragments make up 0 to 3 percent of the surface layer. Permeability is slow in the layers below the surface layer. The rooting depth is limited by the prolonged high water table. The available water capacity is high. Runoff is very slow to ponded. In areas that have not been limed, the surface layer and upper part of the substratum are neutral to mildly alkaline.

This soil has fair to poor potential for farming. If not artificially drained, its potential is poor. Most of the acreage is idle land, pasture, or woodland.

If not artificially drained, this soil is not suited to cultivated crops, but with adequate drainage, it is suited to most crops grown in the county except for the early-market and long-season varieties. It can be especially productive of certain vegetable crops. Prolonged wetness and susceptibility to flooding are the main problems or limitations.

Because this soil is in low areas adjacent to streams, drainage outlets are often difficult to establish. Where drainage is feasible, diking may be necessary to protect the soils from flooding. Cover crops and streambank protection may be needed to prevent stream scour and erosion. Land leveling is often beneficial in filling in cross channels and scour areas. Some areas are small and inaccessible.

If not artificially drained, this soil is not suited to fruit crops, but with adequate drainage, it is moderately suited to apples, pears, and other fruits with similar requirements. The main limitations are the prolonged wetness, susceptibility to flooding, and lack of good air drainage. Because this soil is near natural drainageways, it is very susceptible to flooding and ponding. It is one of the most difficult soils to drain because of the lack of suitable outlets. It is generally located in frost pockets where there is a hazard of frost damage to fruit.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. Grazing when wet causes the soil to compact and can damage the desirable pasture plants. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs. Reseeding is difficult because of the prolonged wetness.

Timber production on this soil is moderately high. Erosion hazard is slight. Equipment limitations are severe. Wetness makes the machine harvesting and planting of trees difficult. Seedling mortality is severe because of wetness. Partial drainage, brush removal, and careful planting improve seedling survival.

This soil has very severe limitations for many urban uses. The main limitations are a prolonged high water table and susceptibility to flooding and ponding (Fig. 7).

This soil has potential as open-space areas or for wetland wildlife habitat. Removing vegetation should be held to a minimum and plant cover should be established as soon as possible. Capability subclass IVw.

WnA—Williamson silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil has a fragipan and formed in glacial lake sediments that are dominantly silt and very fine sand. It is on broad, slightly convex flats on lake plains and deltas. Individual areas of this soil are usually irregular in shape and mostly 10 to 100 acres in size.

Typically the surface layer is friable, dark grayish brown silt loam 8 inches thick. The upper part of the subsoil is very friable, faintly mottled, yellowish brown silt loam 9 inches thick. Next, is a layer of leached, friable, mottled, light yellowish brown and pale brown very fine

sandy loam 5 inches thick. The lower part of the subsoil is a fragipan that extends to a depth of 50 inches. The upper part of the fragipan is very firm, mottled, brown silt loam, and the lower part is firm, mottled lamellae of dark brown and light brown silt loam and very fine sandy loam. The substratum, to a depth of 60 inches, is layers of dark brown firm silt loam and pinkish gray friable very fine sandy loam.

Included with this soil in mapping are small areas of Collamer and Dunkirk soils, which are similar but do not have a fragipan. Also included are a few areas of Wallington soils in depressions and along drainageways. Wet spots, sand spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine and very fine sandy loam.

There is a perched, temporary seasonal high water table above the fragipan early in spring and in other wet periods. The fragipan is at a depth of 15 to 24 inches. Coarse fragments make up 0 to 5 percent of the surface layer but are not common. Permeability is moderate in the upper part of the subsoil and slow in the fragipan and substratum. The rooting depth is somewhat limited by the temporary seasonal high water table and the fragipan. The available water capacity is moderate. Runoff is slow. In areas that have not been limed, reaction ranges from very strongly acid to medium acid in the surface layer and in the upper part of the subsoil. The fragipan is strongly acid to medium acid.

This soil has good potential for farming. Most of the acreage is cultivated or is used as pasture or for fruit crops.

If not artificially drained, this coarse, fragment-free soil is fairly well suited to most cultivated crops grown in the county except for the early-market and long-season varieties. It can be especially productive of certain vegetable crops. The temporary seasonal wetness, moderate depth to fragipan, and moderate available water capacity are the main problems or limitations.

Row crops can be grown on this soil year after year under good management. The temporary wetness briefly delays spring planting and can make the harvesting of long-season crops difficult. Random drainage of wetter areas is needed to make management of fields more uniform. Tile drainage works fairly well if adequate outlets are available. The fragipan limits rooting depth and influences the available water capacity. This soil is very susceptible to the formation of traffic pans. Preventing soil compaction is a continuous problem. Draining wetter areas and using lighter machinery with wider treads help prevent soil compaction. Minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, crop rotation, and other good management practices should be used to improve tilth and maintain the organic matter content.

This soil is well suited to tile drains and irrigation for high value crops. Because of the slow permeability of the fragipan, water should not be applied rapidly or over a long period.

This soil is fairly well suited to fruit crops except for cherries and peaches and other pitted fruits. The main limitations are the seasonal wetness, moderate depth to the fragipan, and moderate available water capacity.

This soil can be drained by tile, which generally needs to be closely spaced because of the slow permeability in the fragipan. Preventing soil compaction is a continuous problem. Spraying is often done in wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. If the pasture is grazed when wet, the soil compacts and plant growth is restricted. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard, equipment limitations, and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a temporary seasonal high water table and slow permeability of the fragipan and substratum.

Basements generally need to be protected from underground seepage. Septic tank filter fields or municipal sewers need to be specially designed for effective waste disposal. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Some areas are good sites for athletic fields and playgrounds. Capability subclass IIw.

WnB—Williamson silt loam, 2 to 6 percent slopes. This gently sloping, moderately well drained soil has a fragipan. It formed in glacial lake sediments that are dominantly silt and very fine sand. It is in slightly convex areas on lake plains and deltas. Some areas are undulating. Areas of this soil are irregular in shape and mostly from 10 to 100 acres in size.

In a typical profile, the surface layer is friable, dark grayish brown silt loam 8 inches thick. The upper part of the subsoil is very friable, faintly mottled, yellowish brown silt loam 7 inches thick. Next, is a leached layer of friable, mottled, light yellowish brown and pale brown very fine sandy loam 5 inches thick. The lower part of the subsoil is a fragipan that extends to a depth of 48 inches. The upper part of the fragipan is very firm, mottled, brown silt loam, and the lower part is firm, mottled lamellae of dark brown and light brown silt loam and very fine sandy loam. The substratum, to a depth of 60 inches, is layers of firm dark brown silt loam and friable pinkish gray very fine sandy loam.

Included with this soil in mapping are small areas of slightly heavier textured Collamer and Dunkirk soils,

which are similar to the Williamson soil but do not have a fragipan. Also included are Wallington soils in small depressions and along drainageways. Wet spots, sand spots, gravel spots, and drainageways are indicated on the map by the appropriate conventional sign and symbol. Also included are areas where the surface layer is fine and very fine sandy loam.

There is a perched temporary seasonal high water table above the fragipan early in spring and in other wet periods. The fragipan is at a depth of 15 to 24 inches. Coarse fragments make up 0 to 5 percent of the surface layer but are not common. Permeability is moderate in the upper part of the subsoil and slow in the fragipan and substratum. The rooting depth is somewhat limited by the temporary seasonal high water table and the fragipan. The available water capacity is moderate. Runoff is medium. In areas that have not been limed, reaction ranges from very strongly acid to medium acid in the surface layer and upper part of the subsoil. The fragipan is strongly acid to medium acid.

This soil has good potential for farming. Most of the acreage is cultivated or is used as pasture or for fruit crops.

If not artificially drained, this soil is fairly well suited to most cultivated crops. It is especially suited to carrots, beets, and certain other close-seeded vegetable crops. The temporary seasonal wetness, moderate depth to the fragipan, moderate available water capacity, and susceptibility to erosion are the main problems or limitations.

Careful management is needed to reduce crusting and control erosion. This soil is very susceptible to compaction. Maintaining good structure is difficult and traffic pans commonly form. Plowing and fitting should be done at proper moisture levels. Planting may have to be slightly delayed early in spring because of the temporary wetness. Where wetter included soils occur, tile drainage is needed to make management of fields more uniform. Controlling erosion is a continuous problem. Good management practices, including maintaining winter cover crops, using crop residue, using sod crops in rotation, and keeping tillage to a minimum, are needed to control erosion where slopes are short. On longer slopes, these practices and mechanical measures, including terraces, contour stripcropping, and keeping grass in waterways, are needed. The effectiveness of irrigation is reduced by the slow permeability of the subsoil and the potential crusting of the surface soil.

This soil is fairly well suited to fruit crops except for cherries and peaches and other pitted fruits. The main limitations are the seasonal wetness, moderate depth to the fragipan, moderate available water capacity, and susceptibility to erosion.

This soil can be drained by tile, which generally needs to be closely spaced, because of the slow permeability in the fragipan. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns in pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and often results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is slight, but erosion can occur, especially along traffic lanes. Logging roads and skid trails should be on the contour or across the slope wherever possible. Equipment limitations and seedling mortality are slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for some urban uses. The main limitations are a temporary seasonal high water table, susceptibility to erosion, and slow permeability of the fragipan and substratum.

Basements often need to be protected from underground seepage. Removing vegetation during construction should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Septic tank filter fields or municipal sewers need to be specially designed for effective waste disposal. Frequent applications of fertilizer and irrigation water help maintain grasses and shrubs. Capability subclass IIe.

WnC—Williamson silt loam, 6 to 12 percent slopes. This sloping, moderately well drained soil has a fragipan and formed in glacial lake sediments that are dominantly silt and very fine sand. It is in slightly convex areas on lake plains and deltas. Some areas are rolling. Areas of this soil are generally adjacent to uplands or in dissected areas. Individual areas are irregular in shape and mostly 5 to 50 acres in size.

Typically, the surface layer is friable, dark grayish brown silt loam 7 inches thick. The upper part of the subsoil is very friable, faintly mottled, yellowish brown silt loam 6 inches thick. Next is a leached layer of friable, mottled, light yellowish brown and pale brown very fine sandy loam 4 inches thick. The lower part of the subsoil is a fragipan that extends to a depth of 45 inches. The upper part of the fragipan is very firm, mottled, brown silt loam, and the lower layer is firm, mottled lamellae of dark brown and light brown silt loam and very fine sandy loam. The substratum is layers of firm dark brown silt loam and friable pinkish gray very fine sandy loam.

Included with this soil in mapping are small areas of slightly heavier textured Collamer and Dunkirk soils, which are similar but do not have a fragipan. Also included are a few severely eroded spots and a few

moderately steep areas. Wet spots, sand spots, gravel spots, drainageways, and springs are indicated on the map by the appropriate conventional sign or symbol. Also included are areas where the surface layer is fine and very fine sandy loam.

There is a perched temporary seasonal high water table above the fragipan early in spring and in other wet periods. The fragipan is at a depth of 15 to 24 inches. Coarse fragments make up 0 to 5 percent of the surface layer but are not common. Permeability is moderate in the upper part of the subsoil and slow in the fragipan and substratum. The rooting depth is somewhat limited by the seasonal high water table and the fragipan. The available water capacity is moderate. Runoff is rapid. In areas that have not been limed, reaction ranges from very strongly acid to medium acid in the surface layer and in the upper part of the subsoil. The fragipan is strongly acid to medium acid.

This soil has fair potential for farming. Most of the acreage is cultivated or idle or is used as pasture or for fruit crops.

This soil is fairly well suited to cultivated crops. The susceptibility to erosion, temporary seasonal wetness, moderate depth to the fragipan, and moderate available water capacity are the main problems or limitations.

Erosion control measures are needed to prevent loss of soil, water, and nutrients. Stripcropping, minimum tillage, use of cover crops, incorporating crop residue into the soil, tillage at proper moisture levels, and cropping systems which include a high proportion of sod crops help to reduce runoff and control erosion in cultivated areas. This soil is also suited to row crops grown in a no-plow system of management in which crop residue protects the soil surface. Careful management is needed to reduce crusting, control erosion, and prevent compaction. Planting may have to be slightly delayed early in spring because of temporary wetness, wet spots, and springs. Tile drainage of wetter areas and interceptor drains are generally needed to make management of fields more uniform and to prevent downslope wetness.

Irrigation is difficult or not practical because of slope and the slow permeability of the fragipan. In places, slope limits the kind of machinery that can be used.

This soil is fairly well suited to fruit crops except cherries and peaches and other pitted fruits. The main limitations are the temporary seasonal wetness, moderate depth to the fragipan, moderate available water capacity, and susceptibility to erosion.

Operating spraying and other equipment may be somewhat difficult because of the wet spots, springs, or moderately steep areas. Traffic lanes should be across the slope if possible. If water accumulates in traffic lanes, the water should be diverted off the downslope side into permanently vegetated areas to prevent erosion and the formation of gullies. Preventing soil compaction is a continuous problem. Spraying is often done during wet periods, and the heavy equipment used causes potholes and traffic pans to form. Draining of wet spots, maintaining good sod cover, using gravel or crushed stone in traffic lanes, and using lighter machinery with wider treads or other specially designed equipment help prevent soil compaction.

Overgrazing and grazing when the soil is wet are the main concerns of pasture management. Overgrazing can cause the reduction or complete loss of the desirable pasture plants and usually results in a loss of soil by erosion. If the pasture is grazed when wet, the soil compacts and restricts plant growth. Proper stocking rates to maintain the key plant species, rotation of pasture, yearly mowing, deferment of grazing, and restricted grazing during wet periods are the main management needs.

Timber production on this soil is moderately high. The erosion hazard is moderate. To help control erosion, logging roads and skid trails should be on the contour or across the slope wherever possible. Moderately steep spots can make the machine harvesting and planting of trees difficult. Seedling mortality is slight. Seedlings should be planted in spring when the soil is moist. Brush removal and careful planting improve seedling survival.

This soil has severe limitations for many urban uses. The main limitations are the temporary seasonal high water table, the susceptibility to erosion, the slow permeability in the fragipan and substratum, and the slope.

Basements generally need to be protected from underground seepage by interceptor drains or some other method. Removing vegetation during construction should be held to a minimum and plant cover should be established as soon as possible. Large construction sites need some form of sediment control, for example, the use of sediment basins. Septic tank filter fields or municipal sewers need to be specially designed for effective waste disposal. Frequent applications of fertilizer help in maintaining grasses and shrubs. This soil is a suitable source of topsoil. Capability subclass IIIe.

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, for 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.

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 best suited to the soil, including some not commonly grown in the survey area, are discussed; the estimated yields of the main crops and hay are presented for each soil; and the system of land capability classification used by the Soil Conservation Service is explained.

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

Approximately 194,000 acres in Wayne County were used for cropland and pasture in 1969. Of this total, 41,000 acres were used for row crops; 40,000 acres for orchards, vineyards, and bush fruit; 25,000 acres for close-grown field crops and 25,000 acres for hay (*12*). The remaining acres were in conservation use, temporarily idle cropland, pasture, rotation hay and pasture, formerly cropped openland, and summer fallow.

The potential for increased food production is good. Much of the land not cultivated at the present time could be cultivated if drained by tile and open ditch drainage. Productive capacity could be increased considerably by using the best current crop production technology on all cropland in the county. The soil survey can help pinpoint the management practices needed for increased crop production.

Some general principles of soil management related to crop production in the county are discussed in the following paragraphs.

Soil Drainage is a major management need on 40 percent of the cropland in the county. Some soils are too wet for cultivated crops without artificial drainage. These are the poorly drained to very poorly drained Lyons, Wayland, Lamson, Canandaigua, Madalin, Lakemont, and Halsey soils. The very poorly drained organic soils, such as Carlisle, Palms, Adrian, Edwards, Chippeny, and Martisco soils, are mainly limited to woods and wildlife and are not artificially drained. Somewhat poorly drained soils, such as Appleton, Massena, Ovid, Junius, Minoa, Niagara, Wallington, and Fredon soils, are too wet for early planting of crops. Although the seasonal wetness interferes with the growth and harvesting of most crops, these soils respond so well to artificial drainage that if adequately drained and well managed, they will outyield many better drained upland soils.

Many upland soils which are well drained or moderately well drained, such as Ontario, Hilton, Madrid, and Bombay soils, need random tile drainage. The random tile is mainly needed to drain included wetter soils.

The design of both surface and subsurface drainage systems varies with the kind of soil. Some soils, for example, Fredon, Halsey, Minoa, Junius, and Lamson soils, have moderate to rapid permeability and respond well to tile drainage. Other soils, such as Ovid and Rhinebeck soils, which have slow permeability, require surface drainage by ditching or landforming. Finding adequate outlets in poorly drained to very poorly drained soils—Wayland, Canandaigua, Lamson, and organic soils, for example—is often difficult. Where outlets are not adequate, the land can sometimes be drained by use of pumps; however, a pump drainage system is more expensive to install and operate than conventional gravity systems. Information on drainage design and costs is available at the local Wayne County Soil and Water Conservation District office or from the Soil Conservation Service.

Soil erosion is a problem on about half of the total cropland in the county. The erosion hazard is related to the slope of the land and the erodibility of the soil. Other factors such as rainfall, length of slope, and tillage practices have a great influence on soil erosion.

The loss of soil through erosion is damaging for many reasons; loss of nutrients and water, gullies formed on hillsides, detrimental sedimentation downslope, and pollution of streams, lakes, and water reservoirs are constant reminders of the hazard of erosion. Soil productivity is

usually reduced by erosion. This is especially true of soil with restricting layers in the subsoil or substratum. Soils with fragipans, such as Sodus, Ira, and Williamson soils, are examples. Soils that are shallow or moderately deep to bedrock, such as Farmington, Wassaic, Lairdsville, and Riga soils, can be permanently damaged by erosion.

There are many tillage and conservation practices that control soil erosion. Minimum tillage, tillage at the proper moisture level, contour stripcropping, cover crops, and stubble mulching are examples of beneficial management practices. Help in controlling erosion can be obtained through the local soil and water conservation office.

Soil blowing is a problem on some soils, especially during extended dry periods and under certain kinds of cultivation. Well drained to somewhat excessively drained sandy soils, such as Colonie and Oakville soils, are especially susceptible. Organic soils, such as Carlisle, Edwards, Palms, Adrian, and Martisco soils, are very susceptible to soil blowing when they are drained and the dried organic surface is exposed to strong winds. Regulating the water table, irrigation, and windbreaks are effective in controlling wind erosion on these organic soils.

Available water capacity is an important consideration in growing crops. Some soils in the county tend to be droughty. Sandy soils, soils with restricting layers such as a fragipan, soils that are shallow or moderately deep to bedrock, and soils with an excessive amount of coarse fragments tend to have a low or moderate capacity to store moisture. Gravelly Alton soils, sandy Colonie soils, and shallow Farmington soils are examples of well drained or somewhat excessively drained soils in Wayne County that have a low available water capacity. These limitations are often difficult to overcome. Some deep rooted crops do well on Alton and Colonie soils; however, shallow rooted crops usually require irrigation to produce satisfactory yields. Good conservation practices, such as maintaining or increasing organic matter levels and improving soil structure, help increase the available water capacity of some droughty soils. Regular additions of lime to acid soils that have a fragipan improve soil structure and thus increase the capacity of the soils to store moisture.

Soil fertility. Most soils in the county need lime and fertilizer. The amount needed depends on the natural content of lime and plant nutrients in the soil, on the needs of the crop, and on the level of yield desired. Natural levels of lime and nutrients can be determined by laboratory analysis and tests. For assistance in getting soil tests made and interpreted, farmers and others should consult their local Cooperative Extension Agent.

Organic-matter content is very important in assessing soil fertility. The average mineral soil in Wayne County has an organic-matter content of about 3.5 to 4.0 percent in the surface layer. Poorly drained and very poorly drained soils usually have a somewhat higher organic-matter content. Nitrogen is released from organic matter, but much of it is in complex organic forms unusable by plants. For this reason, nitrogen fertilizer is needed to supplement nitrogen made available by the soil. Some types of crops, such as dry beans and vegetables, tend to decrease the organic-matter level in the soil. Cropping systems that contain several years of sod crops tend to maintain or increase organic matter levels and thus increase a soil's ability to supply natural nitrogen.

Wayne County soils are usually naturally low in ability to supply phosphorus. Sandy soils, such as Colonie and Oakville soils, tend to be very low in this capacity. The addition of appropriate amounts of phosphate in the form of commercial fertilizers is essential for good crop yields. Most of the soils are low to medium in the ability to supply potassium. However, soils, such as Rhinebeck soils, that have a clayey subsoil have a high ability to supply potassium. Even soils that have a high ability to supply potassium require supplemental fertilizer for optimum yields of most crops.

Acid soils, such as Sodus, Ira, and Williamson soils, tend to be low in calcium. These kinds of soils generally require lime to raise the pH to acceptable levels for most crops. The addition of lime also improves the calcium supply. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils in good tilth are granular and porous.

Tillage practices have a great influence on soil tilth. Some soils that are deep, have good drainage, and are moderately coarse textured or coarse textured, such as the Colonie, Oakville, and Alton soils, can be tilled with little concern about soil tilth. Other soils need to be tilled at the proper moisture level. This applies to the medium textured or moderately fine textured Cazenovia, Dunkirk, and Lairdsville soils and is especially true of soils that are somewhat poorly drained and have a moderately fine or fine textured subsoil, such as Ovid, Rhinebeck, Lockport, and Brockport soils. Plowing or cultivating these finer textured soils when wet tends to puddle them and causes hard crusts or clods to form when the soils dry. Once a crust is formed, it reduces infiltration and increases runoff. Seed germination is usually reduced, and the natural structure of the soil is destroyed. Regular additions of crop residue and lime, green manure crops, and tillage at proper moisture levels will improve tilth and help maintain soil structure.

Special crops are grown in Wayne County in addition to the crops listed in table 5. Vegetables such as celery, onions, spinach, potatoes, and lettuce are commonly grown on the organic Carlisle, Palms, Adrian, Edwards, and Martisco soils. The largest acreage of organic soils, located in the southeastern part of Wayne County, is known as the "Savannah muck area." Special crops are grown mainly on a limited number of organic soils. Estimated yield figures and the latest information for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil and Water 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 soil is not suited to the crop or the crop is not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. 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 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. 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 recreation, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. 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, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Woodland management and productivity

MEREDITH A. PETERS, woodland conservationist, Soil Conservation Service, assisted in the preparation of this section.

Approximately 96,900 acres, or 24 percent of Wayne County, is classified as commercial forest land.

The areas of commercial forest types in the county are as follows: white or red pine, 2,500 acres; plantations, 5,600 acres; oak, 6,800 acres; elm-ash-red maple, 40,000 acres; maple-beech-birch, 38,500 acres; and aspen-birch, 3,500 acres.

Table 7 contains information useful to woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *d*, restricted root depth; *s*, sandy texture; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: w, d, s, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

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 areas; (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 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, 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 local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use and that limitations are 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 (fig. 9). For some soils rated severe, 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 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, 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 8 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.

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 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which 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. 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 if the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, tion, to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

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

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

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

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

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-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 tables 14 and 15.

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 restrict 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 or very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

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

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 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. 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 the soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect

aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

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

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

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

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of 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 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

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 have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, assisted in the preparation of this section.

Wildlife is an important resource in Wayne County. There are good populations of ring-necked pheasants, cottontail rabbits, and woodcock as a result of the land use pattern created by agriculture. There are, however, poor to fair populations of ruffed grouse and deer due to the limited extent of forest land. Waterfowl make good use of the area, particularly along Lake Ontario and Sodus Bay.

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 13, 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 habitat 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 fescue, lovegrass, 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, partridgeberry, and fescue.

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 hardwood plants are oak, poplar, cherry, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are honeysuckle, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, 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, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, 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, wild herbaceous plants, and hardwood trees. 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 ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

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

EDWARD A. FERNAU, senior soil engineer, New York State Department of Transportation, Soil Mechanics Bureau, assisted in the preparation of this section.

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 test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 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 14 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 14 in the standard terms used by the U.S. Department of Agriculture (*10*). 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 (*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. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 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 in plasticity index is 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 15 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.

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.

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.

Soil and water features

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

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

The four hydrologic soil groups are:

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

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

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

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

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent

slopes, and by tides. Water standing for short periods 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 16 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.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 17.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the New York State Department of Transportation, Soil Mechanics Bureau.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The codes for shrinkage and Unified classification, are those assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145-49); Unified classification (D-2487); mechanical analysis (T88); liquid limit (T89-60); plasticity index (T90-56); moisture-density, method C (T99-57); and shrinkage (D-427).

Engineering properties of geologic deposits

The geologic deposits in Wayne County are glacial till, glacial outwash, kames, eskers, and lacustrine, alluvial, and organic material. The engineering significance of each geologic deposit is influenced to a great extent by its mode of deposition, which, in turn, determines the texture of the material and the internal structure. Other influences are the position of the deposits on the landscape and the position of the water table. In Wayne County the geologic deposits are divided into the following categories: Deep Till Deposits, Shallow-to-Rock Deposits, Stratified Coarse-grained Deposits, Stratified Fine-grained Deposits, and Organic Deposits.

DEEP TILL DEPOSITS. These are unstratified, highly variable mixtures of all particle sizes ranging from rock fragments to clay. This material was scoured and transported from nearby sources by glacial ice and deposited as drumlins, ground moraine, and recessional moraines. Isolated lenses or pockets of sorted material may occur, especially in the recessional moraine deposits. Bedrock is usually more than 5 feet beneath the soil surface, but in some small areas this depth to rock may be less or a few rock outcrops may occur. The individual rock and mineral fragments in the soil generally reflect the kinds of bedrock in the area.

Soils that formed in mixed deep till deposits are those of the Appleton, Bombay, Cazenovia, Hilton, Ira, Lyons, Madrid, Massena, Ontario, Ovid, and Sodus series.

These soils are the most dense and compact of the unconsolidated deposits in the county. Most of the tills have been subjected to the compactive weight of overriding ice. Most deep till soils are gently sloping to sloping, and landscapes are so gently sloping that cut and fill earthwork is involved in most construction. The soils usually provide stable, relatively incompressible foundations for engineering works. Fill material from these deposits, when properly compacted, provides stable embankments in contrast with steep cut slopes, which often are subject to surface sloughing and erosion.

SHALLOW-TO-ROCK DEPOSITS. These are unstratified mixtures of glacial till, fine-grained lacustrine deposits, or organic materials deposited as a thin veneer over bedrock. The soil is usually 2 to 5 feet thick, and rock outcrops are common in some areas. The landforms and topography are generally controlled by the bedrock.

Soils that formed in shallow till over limestone bedrock are Farmington; Hilton, bedrock substratum; Joliet; Newstead; and Wassaic soils. The Brockport; Cazenovia, bedrock substratum; Lairdsville; Lockport; and Riga soils formed in shallow till or residual material over shale. Lakemont, shale bedrock substratum, formed in lacustrine, fine-grained material over shale. Chippeny soils formed in organic deposits over limestone bedrock. The bedrock of Wayne County is described in the section "Physiography and Geology".

Soils that formed in shallow till deposits generally have adequate foundation strength for light structures; however, the primary engineering concerns may relate to the underlying bedrock and ground water conditions. The topography may be such that cut and fill earthwork is necessary for extensive engineering works. In general, the shale bedrock is softer and more deeply weathered than the limestone, but occasional harder lenses occur. Fill material is limited in quantity because of the closeness of bedrock.

STRATIFIED COARSE-GRAINED DEPOSITS. These materials are dominantly gravel and sand sorted by glacial melt water into layers or stratified. They occupy such geologic landforms as outwash plains and terraces, kames, eskers, beaches, bars, and the coarser parts of deltas and other lacustrine shore deposits. The strata within these deposits are well sorted or poorly sorted, and particle sizes range from cobblestones to silt. The deposits are usually loose and porous, but in some places there is a cementing of particles.

The Alton, Fredon, Halsey, Palmyra, and Phelps soils formed in gravelly deposits of outwash, kame, esker, or beach and bar origin. Sandy deposits of deltaic origin gave rise to the Colonie, Elnora, Junius, Lamson, Minoa, and Oakville soils.

Coarse-grained deposits generally have relatively high strengths. Because of their loose and porous nature, most of these deposits are not highly erodible but are subject to settlement when vibrated. However, Colonie, Elnora, Lamson, Minoa, Oakville, and Junius soils are susceptible to wind erosion when topsoil is removed. Lamson and Minoa soils, which have a large content of fine sand and a seasonal high water table, are highly susceptible to frost action.

These deposits of gravel and sand have many uses as construction material. Depending on gradation, soundness, and plasticity, they may be used for such purposes as:

1. Fill material for highway embankments.
2. Fill material for parking areas and developments.
3. Fill material to decrease stress on underlying soils so construction operations may progress.
4. Subbase for pavements.
5. Wearing surfaces for driveways, parking lots, and some roads.
6. Material for highway shoulders.
7. Free-draining backfill for structures and pipes.
8. Outside shells of dams for impounding water.
9. Slope protection blankets to drain and help stabilize wet cut slopes.
10. Sources of sand and gravel for general use.

STRATIFIED FINE-GRAINED DEPOSITS. Deposits in this category consist of lacustrine, fine-grained sediment transported by glacial melt water and deposited in quiet glacial lakes and ponds. Some soils on flood plains are on more recent slack water deposits. Distinct layers or laminations, usually of silt and clay-sized particles occur. Although these deposits are mostly silt, there is generally enough clay to make them plastic and sticky.

Soils that formed in deep lake-laid silt and clay deposits are those of the Madalin and Rhinebeck series. The Canandaigua, Collamer, Dunkirk, Wallington, and Williamson soils are on the deep silty areas of deltas. Hamlin, Teel, and Wayland soils are alluvial soils on flood plains.

Because of their fine texture and high moisture content, these deposits have relatively low strength. They are usually highly compressible, and settlement may occur over long periods. The soils with a high content of silt and fine sand are less compressible but are highly erodible and frost susceptible. Hamlin, Teel, and Wayland soils are subject to flooding.

The fine-grained deposits are difficult to use for engineering works, especially the flat, wet, soils that are subject to ponding, such as Madalin soils. Sites for embankments and heavy structures or buildings on all soils that formed in these finer sediments must be investigated for strength, settlement characteristics, and effects of ground water.

ORGANIC DEPOSITS. These deposits are, for the most part, an accumulation of plant and animal remains. In places they include a minimal amount of mineral soil. They occur in very poorly drained depressions and bogs.

Adrian, Carlisle, and Palms soils are underlain by mineral soil at varying depths, and Edwards and Martisco soils are underlain by marl at various depths. The soils that formed in organic deposits are entirely unsuitable for foundations because they are very weak and highly com-

pressible. Generally the organic material should be removed to suitable underlying material and replaced with backfill. Filling over organic deposits causes long term settlement.

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" (*13*).

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 19, 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 Entisol.

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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. 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 Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols 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 preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of 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.

Soils that cannot be classified in a series recognized in the classification system are called taxadjuncts. The Chippeny and Colonie soils in Wayne County are such soils. They are named for a series they strongly resemble and from which they differ in ways too small to be of consequence in interpreting their use or management. The Chippeny soils are warmer than is defined as the range for the series, and the Colonie soils have subsoil lamellae that are more clayey, thicker, and closer to the surface than is defined as the range for the series.

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 (*10*). 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."

Adrian series

The Adrian series consists of deep, very poorly drained organic soils in swamps or marshes. The soils formed in well decomposed organic deposits that are 16 to 50 inches thick over sandy mineral soil material. The slope ranges from 0 to 3 percent but is dominantly less than 1 percent. These soils are used mainly as pasture, woodland, and wildlife habitat. Cleared and drained areas are used mainly for vegetable crops.

Adrian soils are near Lamson and Halsey soils, which are similar, but Adrian soils have a thicker organic mantle.

Typical pedon of Adrian muck in a cultivated field in the town of Sodus, 0.5 mile south of Podger Road, 0.55 mile west of South Centenary, and 400 yards southwest of curve in DeFisher Road:

Oap—0 to 9 inches, black (10YR 2/1) broken face, rubbed, and pressed sapric material (muck); no fibers, weak fine granular structure; friable, common fine roots; 10 percent silt; slightly acid; abrupt smooth boundary.

Oa2—9 to 21 inches, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed sapric material; 15 percent fiber, 2 percent rubbed; weak coarse prismatic structure parting to moderate fine granular; firm; few fine roots; 10 percent silt; slightly acid; abrupt wavy boundary.

IIC—21 to 56 inches, grayish brown (2.5Y 5/2) sand; single grained; loose; mildly alkaline.

The solum is 16 to 50 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 10 percent in the IIC horizon. Depth to carbonates ranges from 24 to 50 inches. Reaction ranges from medium acid to neutral in the organic material and from mildly alkaline to moderately alkaline in the mineral soil substratum.

The surface tier has hue of 10YR or N, value of 2, and chroma of 0 or 1.

The subsurface and bottom tiers have hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 3. In places, thin layers of hemic material occur.

The IIC horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2. Its texture is sand or loamy sand.

Alton series

The Alton series consists of deep, well drained to somewhat excessively drained soils on outwash plains, remnant beaches, terraces, kames, and eskers. The soils formed in glacial outwash and beach deposits. The slope ranges from 0 to 45 percent but is dominantly 3 to 8 percent. These soils are used mainly for vegetable and fruit crops.

The Alton soils are in a drainage sequence with the somewhat poorly drained and poorly drained Fredon soils and the very poorly drained Halsey soils. Alton soils are also near Phelps and Williamson soils, which are similar but Alton soils are better drained and coarser textured than the others.

Typical pedon of Alton gravelly sandy loam, 3 to 8 percent slopes, in a gravel pit in the town of Wolcott, 100 feet south of Old Route 104 and 0.25 mile east of Spring Green Road:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) gravelly sandy loam; weak fine granular structure; very friable; many roots; 30 percent coarse fragments; neutral (limed); abrupt smooth boundary.

IIB2—8 to 42 inches, brown (7.5YR 5/4) very gravelly sandy loam; weak fine and medium granular structure; loose; many roots; 50 percent coarse fragments; medium acid; clear wavy boundary.

IIC—42 to 60 inches; dark brown (7.5YR 4/2) very gravelly sand; single grained; loose; few roots; 40 percent coarse fragments; few angular fragments; neutral.

The solum is 30 to 50 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 20 to 50 percent by volume in the upper part of the solum and 40 to 60 percent in the lower part of the solum and in the substratum. Unlimed reaction ranges from very strongly acid to neutral in the solum and from neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR to 7.5YR, value of 3 to 5, and chroma of 2 or 3. Texture is mainly gravelly sandy loam but includes cobbly loam.

The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 6. Texture is sandy loam or fine sandy loam with gravelly or very gravelly analogs.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Texture is sand or loamy sand with very gravelly analogs. Stratification is common in some pedons.

Appleton series

The Appleton series consists of deep, somewhat poorly drained soils on till plains. The soils formed in glacial till derived from limestone, sandstone, and shale. The slope ranges from 0 to 5 percent. These soils are used mainly for field crops and hay and as pasture and woodland.

The Appleton soils are in a drainage sequence with the well drained Ontario soils, the moderately well drained Hilton soils, and the poorly drained and very poorly drained Lyons soils. Appleton soils are also near Bombay and Massena soils which are similar, but Appleton soils have a finer textured subsoil than both the others, and Appleton soils are wetter than Bombay soils.

Typical pedon of Appleton loam, 0 to 5 percent slopes, in a cultivated field in the town of Arcadia, 100 feet southeast of junction of Clark and Pelis Roads:

Ap—0 to 9 inches, very dark grayish brown (10YR 3/2) loam; light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; neutral; 5 percent coarse fragments; abrupt smooth boundary.

A2—9 to 18 inches, light brownish gray (10YR 6/2) loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure; friable; common fine roots; common fine pores; 5 percent coarse fragments; neutral; abrupt smooth boundary.

B2t—18 to 32 inches, brown (7.5YR 5/4) loam; common fine distinct yellowish brown (10YR 5/6) and a few faint light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; few fine roots; common fine pores with clay linings; brown (7.5YR 5/2) ped faces in upper part; thin nearly continuous clay films on ped faces in lower part; 5 percent coarse fragments; neutral; clear wavy boundary.

C—32 to 50 inches, brown (7.5YR 4/2) loam; common coarse distinct yellowish brown (10YR 5/6) mottles; firm; few pores; 10 percent coarse fragments; moderately alkaline.

The solum is 24 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 15 percent by volume in the surface layer and from 5 to 30 percent in the subsoil and substratum, usually increasing with depth. Depth to carbonates ranges from 20 to 32 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, values of 3 or 4, and chroma of 2.

The A2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. Texture is loam to fine sandy loam or gravelly analogs of these.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Mottles are few to many and are faint or distinct. Texture is sandy clay loam, loam, or silt loam with or without gravelly analogs.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Its texture is loam or silt loam or their gravelly analogs.

Bombay series

The Bombay series consists of deep, moderately well drained soils on till plains and drumlins. These soils formed in glacial till that derived from sandstone and limestone. Slopes range from 0 to 15 percent but are dominantly 3 to 8 percent. These soils are used mainly for field crops, vegetable crops, and fruit crops.

The Bombay soils are in a drainage sequence with the well drained Madrid soils, the somewhat poorly drained Massena soils, and the poorly drained to very poorly drained Lyons soils. Bombay soils are near Hilton and Ira soils; Hilton soils have more clay in the subsoil than Bombay soils, and unlike Bombay soils, Ira soils have a fragipan.

Typical pedon of Bombay gravelly fine sandy loam, 3 to 8 percent slopes, in a cultivated field in Arcadia, 0.7 mile north of Eckert Road and 0.8 mile west of Tellier Road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; moderate medium granular structure; friable; common, fine and medium roots; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—10 to 15 inches; brown (10YR 5/3) gravelly fine sandy loam; few, fine, faint strong brown (7.5YR 5/6) mottles; weak medium platy structure; friable; few fine roots; common fine pores; 10 percent coarse fragments; slightly acid; clear smooth boundary.

B&A—15 to 19 inches; dark yellowish brown (10YR 4/4) loam; common medium faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine pores; brown (10YR 5/3) and light gray (10YR 7/2) dry coatings on ped surfaces 1 to 2 millimeters thick; 10 percent coarse fragments; medium acid; clear wavy boundary.

B2t—19 to 32 inches; brown (7.5YR 4/4) loam; common medium faint strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; common fine pores; clay linings in all pores and nearly continuous clay films on ped faces in the lower part; 10 percent coarse fragments; slightly acid; gradual wavy boundary.

B3—32 to 45 inches; brown (7.5YR 4/4) loam; common fine distinct yellowish brown (10YR 5/6) mottles; very weak medium subangular blocky structure; friable slightly sticky; common medium pores; thin clay linings in some pores; 10 percent coarse fragments; neutral; gradual irregular boundary.

C—45 to 60 inches; brown (7.5YR 5/2) gravelly loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak thick platy structure; firm; nonsticky; 15 percent coarse fragments; calcareous; moderately alkaline.

The solum is 30 to 45 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments range from 10 to 30 percent in the solum and 15 to 35 percent in the substratum. Depth to carbonates ranges from 35 to 45 inches. In unlimed areas the solum is strongly acid to neutral and the substratum is neutral to moderately alkaline.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 3, and chroma of 2.

The A2 horizon has hue of 10YR to 7.5YR, value of 5 or 6, and chroma of 4 or 3. The texture is fine sandy loam or loam and, in places, their gravelly analogs.

The B horizon has hue of 10YR to 5 YR, value of 4 or 5, and chroma of 3 or 4. Mottles are few or common and are faint or distinct. The texture is loam, fine sandy loam, or silt loam and, in places, their gravelly analogs.

The C horizon has hue of 10YR to 5YR, value of 5 or 4, and chroma of 3 or 2. The texture is loam or fine sandy loam and their gravelly analogs.

Brockport series

The Brockport series consists of moderately deep, somewhat poorly drained soils on bedrock-controlled till plains. The soils formed in thin clayey glacial till deposits that are 20 to 40 inches deep to shale bedrock. The slope ranges from 0 to 8 percent. These soils are used mainly for hay, pasture, and some field crops.

The Brockport soils are in a drainage sequence with the moderately well drained to well drained Riga soils and the poorly drained and very poorly drained Lakemont, shale substratum soils. Brockport soils are also near Lockport and Madalin soils, which are similar; but Lockport soils are reddish in color, and Madalin soils do not have underlying shale and are poorly drained or very poorly drained.

Typical pedon of Brockport silty clay loam from an area of Lockport and Brockport silty clay loams, 0 to 3 percent slopes, in an idle field in the town of Lyons, 450 feet south of N. Y. Rte. 31 and 0.5 mile east of Arcadia town line:

Ap—0 to 7 inches, very dark grayish brown (10YR 3/2) silty clay loam; moderate fine blocky structure; friable; many fine roots; neutral; abrupt smooth boundary.

A2g—7 to 12 inches, gray (5Y 6/1) silty clay loam; many fine prominent dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate medium blocky structure; firm; common fine roots and pores; slightly acid; clear wavy boundary.

B2tg—12 to 20 inches, pale olive (5Y 6/3) silty clay; many fine and medium distinct olive (5Y 5/4) and light olive gray (5Y 6/2) mottles; strong coarse prismatic structure parting to strong medium blocky; firm; few fine roots; few fine pores with clay linings; nearly continuous dark gray (5Y 4/1) clay films on ped faces in lower 6 inches; gray (5Y 6/1) silty coats on ped faces in upper 2 inches; few fine shale fragments; neutral; clear wavy boundary.

B3g—20 to 30 inches, pale olive (5Y 6/3) and greenish gray (5GY 5/1) silty clay; strong coarse prismatic structure parting to moderate thick platy structure; very firm; few roots; few pores; gray (10YR 5/1) prism and some ped faces; 14 percent partially weathered shale fragments; mildly alkaline; clear smooth boundary.

R—30 inches, pale olive (5Y 6/3) and greenish gray (5GY 5/1) shale; extremely firm; moderately alkaline.

The solum is 20 to 38 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 0 to 35 percent by volume in the solum and 10 to 35 percent in the substratum. Depth to carbonates ranges from 20 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 1.

The A2g horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2. Texture is silty clay loam.

The Bg horizon has hue of 5Y to 10YR, value of 6 to 4, and chroma of 4 to 1. Mottles are few to many and are distinct or prominent. Texture is silty clay, clay, or heavy silty clay loam or their shaly or gravelly analogs.

The Cg horizon, if present, is like the B horizon in color but lacks the prismatic structure and contains a higher content of shale fragments.

Canandaigua series

The Canandaigua series consists of deep, poorly drained and very poorly drained soils on lake plains. The soils

formed in glacial lake sediments that are dominantly silt. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and as pasture and woodland. Drained areas are used mainly for vegetable and fruit crops.

The Canandaigua soils are in a drainage sequence with the well drained Dunkirk soils, the moderately well drained Collamer soils, and the somewhat poorly drained Niagara soils. Canandaigua soils are also near Lamson and Lyons soils, which are similar, but Lamson soils is coarser textured and Lyons soil has developed mainly in glacial till.

Typical pedon of Canandaigua silt loam in an apple orchard, in the town of Sodus, 100 feet north of Lake Road and 0.3 mile east of Runley Road:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam, light gray (10YR 6/1) dry; moderate fine subangular blocky structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B21g—8 to 14 inches, grayish brown (10YR 5/2) very fine sandy loam; few medium distinct reddish gray (5YR 5/2) and many medium prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; common roots; common medium and fine pores; slightly acid; clear smooth boundary.

B22g—14 to 36 inches, reddish gray (5YR 5/2) silt loam; many medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm; few roots; few pores; neutral; clear smooth boundary.

C—36 to 40 inches, grayish brown (10YR 5/2) thinly varved silt loam and very fine sandy loam; weak thick platy structure; firm; few fine roots; mildly alkaline.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. There are generally no coarse fragments but they range up to 5 percent in some subhorizons of some pedons. Depth to carbonates ranges from 24 to 50 inches. In unlimed areas, reaction ranges from slightly acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2.

The Bg horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles make up more than 20 percent of the Bg horizon, and the chroma is higher than the matrix color. Texture is very fine sandy loam to light silty clay loam.

The C horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 to 3. Texture is silt loam or varved very fine sandy loam and silt loam.

Carlisle series

The Carlisle series consists of deep, very poorly drained soils in swamps or marshes. The soils formed in well decomposed organic deposits more than 51 inches thick. The slope ranges from 0 to 3 percent but is dominantly less than 1 percent. These soils are used mainly for low quality woodland and wetland wildlife habitat or they are idle. Cleared and drained areas are used mainly for vegetable crops.

Carlisle soils are near Palms and Edwards soils, which are similar, but Carlisle soils are deeper to mineral soil deposits.

Typical pedon of Carlisle muck in a cultivated field in the town of Butler, 200 feet south of Salai Road and 500 feet east of Wojeski Road:

Oap—0 to 10 inches, black (10YR 2/1) broken face and rubbed sapric material; 20 percent fibers, 5 percent rubbed; moderate fine granular structure; friable; some silt; few woody fragments; slightly acid; clear smooth boundary.

Oa2—10 to 36 inches, black (N 2/0) broken face, dark reddish brown (5YR 2/2) rubbed sapric material; 20 percent fibers, 5 percent rubbed; weak very thick platy structure parting to moderate coarse subangular blocky structure; firm and slightly brittle; many wood fragments.

Oa3—36 to 66 inches, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed sapric material; 20 percent fibers 5 percent rubbed; massive; friable; common wood fragments; slightly acid.

The organic deposit is more than 51 inches thick. Depth to bedrock is more than 60 inches. Woody fragments range from 0 to 30 percent. Reaction ranges from medium acid to neutral.

The surface tier has hue of 10YR or N, value of 2, and chroma of 0 or 1.

The subsurface and bottom tiers have hue of 10YR to 5YR or N, value of 2 or 3, and chroma of 0 to 3. Some pedons have thin layers of hemic material. Structure is generally weak but ranges from weak to moderate. Common structures are platy or blocky, but the soil material may be massive.

Cazenovia series

The Cazenovia series consists of deep, well drained to moderately well drained soils on till plains. The soils formed in glacial till derived from limestone, sandstone, and shale. The slope ranges from 0 to 15 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, vegetables and fruits.

Cazenovia soils formed in the same type of parent material and make up a drainage sequence with the somewhat poorly drained Ovid soils. They are near the similarly drained Hilton and Ontario soils and have a higher clay content in the subsoil than either of these soils. In many places, they are near the similar Lairdsville soils but are deeper to bedrock than those soils.

Typical pedon of Cazenovia silt loam, 3 to 8 percent slopes, in pasture in the town of Arcadia, 50 feet south of Bailey Road and 0.1 mile east of Turner Road:

Ap—0 to 10 inches, dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

B&A—10 to 15 inches, brown (7.5YR 5/4) heavy silt loam; weak fine subangular blocky structure; friable; common roots; common fine pores; pale brown (10YR 6/3) coating 1 to 2 millimeters thick on ped faces; 2 percent gravel; slightly acid; abrupt wavy boundary.

B2t—15 to 26 inches, reddish brown (5YR 4/3) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common fine pores; thin continuous clay films on ped faces; 10 percent gravel; neutral; gradual wavy boundary.

B3—26 to 36 inches, dark reddish brown (5YR 4/3) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; few roots; common fine pores; patchy clay films on ped faces, clay linings in pores; 10 percent gravel; mildly alkaline; calcareous; gradual wavy boundary.

C—36 to 50 inches, reddish brown (5YR 5/3) clay loam; weak thick platy structure; firm; few fine pores; 10 percent gravel; calcareous; moderately alkaline.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 40 inches. Coarse fragments range from 2 to 25 percent by volume in the solum and 10 to 35 percent in the substratum. Depth to carbonates

ranges from 24 to 40 inches. In unlimed areas, reaction ranges from medium acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Texture is mainly silt loam but includes gravelly silt loam in some areas.

The B&A horizon has hue of 7.5YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Texture is mainly silt loam but includes gravelly silt loam in some areas.

The B horizons have hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 3 or 4. Mottles are none to common, and are faint or distinct. Texture is clay loam or silty clay loam or their gravelly analogs.

The C horizon has hue of 7.5YR to 2.5YR, values of 3 to 5, and chroma of 3 or 4. Texture ranges from loam to silty clay loam or their gravelly analogs.

Chippeny series

The Chippeny series consists of moderately deep, very poorly drained organic soils on bedrock-controlled swamps or bogs. The soils formed in organic deposits that are 20 to 40 inches deep to hard bedrock. The slope ranges from 0 to 3 percent but is dominantly less than 2 percent. These soils are used mainly as woodland and wildlife habitat, or they are idle.

Chippeny soils are near Palms and Carlisle soils, which are similar but Chippeny soils are underlain by bedrock within 51 inches while the other soils are not.

Typical pedon of Chippeny muck in an idle field in the town of Sodus, 50 feet west of Zurich Road and 0.3 mile north of Quarry Road:

Oap—0 to 8 inches, black (10YR 2/1) broken face and rubbed sapric material; moderate coarse granular structure; friable; common fine roots; some silt; neutral; abrupt smooth boundary.

Oa2—8 to 20 inches, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed and pressed sapric material; 10 percent fiber, less than 5 percent rubbed; weak coarse granular structure; firm; few live roots; some silt; few woody fragments; neutral; abrupt wavy boundary.

IICg—20 to 22 inches, light gray (10YR 6/1) loam; massive; friable; moderately alkaline; abrupt broken boundary.

IIIR—22 inches, fractured dolomitic limestone bedrock.

The organic material is 20 to 40 inches thick. Depth to bedrock is 20 to 51 inches. Woody fragments range from 0 to 15 percent. Reaction ranges from medium acid to mildly alkaline in the organic part and from neutral to moderately alkaline in the mineral soil substratum.

The Oap horizon has hue of 10YR or N, value of 2 or 3, and chroma of 0 or 1.

The Oa2 horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 2. In places there are thin hemic or silty layers.

The IIC horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 1 or 2. Its texture is mainly loam or silt loam but sandy loam and silty clay loam are also included.

Chippeny soils in Wayne County are a few degrees warmer than is defined as the range for the series. This difference, however, does not affect their use and management.

Collamer series

The Collamer series consists of deep, moderately well drained soils on lake plains. The soils formed in glacial lake sediments that are dominantly silt. The slope ranges from 2 to 6 percent. These soils are used mainly for field crops, vegetables, and fruits.

The Collamer soils are in a drainage sequence with the well drained Dunkirk soils, the somewhat poorly drained Niagara soils, and the poorly drained and very poorly drained Canandaigua soils. Collamer soils are also near Williamson and Rhinebeck soils, which are similar, but Williamson soils have a lower clay content and a fragipan, and Rhinebeck soils are wetter and have a higher clay content.

Typical pedon of Collamer silt loam, 2 to 6 percent slopes, in an apple orchard, in the town of Sodus, 200 feet west of North Centenary Road, 500 feet south of Lake Ontario, and 200 feet south of private road:

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

A&B—9 to 14 inches, pale brown (10YR 6/3) silt loam; weak thin platy structure; friable; common medium and fine roots; common medium and fine pores; brown (7.5YR 5/4) ped interiors; slightly acid; clear smooth boundary.

B&A—14 to 22 inches, brown (7.5YR 5/4) heavy silt loam; weak coarse subangular blocky structure; friable; common fine roots; common fine and medium pores that have clay linings; light reddish brown (5YR 6/3), light gray (10YR 7/2) dry, ped coats 2 millimeters thick; neutral; clear wavy boundary.

B21t—22 to 32 inches, brown (7.5YR 4/4) heavy silt loam; few medium faint strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; common medium and fine pores with clay linings; continuous clay films on ped faces; neutral; clear wavy boundary.

B22t—32 to 37 inches, brown (7.5YR 4/4) heavy silt loam; common medium distinct brown (7.5YR 5/2) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few large and common medium pores with clay linings; discontinuous clay films on ped faces; neutral; clear wavy boundary.

C1—37 to 45 inches, brown (10YR 5/3) silt loam; few thin varves of very fine sand; many medium distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/2) mottles; weak medium platy structure; firm; very few fine roots; neutral; clear wavy boundary.

C2—45 to 52 inches, dark brown (7.5YR 4/2) very fine sandy loam; thin varves of silt loam; massive; slightly sticky, slightly plastic; neutral.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 4 percent by volume in the solum and substratum. Depth to carbonates ranges from 24 to 65 inches. Reaction ranges from strongly acid to neutral in the upper part of the solum, from medium acid to neutral in the lower part of the solum, and from slightly acid to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The A&B horizon has hue of 10YR to 5YR, mainly value of 5 or 6, and chroma of 2 to 4. The B part has colors similar to the Bt horizon. Texture is silt loam, very fine sandy loam, or fine sandy loam.

The B&A and Bt horizons have hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. The A part of the B&A horizon has colors similar to the A&B horizon. Mottles are few to many and are faint or distinct. Texture is heavy silt loam or light silty clay loam.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 or 3. Its texture is silt loam, very fine sandy loam or varved silt, and very fine sand.

Colonie series

The Colonie series consists of deep, somewhat excessively drained soils on lake plains, remnant sand bars, and deltas. The soils formed in sandy glacial lake and remnant beach deposits. The slope ranges from 0 to 25 pecent but

is dominantly 2 to 6 percent. These soils are used mainly for vegetable crops and fruit crops and as pasture and woodland.

The Colonie soils are in a drainage sequence with the moderately well drained Elnora soils and the somewhat poorly drained and poorly drained Junius soils. Colonie soils are also near Oakville and Alton soils, which are similar, but Oakville soils lack lamellae and Alton soils are gravelly.

Typical pedon of Colonie loamy very fine sand, 2 to 6 percent slopes, in an orchard in the town of Huron, 100 feet south of York Settlement Road and 200 yards east of Brick Schoolhouse Road:

Ap—0 to 7 inches, brown (10YR 4/3) loamy very fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

B21—7 to 12 inches, yellowish brown (10YR 5/4) loamy fine sand; weak very fine granular structure; very friable; common fine roots; medium acid; abrupt wavy boundary.

B22t—12 to 17 inches, reddish brown (5YR 4/4) very fine sandy loam; massive; friable; few roots; some clay bridging between sand grains; medium acid; abrupt wavy boundary.

B31—17 to 25 inches, brown (7.5YR 5/4) loamy fine sand; weak thick platy structure to single grain; very friable; few fine roots; medium acid; clear wavy boundary.

B32—25 to 42 inches, brown (7.5YR 4/4) very fine and fine sand; weak thick platy structure to single grain; very friable; medium acid; 2 thin (less than 1/2 inch) reddish brown (5YR 4/4) loamy very fine sand lamellae that are massive and friable; clear wavy boundary.

C—42 to 60 inches, brown (10YR 5/3) fine sand; few medium distinct strong brown (7.5YR 5/6) mottles; single grain; loose; neutral.

The solum is 36 to 60 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments are absent or very few. Unlimed reaction ranges from very strongly acid to slightly acid in the solum and from medium acid to neutral in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The B21 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. Texture is loamy fine sand or fine sand.

The B22t horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Texture is very fine sandy loam or loamy fine sand. The B3 horizons have hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4 with or without mottles. Texture is fine sand, very fine sand, or loamy fine sand.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. Texture is fine sand, or the sand particles vary in size.

In the Colonie soils in Wayne County, the subsoil lamellae contain more clay and are thicker and slightly closer to the surface than is defined as the range for the series. This difference does not greatly affect the use and management of the soils.

Dunkirk series

The Dunkirk series consists of deep, well drained soils on lake plains. The soils formed in glacial lake sediments dominated by silt. The slope ranges from 2 to 45 percent but is dominantly 15 to 45 percent. These soils are used mainly for field crops, vegetable crops, and fruit crops.

The Dunkirk soils are in a drainage sequence with the moderately well drained Collamer soils, the somewhat poorly drained Niagara soils, and the poorly drained to very poorly drained Canandaigua soils. Dunkirk soils are also near Williamson soils, which are similar but do not have a fragipan, which Williamson soils have.

Typical pedon of Dunkirk silt loam, 2 to 6 percent slopes, in a cultivated field, in the town of Ontario, one-half mile north of Lake Road and 0.9 mile east of Monroe County line:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many roots; strongly acid; abrupt smooth boundary.

A2—7 to 14 inches, brown (10YR 5/3) very fine sandy loam; moderate thin platy structure; friable; many roots; many medium pores; strongly acid; abrupt wavy boundary.

B&A—14 to 21 inches, brown (7.5YR 4/4) silt loam; strong medium and coarse blocky structure; firm; common roots; common medium pores with clay linings; ped faces are pale brown (10YR 6/3) 2 to 4 millimeters thick between peds; medium acid; clear smooth boundary.

B2t—21 to 40 inches, brown (7.5YR 4/4) silt loam; strong coarse blocky structure; firm; few roots; common medium and few large pores with thin clay linings; thin continuous clay films on ped faces; neutral; clear wavy boundary.

C—40 to 80 inches, brown (10YR 4/3) silt and very fine sand; firm; moderately alkaline; calcareous.

The solum is 24 to 45 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the solum and substratum. Depth to carbonates ranges from 24 to 45 inches. In unlimed areas, reaction ranges from strongly acid to mildly alkaline in the solum and from slightly acid to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3.

The A2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. Texture is fine sandy loam to silt loam.

The B horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. Texture ranges from very fine sandy loam to silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. Texture is strata of silt and very fine sand, and occasionally it has lenses of silt loam on silty clay loam.

Edwards series

The Edwards series consists of very poorly drained soils in swamps or bogs. The soils formed in organic deposits 16 to 51 inches thick over marl. The slope ranges from 0 to 3 percent but is mostly less than 1 percent. These soils are used mainly as woodland and wildlife habitat. Cleared and drained areas are used mainly for vegetable crops.

Edwards soils are near Martisco and Carlisle soils, which are similar, but Edwards soils have a thicker organic deposit than Martisco soils and a thinner organic deposit than Carlisle soils.

Typical pedon of Edwards muck in a cultivated field in the town of Sodus, 900 yards south of Podger Road and 400 yards west of South Centenary Road:

Oap—0 to 9 inches, black (10YR 2/1) broken face, rubbed and pressed sapric material (muck); no fibers; moderate coarse granular structure; friable; few live roots; some silt; mildly alkaline; clear smooth boundary.

Oa2—9 to 30 inches, black (5YR 2/1) broken face, very dark gray (5YR 3/1), pressed and rubbed, sapric material; 3 percent fibers, 1 percent rubbed; weak thick platy structure; friable; few live roots; few small snail shells; some silt; mildly alkaline; clear smooth boundary.

Lca—30 to 54 inches, grayish brown (2.5Y 5/2) marl; massive; friable; nonplastic; moderately alkaline; calcareous.

The organic material is 16 to 51 inches thick. Depth to bedrock is more than 60 inches. Woody fragments range from 0 to 15 percent in

the organic part. Depth to carbonates ranges from 16 to 51 inches. Reaction ranges from medium acid to mildly alkaline in the organic material. The underlying marl ranges from mildly alkaline to moderately alkaline.

The Oap horizon has hue of 10YR or N, value of 2, and chroma of 0 to 2.

The Oa2 horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 3. In places there are thin layers of hemic or fibric material.

The marl has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 or 2. The marl may or may not have sandy mineral soil layers. Mineral soil layers total less than 6 inches in thickness.

Elnora series

The Elnora series consists of deep, moderately well drained soils on remnant beaches and sand bars. The soils formed in sandy glacial lake and remnant beach deposits. The slope ranges from 2 to 6 percent but is dominantly 0 to 2 percent. These soils are used mainly for vegetable crops and fruit crops and as pasture and woodland.

Elnora soils are in a drainage sequence with the somewhat excessively drained Colonie soils and the somewhat poorly drained and poorly drained Junius soils. Elnora soils are also near Minoa and Williamson soils, which are similar, but Minoa soils are wetter and finer textured and Williamson soils are finer textured and have a fragipan.

Typical pedon of Elnora loamy fine sand, 0 to 2 percent slopes, in an idle field in the town of Butler, 100 feet north of Salter-Colvin Road and 100 yards east of Limekiln Road:

Ap—0 to 10 inches, dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.

B21—10 to 21 inches, strong brown (7.5YR 5/6) loamy fine sand; weak coarse subangular blocky structure; very friable; common fine roots; common fine pores; strongly acid; clear wavy boundary.

B22—21 to 32 inches, brown (10YR 5/3) fine sand; few fine faint yellowish brown (10YR 5/4 and 5/6) mottles; weak thick platy structure; very friable; few fine roots; few fine pores; medium acid; gradual wavy boundary.

C1—32 to 40 inches, grayish brown (10YR 5/2) fine sand; common medium distinct strong brown (7.5YR 5/6) mottles; single grain; loose; slightly acid; gradual smooth boundary.

C2—40 to 60 inches, brown (7.5YR 4/2) fine sand; few fine distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/2) mottles; single grain; loose; neutral.

The solum is 26 to 40 inches thick. Depth to bedrock is more than 60 inches. There are commonly no coarse fragments, but they range from 0 to 2 percent in the solum and from 0 to 5 percent in the substratum. In unlimed areas, reaction ranges from very strongly acid to slightly acid in the solum and from strongly acid to neutral in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 3 to 6. Mottles are few to many in the lower part of the B horizon and are faint or distinct. Texture is loamy fine sand or fine sand.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 or 3. Texture is fine sand, loamy fine sand, or strata of both.

Farmington series

The Farmington series consists of shallow, well drained soils on bedrock-controlled till plains. The soils formed in glacial till that is 10 to 20 inches deep to bedrock. The slope ranges from 0 to 8 percent but is mostly less than 6 percent. These soils are used mainly for field crops, hay, and pasture.

The Farmington soils are in a drainage sequence with the poorly drained Joliet soils. Farmington soils are also near Wassaic and Newstead soils, which are similar, but Farmington soils are shallower than both and are better drained than Newstead soils.

Typical pedon of Farmington silt loam, 0 to 8 percent slopes, in an idle field in the town of Sodus, near the intersection of Feiock Road and New York Highway 88, 100 feet north of Feiock Road and 200 feet east of Highway 88:

Ap—0 to 9 inches, dark grayish brown (10YR 4/2) silt loam; dark brown (10YR 3/3) crushed; moderate medium granular structure; friable; many fine roots; 5 percent coarse fragments; slightly acid; clear smooth boundary.

B2—9 to 15 inches, dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common roots; many fine pores; 10 percent coarse fragments; neutral; abrupt wavy boundary.

R—15 inches, hard dolomitic limestone bedrock.

The solum is 10 to 20 inches thick. Depth to bedrock is 10 to 20 inches. Coarse fragments range from 5 to 35 percent by volume in the solum. In unlimed areas, reaction ranges from strongly acid to neutral in the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Texture is loam, silt loam, or fine sandy loam or gravelly or cherty analogs of those textures.

Fredon series

The Fredon series consists of deep, somewhat poorly drained to poorly drained soils on outwash plains, remnant beaches, and terraces. The soils formed in glacial outwash deposits and glacial beach deposits. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and as pasture and woodland. Cleared and drained areas are used mainly for vegetable crops, field crops, and fruit crops.

The Fredon soils are in a drainage sequence with the well drained to excessively drained Palmyra soils, moderately well drained Phelps soils, and the very poorly drained Halsey soils.

Typical pedon of Fredon loam in a cornfield in the town of Marion, one-fourth mile north of Marion-Walworth Road and 400 yards east of gravel pit:

Ap—0 to 8 inches, very dark grayish brown (10YR 3/2) loam; dark reddish brown (5YR 3/3) organic stains; weak coarse subangular blocky structure; friable; many fine and medium roots; 5 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—8 to 14 inches, brown (10YR 5/3) loam; many coarse distinct dark brown to brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; few fine roots; common medium and large pores; light brownish gray (10YR 6/2) ped coats; 10 percent coarse fragments; medium acid; clear wavy boundary.

B22—14 to 20 inches, brown (7.5YR 5/4) heavy loam, crushed; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; slightly sticky, slightly plastic; few fine roots; few large and medium pores; light brownish gray (10YR 6/2) ped coats; 5 percent coarse fragments; medium acid; diffuse wavy boundary.

B3—20 to 24 inches, brown (7.5YR 5/2) sandy loam; very weak thick platy structure; slightly sticky, slightly plastic; few fine roots; few large and medium pores; 5 percent coarse fragments; slightly acid; abrupt wavy boundary.

IIC—24 to 50 inches, brown (7.5YR 5/2) stratified sand and gravel; massive; nonsticky; neutral.

The solum is 22 to 35 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 15 percent by volume in the solum and 35 to 70 percent in the substratum. In unlimed areas, reaction ranges from medium acid to neutral in the solum and from neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 or 2.

The B horizon has hue of 10YR to 7.5YR, value of 5 or 6, and chroma of 2 to 4. Mottles are none to many and are faint or distinct. Texture ranges from sandy loam to loam.

The IIC horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 1 to 3. Texture is stratified sand and gravel or very gravelly sandy loam.

Halsey series

The Halsey series consists of deep, very poorly drained soils in depressions on outwash plains, remnant beaches, and terraces. The soils formed in glacial outwash and glacial beach deposits. The slope ranges from 0 to 3 percent but is dominantly less than 2 percent. These soils are used mainly as pasture and woodland, or they are idle. Cleared and drained areas are used mainly for vegetable crops.

The Halsey soils are in a drainage sequence with the well drained to excessively drained Palmyra soils, moderately well drained Phelps soils, and the somewhat poorly drained or poorly drained Fredon soils. Halsey soils are also near Canandaigua and Lamson soils, which are similar, but these soils do not have a sand and gravel substratum.

Typical pedon of Halsey silt loam in an idle field in the town of Sodus, 0.15 mile east of intersection of New York Highway 104 and County Road 400 (Old U.S. Highway 104), 200 yards north of County Road 400:

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; many fine roots; 3 percent coarse fragments; medium acid; abrupt smooth boundary.

A2g—9 to 15 inches, grayish brown (2.5Y 5/2) loam; few fine faint brown (10YR 5/3) mottles; weak medium platy structure; friable; few fine roots and pores; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.

B2g—15 to 24 inches, olive gray (5Y 5/2) loam; few fine faint brown (10YR 5/3) and few fine distinct dark brown (7.5YR 4/4) mottles; weak medium and coarse subangular blocky structure; friable, hard when dry; few roots and pores; 10 percent coarse fragments; slightly acid; gradual wavy boundary.

B3g—24 to 28 inches, light olive gray (5Y 6/2) fine sandy loam; few fine distinct dark brown (7.5YR 4/4) mottles; weak medium platy structure; friable; few pores; 5 percent coarse fragments; slightly acid; clear smooth boundary.

IIC—28 to 50 inches, dark gray (5Y 4/1) very gravelly sand and stratified sand and gravel; single grain; loose; neutral; 50 percent coarse fragments.

The solum is 22 to 32 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 10 percent by volume in the solum and 20 to 50 percent in the substratum. Depth to carbonates ranges from 36 to 55 inches. Reaction ranges from medium acid to slightly acid in the solum and from neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The A2g horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2. Texture is loam, fine sandy loam, or very fine sandy loam.

The Bg horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2 or 1. Mottles are few to many and are faint or distinct. Texture is loam, fine sandy loam, or very fine sandy loam.

The IIC horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. Texture is gravelly sand, very gravelly sand, or stratified sand and gravel.

Hamlin series

The Hamlin series consists of deep, well drained soils on flood plains. The soils formed in recent alluvial deposits. The slope ranges from 0 to 3 percent. These soils are used mainly for field crops, vegetable crops, hay, and pasture.

The Hamlin soils are in a drainage sequence with the moderately well drained and somewhat poorly drained Teel soils and the poorly drained and very poorly drained Wayland soils.

Typical pedon of Hamlin silt loam in an idle field in the town of Lyons, 350 feet south of New York Highway 31 and 400 feet east of Leach Road:

Ap—0 to 9 inches, very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium and coarse granular structure; friable; many roots; neutral; abrupt smooth boundary.

B21—9 to 18 inches, dark grayish brown (10YR 4/2) silt loam; weak medium and coarse prismatic structure parting to weak fine subangular blocky; friable; many fine roots; many fine pores; few worm channels; neutral; gradual wavy boundary.

B22—18 to 40 inches, dark brown (10YR 4/3) silt loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; few very fine roots; many fine and medium pores; few worm channels; neutral; gradual smooth boundary.

C1—40 to 48 inches, dark grayish brown (10YR 4/2) silt loam; massive; friable; very few roots; many fine and medium pores; mildly alkaline; clear smooth boundary.

C2—48 to 64 inches, brown (7.5YR 5/2) and very fine sandy loam; many fine faint grayish brown (10YR 5/2) and few fine faint dark yellowish brown (10YR 4/4) mottles; massive; friable; very few roots; common fine and medium pores; mildly alkaline.

The solum is 30 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the solum and 0 to 10 percent in the substratum below a depth of 40 inches. Depth to carbonates ranges from 40 to 60 inches. Reaction ranges from slightly acid to neutral in the solum and from neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR to 7.5YR, value of 3 or 4, and chroma of 2.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam to very fine sandy loam.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2. Texture is silt loam to fine sandy loam.

Hilton series

The Hilton series consists of deep, moderately well drained soils on till plains and drumlins. The soils formed in glacial till. The slope ranges from 0 to 15 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, vegetable crops, and fruit crops.

The Hilton soils are in a drainage sequence with the well drained Ontario soils, the somewhat poorly drained Appleton soils, and the poorly drained or very poorly drained Lyons soils. Hilton soils are also near Sodus and Ira soils, which are similar but have a fragipan. Hilton soils contain more clay in the subsoil than the Madrid and Bombay soils.

Typical pedon of Hilton gravelly loam, 3 to 8 percent slopes, in an apple orchard in the town of Sodus, 575 feet west of Centenary Road and 50 feet south of Lake Road:

Ap—0 to 8 inches, dark brown (7.5YR 3/2) gravelly loam; strong coarse granular structure; friable; many roots; 20 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2—8 to 11 inches, brown (7.5YR 5/2) gravelly loam; moderate medium subangular blocky structure; friable; many roots; common large and medium pores; 20 percent coarse fragments; slightly acid; clear wavy boundary.

B&A—11 to 14 inches, reddish brown (5YR 5/3) gravelly loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common roots; common medium pores with thin clay linings; ped surfaces coated with pinkish gray (7.5YR 6/2) material 2 to 4 mm. thick; 20 percent coarse fragments; slightly acid; clear wavy boundary.

B2t—14 to 31 inches, reddish brown (5YR 4/3) heavy gravelly loam; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few roots; common medium and large pores with thin clay linings; thin continuous clay films on ped faces; 25 percent coarse fragments; neutral; clear wavy boundary.

C—31 to 50 inches, reddish gray (5YR 5/2) gravelly loam; strong medium platy structure; very firm; few fine pores; 20 percent coarse fragments; moderately alkaline; calcareous.

The solum is 24 to 42 inches thick. Depth to bedrock is more than 40 inches. Coarse fragments range from 5 to 25 percent by volume in the solum, and the percentage increases with depth in many profiles. Depth to carbonates corresponds to solum thickness. Reaction ranges from strongly acid to neutral in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2.

The A2 horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4.

The B horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 3 or 4. Mottles are faint or distinct and have chroma of 1 to 3 units higher than the matrix. Texture is loam, fine sandy loam, or sandy clay loam or gravelly analogs of those textures.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Texture is loam or fine sandy loam and gravelly analogs of those textures. Consistency is firm or very firm.

Ira series

The Ira series consists of deep, moderately well drained soils on till plains, moraines, and drumlins. The soils formed in loamy glacial till. The slope ranges from 0 to 15 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, hay, pasture, and some fruit crops.

The Ira soils are in a drainage sequence with the well drained Sodus soils, the somewhat poorly drained Massena soils, and the poorly drained and very poorly drained Lyons soils. Ira soils are near Hilton and Bombay soils, which are similar but do not have the fragipan characteristic of Ira soils.

Typical pedon of Ira gravelly fine sandy loam, 3 to 8 percent slopes, in an apple orchard in the town of Sodus, 75 feet south of Lake Road and about 0.9 mile west of North Centenary Road:

Ap—0 to 5 inches, dark grayish brown (10YR 4/2) gravelly fine sandy loam; moderate medium granular structure; friable; many roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—5 to 14 inches, yellowish red (5YR 4/6) gravelly fine sandy loam; weak medium subangular blocky structure; friable; many fine roots; common medium pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22—14 to 18 inches, brown (7.5YR 5/4) gravelly fine sandy loam; common medium distinct reddish brown (5YR 5/4) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common roots; common medium pores; 25 percent coarse fragments; strongly acid; clear wavy boundary.

A'2—18 to 21 inches, light brownish gray (10YR 6/2) gravelly fine sandy loam; common, coarse, distinct yellowish brown (10YR 5/6) and reddish brown (5YR 5/4) mottles; weak very thick platy structure parting to weak coarse subangular blocky; firm; few roots; few large and common medium pores; 25 percent coarse fragments; medium acid; abrupt irregular boundary.

B'x—21 to 44 inches, yellowish red (5YR 5/6) gravelly loam; few, fine distinct pinkish gray (5YR 6/2) and reddish gray (5YR 5/2) mottles; moderate very coarse prismatic structure; very firm and brittle; very few roots along prism faces; interiors of prisms dense and massive; prism faces are dark reddish gray (5YR 4/2); 25 percent coarse fragments; slightly acid; clear wavy boundary.

C—44 to 50 inches, reddish gray (5YR 5/2) gravelly fine sandy loam; strong medium platy structure; firm; 25 percent coarse fragments; neutral.

The solum is 36 to 50 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 10 to 35 percent by volume in the solum and 20 to 50 percent in the substratum. Depth to carbonates is more than 3 feet. Reaction ranges from strongly acid to neutral in the solum and from slightly acid to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2.

The B2 horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 6. Texture is sandy loam, fine sandy loam, loam, or the gravelly analogs of those textures.

The A2 horizon is lighter in color than the B2 horizon and is distinctly or prominently mottled. Texture is similar to that of the B2 horizon.

The Bx horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 6. Mottles are few or common and are faint or distinct. Texture is fine sandy loam or loam or gravelly analogs of those textures.

The C horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 2 or 3. Texture is fine sandy loam or loam or gravelly or very gravelly analogs of those textures.

Joliet series

The Joliet series consists of shallow, poorly drained soils on bedrock-controlled till plains. The soils formed in glacial till deposits that are 10 to 20 inches deep to bedrock. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and pasture.

Joliet soils are in a drainage sequence with the well drained Farmington soils. Joliet soils are near Wassaic and Newstead soils, which are similar but are deeper and better drained.

Typical pedon of Joliet loam in an idle field in the town of Sodus, 0.5 mile west of Maple Ridge Road and 100 feet north of Joy Road:

Ap—0 to 5 inches, very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; many fine roots; few coarse fragments; neutral; abrupt smooth boundary.

B2g—5 to 11 inches, dark gray (10YR 4/1) loam; common fine distinct reddish brown (5YR 4/4) mottles; moderate medium subangular blocky structure; friable; many fine roots; common fine pores; 5 percent coarse fragments; neutral; abrupt wavy boundary.

IIR—11 inches, gray calcareous dolomitic limestone.

The solum is 10 to 20 inches thick. Depth to bedrock is 10 to 20 inches. Coarse fragments range from 0 to 15 percent in the solum. Reaction ranges from slightly acid to moderately alkaline in the solum.

The Ap horizon as hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The B horizon has hue of 10YR to N, value of 3 to 5, and chroma of 0 to 2. Mottles are few or common and are faint or distinct.

Junius series

The Junius series consists of deep, somewhat poorly drained and poorly drained soils on lake plains and sand bars. The soils formed in sandy glacial lake-laid sediments. The slope ranges from 0 to 3 percent. These soils are used mainly for vegetable crops and hay and as pasture and woodland. Cleared and drained areas are used mainly for vegetable crops.

Junius soils are associated with the somewhat excessively drained Colonie soils, the well drained Oakville soils, and the moderately well drained Elnora soils. Junius soils are also near Minoa and Lamson soils but are slightly coarser textured than these soils.

Typical pedon of Junius loamy very fine sand in a cultivated field in the town of Savannah, one-fourth mile east of VanDyne Spoor Road and 75 feet south of Wright Road:

Ap—0 to 10 inches, dark gray (10YR 4/1) loamy very fine sand, gray (10YR 6/1) dry; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B21g—10 to 15 inches, grayish brown (10YR 5/2) loamy fine sand; few fine distinct yellowish brown (10YR 5/4) mottles; single grain; very friable; few fine roots; few pores; neutral; clear wavy boundary.

B22—15 to 24 inches, yellowish brown (10YR 5/4) loamy fine sand; many coarse distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; single grain; very friable; few roots; few pores; neutral; clear wavy boundary.

B23—24 to 36 inches, brown (10YR 5/3) fine sand; many fine faint yellowish brown (10YR 5/6) mottles; single grain; very friable; few pores; neutral; clear wavy boundary.

Cg—36 to 50 inches, dark grayish brown (10YR 4/2) fine sand; single grain; very friable; neutral to mildly alkaline.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 2 percent by volume in the solum and 0 to 5 percent in the substratum. Depth to carbonates ranges from 24 to 60 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 or 2.

The B horizon has hue of 10YR to 7.5YR, value of 4 or 5, and chroma of 2 to 4. Mottles are few to many and are faint or distinct. Texture is fine sand or loamy fine sand.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 1. Texture is fine sand or loamy fine sand.

Lairdsville series

The Lairdsville series consists of moderately deep, well drained to moderately well drained soils on bedrock-controlled till plains. The soils formed in shaly glacial till 20 to 40 inches deep to bedrock. The slope ranges from 2 to 25 percent but is dominantly 2 to 6 percent. These soils are used mainly for field crops and hay and as pasture and woodland.

The Lairdsville soils are in a drainage sequence with the somewhat poorly drained Lockport soils and the poorly drained and very poorly drained Lakemont soils. Lairdsville soils are also near Riga and Brockport soils, which are similar but do not have the reddish color which Lairdsville soils have.

Typical pedon of Lairdsville silty clay loam from an area of Lairdsville and Riga silty clay loams, 2 to 6 percent slopes, in a cultivated field in the town of Arcadia, 0.75 mile east of Stebbins Road and 50 feet south of Stuart Avenue:

Ap—0 to 8 inches, dark brown (7.5YR 4/2) silty clay loam; strong fine and medium subangular blocky structure; friable; many fine roots; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21t—8 to 12 inches, reddish brown (2.5YR 4/4) silty clay loam; moderate medium and coarse prismatic structure parting to moderate medium blocky; firm; common roots; common fine and medium pores with clay linings; nearly continuous thin clay films on prism faces, patchy clay films on internal blocky faces; thin less than 1 mm thick, light reddish brown (5YR 6/3) silty ped coats in upper part; 5 percent coarse fragments; slightly acid; gradual wavy boundary.

B22t—12 to 26 inches, dark reddish brown (2.5YR 3/4) silty clay; strong medium and coarse prismatic structure parting to strong medium blocky; firm; common roots; common pores; thin nearly continuous clay films, thicker films in pores; 5 percent shale fragments; neutral; clear smooth boundary.

C—26 to 32 inches, dark reddish brown (2.5YR 3/4) shaly silty clay; weak thick platy structure; very firm; very few roots and pores; 20 percent shale fragments; mildly alkaline; clear smooth boundary.

R—32 to 40 inches, dusky red (2.5YR 3/2) slightly weathered shale; extremely firm; extremely hard; mildly alkaline.

The solum is 18 to 36 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 2 to 25 percent by volume in the solum and 10 to 35 percent in the substratum. Depth to carbonates ranges from 18 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The Bt horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 3 or 4. Few or common mottles may be present in the lower part. Texture is clay loam, silty clay, silty clay loam, or shaly analogs of those textures.

The C horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 3 or 4. Texture is clay loam, silty clay, silty clay loam, or shaly analogs of those textures.

Lakemont series

The Lakemont series consists of deep, poorly drained and very poorly drained soils on lake plains. The soil formed in glacial lake sediments dominated by clay and silt. These soils are used mainly for hay and as pasture, woodland, and wildlife habitat.

The Lakemont soils are in a drainage sequence with the well drained and moderately well drained Lairdsville and Riga soils and the somewhat poorly drained Lockport soils. Lakemont soils are also near Madalin and Rhinebeck soils, which are similar but lack the reddish colored subsoil and have bedrock at a greater depth.

Typical pedon of Lakemont silty clay loam, shale bedrock substratum, in an idle field in the town of Arcadia, 200 feet southeast of New York Highway 31 and 425 yards northeast of Fink Road:

Ap—0 to 9 inches, very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1), dry; moderate fine subangular blocky structure; friable; many fine roots; neutral, abrupt wavy boundary.

A2g—9 to 14 inches, dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; few fine roots and pores; neutral, clear broken boundary.

B2gt—14 to 24 inches, reddish gray (5YR 5/2) silty clay; many medium distinct reddish brown (5YR 5/4) mottles as centers of peds; moderate coarse prismatic structure parting to moderate medium blocky; firm; few fine roots; common fine pores with clay linings; dark gray (5YR 4/1) prism faces; thin clay films on prism faces and on 10 to 15 percent of interior of peds; neutral; clear wavy boundary.

B3g—24 to 28 inches, reddish gray (5YR 5/2) silty clay; many coarse faint reddish brown (5YR 4/3) mottled ped interiors; moderate coarse prismatic structure parting to weak thick platy; firm; few fine pores; gray (N 6/0) faces; mildly alkaline; clear smooth boundary.

Cg—28 to 42 inches, gray (5YR 5/2) and reddish brown (5YR 4/3) silty clay; common medium distinct brownish yellow (10YR 6/6) and common medium faint gray (N 6/0) mottles; weak thick platy structure; very firm; moderately alkaline; calcareous; clear smooth boundary.

R—42 inches, slightly weathered dusky red (10YR 3/3) and greenish gray (5GY 6/1) shale; horizontal rock structure; extremely firm; moderately alkaline; calcareous.

The solum is 24 to 35 inches thick. Depth to bedrock is 40 to 72 inches. Coarse fragments range from 0 to 2 percent by volume in the solum and substratum. Depth to carbonates ranges from 20 to 30 inches. Reaction ranges from slightly acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR moist value of 2 or 3, and chroma of 1 or 2.

Where there is an A2g horizon, it has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. Texture is clay, silty clay, or silty clay loam.

The Bg horizon has hue of 5YR to 2.5YR value of 4 or 5, and chroma of 2 to 4 in the matrix. Ped faces have value of 4 to 6, and chroma of 0 or 1. Mottles are common to many and are faint or distinct. Texture is clay, silty clay, or heavy silty clay loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 1 to 4. Texture is silty clay or varved clay and some silt.

Lamson series

The Lamson series consists of deep, poorly drained and very poorly drained soils on lake plains and deltas. The soils formed in sandy glacial lake sediments. The slope ranges from 0 to 3 percent but is dominantly less than 2 percent. These soils are used mainly for hay and as pasture and woodland. Cleared and drained areas are used mainly for vegetable crops.

The Lamson soils are near the somewhat excessively drained Colonie soils, the moderately well drained Elnora soils, and the somewhat poorly drained Minoa soils. Lamson soils are also near Junius and Canandaigua soils, which are similar, but Junius soils are coarser textured and Canandaigua soils have a finer textured subsoil.

Typical pedon of Lamson very fine loam in an idle field in the town of Rose, 50 feet north of Salter-Colvin Road and 210 feet east of junction with Lasher Road:

Ap—0 to 10 inches, very dark gray (10YR 3/1) very fine sandy loam, gray (10YR 6/1) dry; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; neutral; abrupt smooth boundary.

B21—10 to 23 inches, pinkish gray (7.5YR 6/2) fine sandy loam; many (40 percent) medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few fine pores; prism faces are gray (10YR 6/1); neutral; clear smooth boundary.

B22g—23 to 33 inches, grayish brown (10YR 5/2) fine sandy loam; many (45 percent) coarse distinct yellowish brown (10YR 5/6) mottles and few medium distinct gray (10YR 6/1) mottles; massive; friable, nonsticky and nonplastic; few fine and medium pores; neutral; clear wavy boundary.

C—33 to 50 inches, gray (10YR 6/1) very fine sandy loam; many coarse distinct yellowish brown (10YR 5/4) mottles; massive; friable, nonsticky and nonplastic; thin strata of loamy fine sand; neutral in upper part; moderately alkaline and calcareous at 40 inches.

The solum is 30 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the solum and in the substratum. Depth to carbonates ranges from 20 to 40 inches. In unlimed areas, reaction ranges from slightly acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 2, and chroma of 1 or 2.

The Bg horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 1 to 3. Mottles are few to many and are faint or distinct. Texture is mainly fine sandy loam.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 1 or 2. Texture is very fine sandy loam or thin strata of mainly fine sand and very fine sand.

Lockport series

The Lockport series consists of moderately deep, somewhat poorly drained soils on bedrock-controlled till plains. The soils formed in a thin clayey glacial till deposit overlying shale bedrock at a depth of 20 to 40 inches. The slope ranges from 0 to 8 percent. These soils are used mainly for hay and pasture and occasionally for field crops.

The Lockport soils are in a drainage sequence with the moderately well drained to well drained Lairdsville soils and the poorly drained and very poorly drained Lakemont, shale substratum, soils. Lockport soils are also near Brockport and Madalin soils, which are similar but not reddish in color. Madalin soils do not have underlying shale bedrock and are poorly drained or very poorly drained.

Typical pedon of Lockport silty clay loam from an area of Lockport and Brockport silty clay loams, 0 to 3 percent slopes, in a cultivated field in the town of Ontario, 800 yards west of intersection of Putnam and Furnaceville Roads and 0.5 mile east of Knickerbocker Road:

Ap—0 to 6 inches, dark brown (7.5YR 3/2) silty clay loam; moderate fine and very fine subangular blocky structure; friable; many fine roots; neutral; abrupt wavy boundary.

B21t—6 to 16 inches, reddish brown (5YR 4/3) silty clay; many fine prominent strong brown (7.5YR 5/6) mottles; strong coarse prismatic structure parting to strong medium blocky; firm; common fine roots; common fine and a few medium pores with clay linings; dark reddish gray (5YR 4/2) ped and prism faces; thin continuous clay films on prism faces; patchy clay films on interior peds; neutral; clear wavy boundary.

B22t—16 to 25 inches, dark reddish brown (2.5YR 3/4) silty clay; common fine distinct weak red (2.5YR 5/2) mottles; moderate coarse prismatic structure parting to moderate medium and coarse blocky; firm; few fine roots; common fine pores with clay linings; reddish gray (5YR 5/2) prism and ped faces; thin clay films on most of ped and prism faces; neutral; abrupt smooth boundary.

C—25 to 30 inches, dark reddish brown (2.5YR 2/4) shaly silty clay; strong thin platy structure; very firm; few fine pores; 15 percent coarse fragments; mildly alkaline; abrupt broken boundary.

R—30 inches, reddish gray (10R 5/1) and dark reddish brown (2.5YR 2/4) shale; partially weathered; extremely firm; mildly alkaline.

The solum is 18 to 36 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 2 to 35 percent in the solum and substratum. Depth to carbonates ranges from 20 to 40 inches. Reaction ranges from medium acid to midly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 7.5YR to 10YR, value of 4 or 3, and chroma of 2 or 3.

The Bt horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. Mottles are common or many and faint to prominent. Texture is silty clay, heavy silty clay loam, clay, or shaly or gravelly analogs of those textures.

If there is a C horizon, it has hue of 5YR to 10YR, value of 2 to 4, and chroma of 3 or 4. Texture is silty clay, heavy silty clay loam, clay, or shaly or gravelly analogs of those textures.

Lyons series

The Lyons series consists of deep, poorly drained and very poorly drained soils on till plains. The soils formed in glacial till. The slope ranges from 0 to 3 percent. These soils are used mainly as pasture, woodland, and wildlife habitat. Cleared and drained areas are used mainly for vegetable crops.

The Lyons soils are in a drainage sequence with the well drained Ontario soils, the moderately well drained Hilton soils, and the somewhat poorly drained Appleton soils. Lyons soils are also near Massena and Ovid soils, which are similar but are better drained.

Typical pedon of Lyons mucky silt loam in a wooded area in the town of Savannah, 2 miles south of South Butler, 25 feet east of Wilson Road, 500 yards from New York Highway 89 and Wilson Road junction:

A1—0 to 8 inches, very dark brown (10YR 2/2) mucky silt loam, grayish brown (10YR 5/2) crushed and dry; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

A2g—8 to 18 inches, light gray (10YR 7/1) loam; weak medium platy structure; friable; few roots; common medium pores; 5 percent coarse fragments; slightly acid; clear wavy boundary.

B21g—18 to 24 inches, brown (7.5YR 5/2) gravelly loam; common medium distinct reddish brown (2.5YR 5/4) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few roots; common large and medium pores; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

B22g—24 to 38 inches, dark brown (7.5YR 4/2) heavy gravelly loam; common coarse faint strong brown (7.5YR 5/6) and common coarse distinct light gray (10YR 7/1) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few roots; common medium and fine pores; 20 percent coarse fragments; neutral; clear wavy boundary.

C—38 to 54 inches, dark brown (7.5YR 4/2) gravelly loam; common medium distinct light gray (10YR 7/1) mottles; moderate thick platy structure; firm; 20 percent coarse fragments; mildly alkaline; calcareous.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 30 percent by volume in the solum and 15 to 50 percent in the substratum. Depth to carbonates ranges from 24 to 40 inches. Reaction ranges from medium acid to neutral in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Some areas are very stony. Where there is an A2g horizon, it has hue of 10YR or 7.5YR, value of 6 or 7, and chroma of 1 or 2. Texture is fine sandy loam, loam, or gravelly analogs of those textures.

The Bg horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Mottles are few to many and are faint or distinct. Texture is loam, fine sandy loam, silt loam, or gravelly analogs of those textures.

The C horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Texture is loam, fine sandy loam, silt loam, or gravelly or very gravelly analogs of those textures.

Madalin series

The Madalin series consists of deep, poorly drained and very poorly drained soils on lake plains. The soils formed in glacial lake sediments dominated by clay and silt. The slope ranges from 0 to 3 percent but is mostly less than 2 percent. These soils are used mainly for hay and as pasture and woodland. Some drained areas are in field crops.

The Madalin soils are in a drainage sequence with the somewhat poorly drained Rhinebeck soils. Madalin soils are also near Dunkirk and Collamer soils, which are similar but contain more silt and are better drained.

Typical pedon of Madalin silty clay loam in a wooded area in the town of Galen, 1.25 miles northwest of County Route 250 and New York Highway 31 intersection and 500 feet west of County Road 250:

Ap—0 to 6 inches, very dark gray (10YR 3/1) light silty clay loam, gray (10YR 5/1) when dry; few reddish brown (5YR 5/4) root stains; moderate coarse granular structure; friable; many roots; neutral; abrupt smooth boundary.

B21tg—6 to 10 inches, dark grayish brown (10YR 4/2) silty clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate fine and medium blocky; friable; many roots; common fine and medium pores with clay linings; thin dark gray (10YR 4/1) clay films on prism and ped faces; slightly acid; abrupt wavy boundary.

B22tg—10 to 17 inches, grayish brown (10YR 5/2) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium blocky; firm; few roots; common medium pores with clay linings; gray (10YR 6/1) clay films on prism and ped faces; slightly acid; clear wavy boundary.

B23tg—17 to 30 inches, gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium and coarse blocky; firm; few roots; few medium pores with clay linings; gray (10YR 6/1) clay films on prism and ped faces; mildly alkaline; clear smooth boundary.

Cg—30 to 42 inches, gray (10YR 5/1) varved clay and silt; weak thick platy structure; firm; few light gray (10YR 7/1) lime streaks; moderately alkaline; calcareous.

The solum is 24 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 3 percent in the solum and the substratum. Depth to carbonates ranges from 24 to 36 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 2, and chroma of 2 or 1.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 1. Mottles are few to many and are faint or distinct. Texture is silty clay loam, silty clay, or clay.

The Cg horizon has hue of 10YR or 5Y, value of 4 or 5, and chroma of 1 or 2. Texture is silty clay or varved clay and silt.

Madrid series

The Madrid series consists of deep, well drained soils on till plains, moraines, and drumlins. They formed in glacial till. The slope ranges from 2 to 25 percent but is dominantly 2 to 8 percent. These soils are used mainly for field crops, vegetable crops, fruit crops, and hay.

The Madrid soils are in a drainage sequence with the moderately well drained Bombay soils and the somewhat poorly drained to poorly drained Massena soils. Madrid soils are also near Ontario and Hilton soils, which are similar but have a thinner solum and contain more clay in the Bt horizon.

Typical pedon of Madrid gravelly fine sandy loam, 2 to 8 percent slopes, in a cultivated field, in the town of Walworth, 1,000 feet north of intersection of New York Highways 350 and 441, and 300 feet west of New York Highway 350:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) gravelly fine sandy loam; weak medium and fine granular structure; friable; many fine roots; 15 percent coarse fragments; medium acid; clear smooth boundary.

B1—8 to 24 inches, yellowish brown (10YR 5/4) loam; weak fine and medium granular structure; friable; common roots; many pores; 10 percent coarse fragments; strongly acid; clear wavy boundary.

A'22B—24 to 34 inches, pale brown (10YR 6/3) very fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; many medium and large pores; ped interiors are brown (7.5YR 4/4) with thin clay linings in pores; 10 percent coarse fragments; medium acid; gradual wavy boundary.

B&A'2—34 to 41 inches, brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; few fine roots; common medium and large pores with thin clay linings; peds are coated with pale brown (10YR 6/3) fine sand and silt 2 to 4 millimeters thick; 10 percent coarse fragments; medium acid; clear wavy boundary.

B2t—41 to 51 inches, reddish brown (5YR 4/3) gravelly loam; weak medium and coarse subangular blocky structure; firm; few fine roots; common fine and medium pores with clay linings; patchy clay films on ped faces; 15 percent coarse fragments; slightly acid; clear wavy boundary.

IIC—51 to 62 inches, brown (10YR 5/3) gravelly fine sandy loam; weak thick platy structure; friable; 30 percent coarse fragments; neutral.

The solum is 36 to 56 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 30 percent by volume in the solum and 15 to 35 percent in the substratum. Depth to carbonates ranges from 36 to 80 inches. Reaction ranges from strongly acid to neutral in the solum and from slightly acid to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam to fine sandy loam or gravelly analogs of those textures.

The A'22 and the B&A'2 horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3 in the A'2 part and similar hue with value of 3 to 5, and chroma of 3 or 4 in the B part. Texture is silt loam to fine sandy loam or gravelly analogs of those textures. Consistency is friable or very friable.

The Bt horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. Mottles may or may not be present below a depth of 30 inches. Texture ranges from silt loam to fine sandy loam or gravelly analogs of those textures. Consistency is friable or firm.

The C horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam to fine sandy loam or gravelly analogs.

Martisco series

The Martisco series consists of very poorly drained soils in bogs and marshes. The soils formed in organic deposits 8 to 16 inches thick over marl. The slope ranges from 0 to 3 percent but is mostly less than 1 percent. These soils are mainly in woodland and wetland vegetation. Cleared and drained areas are used mainly for vegetable crops.

Martisco soils are near Edwards and Palms soils, which are similar, but Martisco soils have a thinner deposit of organic material than Edwards soils, and Palms soils are not underlain by marl.

Typical pedon of Martisco muck in a cultivated field in the town of Sodus, 800 yards south of Podger Road and 800 feet west of South Centenary Road:

Oap—0 to 9 inches, black (10YR 2/1) sapric material (muck); moderate coarse granular structure; friable; common fine roots; few small snail shells; 40 percent silt; mildly alkaline; clear smooth boundary.

Oa2—9 to 12 inches, black (5YR 2/1) sapric material; weak coarse subangular blocky structure; friable; few fine roots; few fine pores; some small snail shells; 30 percent silt; mildly alkaline; abrupt smooth boundary.

IICca—12 to 34 inches, grayish brown (2.5Y 5/2) marl, common medium distinct brown (5YR 5/4) mottles; massive; nonsticky and nonplastic; very few roots; few fine pores; many small snail shells; moderately alkaline; clear smooth boundary.

IIIC—34 to 42 inches, gray (5Y 5/1) silt; massive; slightly sticky; moderately alkaline.

Thickness of organic material and depth to marl are 8 to 16 inches. Depth to bedrock is more than 60 inches. Mineral material in the organic part ranges from 0 to 50 percent. Reaction ranges from slightly acid to moderately alkaline in the organic part. The marl is moderately alkaline.

The Oap horizon has hue of 10YR or N, value of 2, and chroma of 0 to 2. Oa2 horizon has hue of 10YR to 5YR, value of 2, and chroma of 0 to 2.

The IICca horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2.

The IIIC horizon, where present, is at depths of more than 32 inches. It has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 2. Texture is fine sandy loam to silty clay or varved silts and clays.

Massena series

The Massena series consists of deep, somewhat poorly drained to poorly drained soils on till plains. The soils formed in glacial till. The slope ranges from 0 to 8 percent but is dominantly 0 to 3 percent. These soils are used mainly for field crops, hay, and pasture.

The Massena soils are in a drainage sequence with the well drained Madrid soils and the moderately well drained Bombay soils. Massena soils are also near Hilton and Lyons soils, which are similar, but Massena soils do not have clay accumulation in the subsoil and are wetter than the Hilton soils. Massena soils are slightly coarser textured and better drained than Lyons soils.

Typical pedon of Massena gravelly loam, 0 to 3 percent slopes, in an idle field in the town of Wolcott, 0.6 mile south of Chapmans Corners Road and 150 feet west of New York Highway 104A:

Ap—0 to 7 inches, very dark grayish brown (10YR 3/2) gravelly loam; weak fine granular structure; friable; many fine roots; 15 percent coarse fragments; neutral; abrupt smooth boundary.

B21—7 to 13 inches, brown (10YR 5/3) gravelly fine sandy loam; many medium distinct dark brown (7.5YR 4/4) mottles and few medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common fine roots; many fine pores; grayish brown (10YR 5/2) ped faces; 15 percent coarse fragments; clear wavy boundary.

B22—13 to 33 inches, dark brown (7.5YR 4/4) gravelly fine sandy loam; many fine distinct yellowish brown (10YR 5/6) and common medium faint brown (7.5YR 5/2) mottles; weak medium subangular blocky structure; firm; few roots in upper part; common fine and few medium pores; dark grayish brown (10YR 4/2) ped faces; 20 percent coarse fragments; neutral; clear wavy boundary.

C—33 to 48 inches, brown (7.5YR 5/2) gravelly fine sandy loam; few medium and coarse distinct strong brown (7.5YR 5/6) mottles; weak thick platy structure; firm; few pores; 25 percent coarse fragments; moderately alkaline.

The solum is 20 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 35 percent by volume in the solum and 15 to 45 percent in the substratum. Depth to carbonates ranges from 20 to 40 inches. Reaction ranges from medium acid to neutral in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 or 2. Texture is mainly gravelly loam but some areas are very stony.

The B horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Mottles are few to many and are faint or distinct. Texture is loam to sandy loam or gravelly analogs of those textures.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Texture is loam to sandy loam and gravelly or very gravelly analogs of those textures.

Minoa series

The Minoa series consists of deep, somewhat poorly drained soils on lake plains and deltas. The soils formed in glacial lake sediments dominated by sand. The slope ranges from 0 to 3 percent. These soils are used mainly for field crops, vegetable crops, hay, and pasture.

The Minoa soils are in a drainage sequence with the poorly drained and very poorly drained Lamson soils. Minoa soils are also near Elnora, Junius, and Canandaigua soils, which are similar, but Minoa soils are wetter and slightly finer textured than Elnora soils, are slightly finer textured than Junius soils, and are better drained and contain less silt than Canandaigua soils.

Typical pedon of Minoa very fine sandy loam in an idle field near the town of Sodus, 0.3 mile west of New York Highway 14 and 150 feet south of New York Highway 104:

Ap—0 to 12 inches, dark grayish brown (10YR 4/2) very fine sandy loam; moderate fine granular structure; friable; many roots; medium acid; abrupt smooth boundary.

B21—12 to 16 inches, brown (10YR 5/3) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; common roots; common pores; medium acid; clear smooth boundary.

B22—16 to 22 inches, brown (10YR 5/3) very fine sandy loam; many medium distinct strong brown (7.5YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; massive; friable; few roots; few pores; slightly acid; clear smooth boundary.

B3—22 to 32 inches, brown (10YR 5/3) loamy very fine sand; many coarse distinct strong brown (7.5YR 5/6) mottles; weak thick platy structure; friable; few roots; few pores; few firm brown (7.5YR 4/4) very fine sandy loam lamellae less than 1/2 inch thick; slightly acid; clear wavy boundary.

C—32 to 72 inches, brown (7.5YR 5/2) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; firm; neutral.

The solum is 26 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the solum and substratum. Depth to carbonates is more than 40 inches. Reaction ranges from strongly acid to neutral in the solum and from medium acid to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The B horizon has hue of 10YR to 5YR, value of 4 to 5, and chroma of 3 or 4. Mottles are few to many and are faint or distinct. Texture is loamy very fine sand to silt loam.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 or 3. Texture is very fine sandy loam, or the horizon has a high content of sand and silt.

Newstead series

The Newstead series consists of moderately deep, somewhat poorly drained and poorly drained soils on till plains. The soils formed in glacial till that is 20 to 40 inches deep to bedrock. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and as pasture and woodland.

The Newstead soils are in a drainage sequence with the well drained and moderately well drained Wassaic soils. Newstead soils are near Farmington and Lyons soils, which are similar, but Farmington soils are shallower and better drained and Lyons soils are deeper and slightly wetter.

Typical pedon of Newstead gravelly fine sandy loam in an idle field in the town of Walworth, 850 feet north of Plant Road and 75 feet west of Albright Road:

Ap—0 to 10 inches, very dark gray (10YR 3/1) gravelly fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; 15 percent coarse fragments; neutral; abrupt smooth boundary.

B21g—10 to 14 inches, grayish brown (10YR 5/2) fine sandy loam; many fine distinct brown (7.5YR 5/4) mottles; weak fine subangular blocky structure; friable; common fine roots; common medium and fine pores; 10 percent coarse fragments; neutral; clear wavy boundary.

B22g—14 to 20 inches, brown (7.5YR 5/2) very fine sandy loam; common medium faint brown (10YR 4/3) and common medium distinct strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots and pores; 10 percent coarse fragments; mildly alkaline; clear wavy boundary.

C—20 to 27 inches, brown (7.5YR 4/2) and grayish brown (10YR 5/2) gravelly fine sandy loam; many faint brown (10YR 4/3) and common distinct strong brown (7.5YR 5/6) mottles; weak thick platy structure; firm; few roots; common pores; 20 percent coarse fragments; moderately alkaline; abrupt smooth boundary.
R—27 inches, hard gray dolomitic limestone bedrock.

The solum is 15 to 30 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 10 to 35 percent by volume in the solum and 15 to 40 percent in the substratum. Depth to carbonates ranges from 15 to 40 inches. Reaction ranges from slightly acid to moderately alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 2, and chroma of 1 or 2.

The B2g horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3. Mottles are few to many and are faint or distinct. Texture is very fine sandy loam to loam or sandy loam or gravelly analogs of those textures.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3. Texture is sandy loam to silt loam or gravelly or very gravelly analogs of those textures.

Niagara series

The Niagara series consists of deep, somewhat poorly drained soils on lake plains. The soils formed in silty glacial lake sediments. The slope ranges from 0 to 3 percent. These soils are used mainly for field crops, vegetable crops, fruit crops, hay, and pasture.

The Niagara soils are in a drainage sequence with the well drained Dunkirk soils, moderately well drained Collamer soils, and the poorly drained and very poorly drained Canandaigua soils. Niagara soils are also near Rhinebeck and Williamson soils which are similar, but Rhinebeck soils formed in finer textured sediments than Niagara soils, and Williamson soils are better drained and have a fragipan.

Typical pedon of Niagara silt loam in an apple orchard in the town of Ontario, 0.2 mile north of Lake Road and 0.5 mile east of Brookwood Science Center:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) silt loam; moderate medium subangular blocky structure; friable; many roots; neutral; abrupt smooth boundary.
A2—8 to 17 inches, light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles and common medium dark reddish brown (2.5YR 3/4) mottles; weak fine subangular blocky structure; friable; many fine roots; many fine and medium pores; neutral; clear wavy boundary.
B21—17 to 23 inches, dark grayish brown (10YR 4/2) heavy silt loam; many (45 percent) medium distinct yellowish brown (10YR 5/6) and dark reddish brown (2.5YR 3/4) mottles; moderate coarse and medium subangular blocky structure; firm; few roots; many fine and medium pores; light brownish gray (10YR 6/2) coatings on ped surfaces; neutral; clear wavy boundary.
B22t—23 to 29 inches, dark grayish brown (10YR 4/2) light silty clay loam; many fine and medium distinct dark yellowish brown (10YR 4/4) and dark reddish brown (2.5YR 3/4) mottles; moderate coarse subangular blocky structure; firm; few roots; many fine pores with clay linings; thin clay films on ped surfaces; neutral; gradual wavy boudnary.
B23t—29 to 38 inches, dark grayish brown (10YR 4/2) light silty clay loam; many medium faint dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2) mottles; moderate coarse subangular blocky structure; firm; few fine roots; many fine and medium pores; thin clay films on ped surfaces, thicker films in pores; neutral; clear wavy boundary.
C—38 to 60 inches, dark grayish brown (2.5Y 4/2) silt loam; common large faint olive brown (2.5Y 4/4) and dark brown (10YR 3/3) mottles; weak medium platy structure; firm; few medium pores; structural units are inherent from laminated deposition; moderately alkaline.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 60 inches. There generally are no coarse fragments, but they range from 0 to 5 percent by volume in the surface layer and 0 to 3 percent in the subsoil and substratum. Depth to carbonates ranges from 20 to 50 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 3, and chroma of 2 or 3.

The A2 horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 or 3.

The B horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Mottles are few to many and are faint or distinct. Texture is silt loam or silty clay loam.

The C horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam or varved fine sand to silty clay loam.

Oakville series

The Oakville series consists of deep, well drained and moderately well drained soils on lake plains, outwash plains, beaches, and sand bars. The soils formed in sandy outwash, beach, and lake deposits. The slope ranges from 0 to 6 percent. These soils are used mainly for field crops, vegetable crops, hay, and pasture.

The Oakville soils are in a drainage sequence with the somewhat poorly drained and poorly drained Junius soils. Oakville soils are also near Colonie and Elnora soils, which are similar, but Oakville soils do not have the bands or lamellae that are characteristic of the Colonie soils, and Oakville soils are generally better drained than the Elnora soils.

Typical pedon of Oakville loamy fine sand, 0 to 6 percent slopes, in a cultivated field in the town of Wolcott, 200 yards south of N. Y. Rte. 104 and N. Y. 104A junction and 25 feet east of Simmonds Drive:

Ap—0 to 10 inches, dark brown (10YR 3/3) loamy fine sand; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.
B2—10 to 19 inches, strong brown (7.5YR 5/6) fine sand; single grain; loose; few fine roots; a few irregular shaped, random bodies of yellowish red (5YR 4/6) loamy fine sand; slightly acid; clear wavy boundary.
B3—19 to 37 inches, brown (10YR 5/3) fine sand; single grain; loose; very few roots; a few narrow streaks of strong brown (7.5YR 5/6) fine sand; slightly acid; clear wavy boundary.
C—37 to 56 inches, brown (10YR 5/3) fine sand; single grain; loose; common bands of yellowish red (5YR 4/6) and very dark gray (10YR 3/1) fine sand; neutral.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 3 percent in the solum and substratum. Depth to carbonates is more than 30 inches. Reaction ranges from medium acid to neutral to a depth of 30 inches or more.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The B2 horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is dominantly fine sand.

The C horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 2 to 4. Texture is fine sand or thin layers of different size sand including small amounts of gravel or silt in some pedons.

Ontario series

The Ontario series consists of deep, well drained soils on till plains, moraines, and drumlins. The soils formed in glacial till. The slope ranges from 3 to 50 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, hay, and pasture. Most steep areas are idle land or woodland.

The Ontario soils are in a drainage sequence with the moderately well drained Hilton soils, the somewhat poorly drained Appleton soils, and the poorly drained and very poorly drained Lyons soils. Ontario soils are also near Madrid and Sodus soils, which are similar, but Ontario soils have a finer textured subsoil than Madrid soils and do not have a fragipan, which Sodus soils have.

Typical pedon of Ontario gravelly loam, 3 to 8 percent slopes, in a cultivated field in the town of Lyons, 0.2 mile west of Warncke Road and 100 feet north of New York Highway 31:

Ap—0 to 10 inches, dark brown (10YR 3/3) gravelly loam; weak fine and medium granular structure; friable; many roots; 20 percent coarse fragments; slightly acid; abrupt smooth boundary.

B1—10 to 15 inches, brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; very friable; many roots; many medium and large pores; 20 percent coarse fragments; slightly acid; clear broken boundary.

A'2—15 to 22 inches, light brownish gray (10YR 6/2) loam; weak medium platy structure; very friable; many roots; many medium and few large pores; 10 percent coarse fragments; slightly acid; clear irregular boundary.

B&A—22 to 26 inches, reddish brown (5YR 4/4) loam; moderate coarse subangular blocky structure; firm; few roots; common medium pores with clay linings; light brownish gray (10YR 6/2) ped coats 1 to 2 mm thick; 10 percent coarse fragments; slightly acid; clear wavy boundary.

B2t—26 to 37 inches, reddish brown (5YR 4/4) heavy loam; moderate coarse subangular blocky structure; firm; few roots; common medium and few large pores lined with clay; continuous thin clay films on ped surfaces in lower part; 10 percent coarse fragments; neutral; clear wavy boundary.

C—37 to 56 inches, brown (7.5YR 5/2) gravelly loam; moderate thick platy structure; firm; common medium pores; 25 percent coarse fragments; moderately alkaline; calcareous.

The solum is 36 to 48 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 10 to 30 percent by volume in the solum and 20 to 45 percent in the substratum. Depth to carbonates ranges from 34 to 48 inches. Reaction in unlimed areas ranges from strongly acid to neutral in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3.

The B1 horizon may or may not be present.

The A2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. Texture is mainly loam or gravelly loam.

The B&A horizon has characteristics similar to both the A'2 and B2t horizons.

The B2t horizon has hue of 10YR to 5YR, value of 5 or 4, and chroma of 3 or 4. Texture is heavy loam to light sandy clay loam or gravelly analogs of those textures.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 or 3. Texture is loam or fine sandy loam and gravelly or very gravelly analogs of those textures.

Ovid series

The Ovid series consists of deep, somewhat poorly drained soils on till plains and moraines. The soils formed in calcareous glacial till. The slope ranges from 0 to 8 percent but is dominantly 0 to 3 percent. These soils are used mainly for field crops, fruit crops, hay, and pasture.

The Ovid soils are in a drainage sequence with the well drained to moderately well drained Cazenovia soils. Ovid soils are also near Appleton and Lyons soils, which are similar, but Ovid soils have a finer textured subsoil than Appleton soils and are better drained than Lyons soils.

Typical pedon of Ovid silt loam, 0 to 3 percent slopes, in an idle apple orchard in the town of Ontario, 0.4 mile north of Lake Road and 20 feet west of Verdine Road:

Ap—0 to 8 inches, very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

A2—8 to 12 inches, brown (7.5YR 5/2) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium platy structure; friable; common fine roots; common fine pores; 5 percent coarse fragments; neutral; clear wavy boundary.

B21t—12 to 18 inches, brown (7.5YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/4) and common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few roots; common fine pores with clay linings; grayish brown (10YR 5/2) ped coats and patchy clay films; 10 percent coarse fragments; neutral; clear wavy boundary.

B22t—18 to 30 inches, reddish brown (5YR 4/3) silty clay loam; common medium faint dark brown (7.5YR 4/2) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; few fine pores with clay linings; grayish brown (10YR 5/2) ped coats and patchy clay films; 10 percent coarse fragments; neutral; clear wavy boundary.

C—30 to 40 inches, brown (7.5YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate thick platy structure; firm; few fine pores; 20 percent coarse fragments; mildly alkaline; calcareous.

The solum is 20 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 2 to 25 percent in the solum and 5 to 35 percent in the substratum. Depth to carbonates ranges from 18 to 36 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The A2 horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 or 3. This horizon may be absent in some profiles.

The Bt horizons have hue of 7.5YR to 2.5YR, value of 5 or 4, and chroma of 3 or 4. Faces of peds have chroma of 1 or 2. Mottles are few to many and are faint or distinct. Texture is silty clay loam or clay loam or gravelly analogs of those textures.

The C horizon has hue of 7.5YR to 2.5YR, value of 5 to 3, and chroma of 2 or 3. Texture is silty clay loam or clay loam or gravelly analogs of those textures.

Palms series

The Palms series consists of deep, very poorly drained soils in bogs or marshes. The soils formed in well decomposed organic deposits that are 16 to 50 inches thick over silty mineral soil material. The slope ranges from 0 to 3 percent but is dominantly less than 1 percent. These soils are used mainly for woodland and wildlife habitat.

Cleared and drained areas are used mainly for vegetable crops.

Palms soils are near and are similar to Lyons, Canandaigua, and Carlisle soils. They have organic layers 16 to 50 inches thick, which Lyons and Canandaigua soils do not have. Carlisle soils have thicker organic layers than Palms soils.

Typical pedon of Palms muck in a cultivated field near the town of Sodus, 50 feet east of New York Highway 88 and 1.3 miles south of village of Sodus:

Oap—0 to 8 inches, black (10YR 2/1) broken face, very dark brown (10YR 2/2) when rubbed, sapric material; 5 percent fibers; weak medium granular structure; friable; common fine roots; 40 percent mineral, mostly silt; neutral; clear smooth boundary.

Oa2—8 to 22 inches, black (10YR 2/1) broken face, very dark brown (10YR 2/2) when rubbed, sapric material; 5 percent fibers, less than 5 when rubbed; weak coarse granular structure; friable; few live roots; 30 percent mineral, mostly silt; neutral; abrupt wavy boundary.

IICg—22 to 50 inches, grayish brown (2.5Y 5/2) heavy silt loam; few medium faint reddish gray (5YR 5/2) mottles; massive; firm; nonplastic; slightly sticky; very few roots; mildly alkaline; weakly calcareous.

The solum is 16 to 50 inches thick. Depth to bedrock is more than 60 inches. Woody fragments range from 0 to 15 percent in the organic part, and coarse fragments range from 0 to 15 percent in the mineral soil substratum. Mineral material (mostly silt) ranges from 0 to 50 percent in the organic part. Depth to carbonates ranges from 20 to 50 inches. Reaction ranges from strongly acid to neutral in the organic part. The mineral soil substratum ranges from slightly acid to moderately alkaline.

The surface tier has hue of 10YR, value of 2, and chroma of 1 or 2.

The subsurface tier has hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 3. In places, thin layers of hemic material are present.

The IICg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Texture ranges from silt loam to clay loam.

Palmyra series

The Palmyra series consists of deep, well drained to excessively drained soils on outwash plains, terraces, kames, and eskers. The soils formed in glacial outwash deposits. The slope ranges from 0 to 40 percent but is dominantly 3 to 8 percent. These soils are used for field crops, vegetable crops, fruit crops, hay, pasture, and woods.

The Palmyra soils are in a drainage sequence with the moderately well drained Phelps soils, the somewhat poorly drained to poorly drained Fredon soils, and the very poorly drained Halsey soils. Palmyra soils have a stratified substratum, which the nearby Ontario and Hilton soils do not have.

Typical pedon of Palmyra gravelly loam, 3 to 8 percent slopes, in an idle field near the town of Macedon, 1 mile west of the village of Palmyra, 0.5 mile north of N.Y.S. Barge Canal, 0.5 mile west to gravel pit and 100 feet north of gravel pit:

Ap—0 to 9 inches, dark grayish brown (10YR 4/2) gravelly loam; weak medium and fine granular structure; friable; many fine roots; 20 percent coarse fragments; slightly acid; abrupt smooth boundary.

A&B—9 to 11 inches, grayish brown (10YR 5/2) gravelly loam; massive; friable; many fine roots; common fine pores; 20 percent dark brown to brown (10YR 4/3) subangular blocky peds one-half inch across are slightly more firm than the matrix; 25 percent coarse fragments; medium acid; clear irregular boundary.

B21t—11 to 18 inches, dark brown to brown (10YR 4/3) gravelly heavy loam; weak medium and fine subangular blocky structure; friable; common roots; common fine pores with clay linings; peds have coats of grayish brown (10YR 5/2) light loam 1 to 2 millimeters thick in upper part; 30 percent coarse fragments; thin films of clay on some gravel; slightly acid; gradual irregular boundary.

B22t—18 to 24 inches, brown (7.5YR 4/4) gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; common fine pores; medium and thick clay coats on 30 percent of vertical and horizontal ped faces in all pores and on 10 percent of the gravel surfaces; 30 percent coarse fragments; few soft dark brown (7.5YR 3/2) to dark reddish brown (5YR 2/2) weathered limestone gravel; cone-shaped tongues of B extending 12 to 20 inches into C at 2 to 5 foot intervals (4 to 6 inches between tongues, 12 to 20 inches thick in tongues); neutral; abrupt irregular boundary.

IIC—24 to 40 inches, grayish brown (10YR 5/2), dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) gravel and sand; single grain; loose; moderately alkaline; calcareous.

The solum is 15 to 45 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 15 to 35 percent by volume in the solum and 35 to 60 percent in the substratum. Depth to carbonates ranges from 15 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Texture is gravelly loam or cobbly loam.

The A & B horizon, where present, has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 to 4. Texture is loam to fine sandy loam and gravelly analogs of those textures.

The Bt horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. Texture is fine sandy loam to sandy clay loam and gravelly analogs of those textures.

The IIC horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. Texture is very gravelly sand or stratified sand and gravel.

Phelps series

The Phelps series consists of deep, moderately well drained soils on outwash plains, remnant beaches, and terraces. The soils formed in glacial outwash and glacial beach deposits containing sand and gravel. The slope ranges from 0 to 8 percent but is dominantly 0 to 3 percent. These soils are used mainly for field crops, hay, and pasture.

The Phelps soils are in a drainage sequence with the well drained to excessively drained Palmyra soils, the somewhat poorly drained to poorly drained Fredon soils, and the very poorly drained Halsey soils. Phelps soils are finer textured and not as well drained as Alton soils and are coarser textured in the substratum than the nearby Cazenovia soils.

Typical pedon of Phelps gravelly loam, 0 to 3 percent slopes, in a cultivated field in the town of Arcadia, 0.2 mile north of Eckert Road and 0.8 mile west of Tellier Road:

Ap—0 to 9 inches, very dark grayish brown (10YR 3/2) gravelly loam; moderate medium granular structure; friable; many fine roots; 25 percent coarse fragments; slightly acid; abrupt smooth boundary.

B&A—9 to 14 inches, dark yellowish brown (10YR 4/4) gravelly loam; moderate fine subangular blocky structure; friable; few fine roots; pale brown (10YR 6/3) coats of clean sand grains on ped faces that are 1 to 2 millimeters thick; clay films in pores; 25 percent coarse fragments; slightly acid; clear wavy boundary.

B2t—14 to 25 inches, dark reddish brown (5YR 3/3) gravelly clay loam; few medium distinct reddish gray (5YR 5/2) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable and sticky; few fine roots; clay films in many medium pores; thick patchy clay films on ped faces; 30 percent coarse fragments; neutral; clear wavy boundary.

B3—25 to 34 inches, dark reddish brown (5YR 3/3) gravelly clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable and sticky; porous with clay film in some pores; 30 percent coarse fragments; neutral; clear irregular boundary.

IIC—34 to 50 inches, dark brown (7.5YR 4/2) stratified gravel and sand; single grain; loose; 40 percent coarse fragments; moderately alkaline; calcareous.

The solum is 24 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 35 percent in the solum and 35 to 60 percent in the substratum. Depth to carbonates ranges from 24 to 40 inches. Reaction ranges from medium acid to neutral in the solum and mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2. Texture is gravelly loam or cobbly loam.

The B&A horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4 in the B part, and value of 5 or 6, and chroma of 2 or 3 in the A part. Texture is loam to clay loam or gravelly analogs of these textures.

The B horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 or 4. Mottles are few to many and are faint or distinct. There are few to common mottles with chroma of 2 or less. Texture is loam, silt loam, clay loam, or gravelly analogs of those textures.

The IIC horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 or 3. Texture is very gravelly sand or stratified sand and gravel.

Rhinebeck series

The Rhinebeck series consists of deep, somewhat poorly drained soils on lake plains. The soils formed in glacial lake sediments dominated by clay and silt. The slope ranges from 0 to 6 percent but is dominantly 0 to 2 percent. These soils are used mainly for field crops, hay, and pasture.

The Rhinebeck soils are in a drainage sequence with the poorly drained to very poorly drained Madalin soils. Rhinebeck soils are also near Lockport, Collamer, and Ovid soils, which are similar, but they are grayer in color and deeper to bedrock than Lockport soils; are finer textured and not so well drained as Collamer soils; and are finer textured than Ovid soils.

Typical pedon of Rhinebeck silty clay loam, 0 to 2 percent slopes, in an idle field in the town of Galen, south of the hamlet of Lock Berlin and 200 feet south of intersection of old and new New York Highway 31:

Ap—0 to 6 inches, very dark grayish brown (10YR 3/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

A2—6 to 8 inches, grayish brown (10YR 5/2) silty clay loam; many faint gray (10YR 5/1) and few fine distinct reddish brown (5YR 5/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; common pores; neutral; abrupt smooth boundary.

B21t—8 to 17 inches, brown (7.5YR 5/2) silty clay loam; many (45 percent) faint brown (7.5YR 5/4) and a few distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium and fine blocky; firm; few fine roots; common pores with clay linings, patchy clay films on ped faces; grayish brown (10YR 5/2) silty material coats peds in upper 2 to 3 inches; gray (10YR 5/1) prism faces in lower 6 or 7 inches; neutral; clear wavy boundary.

B22t—17 to 24 inches, dark brown (10YR 4/3) silty clay loam; common fine distinct gray (10YR 6/1) and brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure parting to moderate medium blocky; firm; few fine roots; common pores with clay linings; thin nearly continuous clay films on ped faces; gray (10YR 5/1) prism faces; neutral; clear smooth boundary.

C—24 to 60 inches, grayish brown (10YR 5/2) varved silt and clay; weak medium platy structure; firm; few pores; a few white (10YR 8/1) lime streaks; moderately alkaline.

The solum is 20 to 36 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 3 percent in the solum and in the substratum. Depth to carbonates ranges from 20 to 36 inches. Reaction ranges from medium acid to neutral in the solum and from mildly alkaline to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. The A2 horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 2 or 1.

The Bt horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 2 or 3. Mottles are faint to prominent and usually have both higher and lower chroma than the matrix. Ped faces are 2 chroma or less. Texture is silty clay, silty clay loam, or clay.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 3. Texture is silty clay loam or varved silt and clay.

Riga series

The Riga series consists of moderately deep, well drained to moderately well drained soils on bedrock-controlled till plains. The soils formed in shaly glacial till 20 to 40 inches deep over bedrock. The slope ranges from 2 to 25 percent but is dominantly 2 to 6 percent. These soils are used mainly for field crops and hay and as pasture and woodland.

The Riga soils are in a drainage sequence with the somewhat poorly drained Brockport soils. Riga soils are also near Lairdsville and Lockport soils, which are similar but do not have the olive gray color of Riga soils.

Typical pedon of Riga silty clay loam from an area of Lairdsville and Riga silty clay loam, 6 to 20 percent slopes, severely eroded, in a pasture field in the town of Lyons, 0.4 mile southeast of New York Highway 31 and 100 feet southwest of Fink Road:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silty clay loam; moderate fine subangular blocky structure; friable; many fine roots; common worm channels; 5 percent coarse fragments; neutral; clear wavy boundary.

B21t—6 to 13 inches, light olive brown (2.5Y 5/4) silty clay; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; firm; common fine and few medium roots; common pores with clay linings; dark gray (10R 4/1) clay films on ped and prism faces in lower part; grayish brown (10YR 5/2) silty vertical ped faces 1 to 2 millimeters thick in upper 3 inches; 5 percent coarse fragments; neutral; clear wavy boundary.

B22t—13 to 26 inches, pale olive (5Y 6/3) silty clay; few fine faint grayish brown (2.5Y 5/2) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; common fine roots; common fine pores with clay linings; gray (10YR 5/1) and dark gray (10YR 4/1) clay films on ped and prism faces; 10 percent coarse fragments; neutral; clear smooth boundary.

R—26 to 36 inches, olive (5Y 5/3) slightly weathered shale; platy structure (inherent from shale rock); extremely firm; moderately alkaline.

The solum is 18 to 36 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 2 to 15 percent by volume in the solum and 10 to 35 percent in the substratum. Depth to carbonates ranges from 18 to 40 inches. Reaction ranges from medium acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3.

The Bt horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. Texture is silty clay, silty clay loam, or clay loam.

The C horizon, if present, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. Texture is silty clay, silty clay loam, or clay loam or shaly analogs of those textures.

Sodus series

The Sodus series consists of deep, well drained soils on till plains, moraines, and drumlins. The soils formed in glacial till. The slope ranges from 3 to 40 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, fruit crops, hay, and pasture.

The Sodus soils are in a drainage sequence with the moderately well drained Ira soils and the somewhat poorly drained to poorly drained Massena soils. Sodus soils are also near Alton and Madrid soils, which are similar but do not have a fragipan, which Sodus soils have.

Typical pedon of Sodus gravelly fine sandy loam, 3 to 8 percent slopes, on top of a drumlin in the town of Wolcott, 0.25 mile north of Sterling Station Road and Dry Bridge Road intersection and 100 feet east of Dry Bridge Road:

Ap—0 to 9 inches, brown (7.5YR 4/2) gravelly fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21—9 to 18 inches, strong brown (7.5YR 5/6) gravelly fine sandy loam; weak coarse subangular blocky structure; friable; many fine roots; common medium and large pores; 20 percent coarse fragments; strongly acid; wavy boundary.

B22—18 to 24 inches, brown (7.5YR 5/4) gravelly fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; common medium and large pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

A'2—24 to 28 inches, reddish gray (5YR 5/2) gravelly fine sandy loam; massive; firm; few fine roots; few fine and medium pores; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

B'x—28 to 45 inches, dark reddish brown (2.5YR 3/4) gravelly loam; weak very coarse prismatic structure, massive within prisms; firm and brittle; few medium pores with thin clay linings; reddish gray (5YR 5/2) prism faces; 25 percent coarse fragments; medium acid; clear wavy boundary.

C—45 to 56 inches, reddish brown (5YR 4/3) gravelly fine sandy loam; massive; firm; 25 percent coarse fragments; medium acid.

The solum is 40 to 65 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 5 to 30 percent by volume in the upper part of the solum and 25 to 50 percent in the fragipan and substratum. Depth to carbonates ranges from 48 to 96 inches. In unlimed areas, reaction ranges from strongly acid to medium acid in the solum and from medium acid to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The B2 horizon has hue of 10YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is very fine sandy loam, fine sandy loam or gravelly analogs of those textures, or loam.

The A'2 horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 or 3. Texture is very fine sandy loam, fine sandy loam, loam, or gravelly analogs of those textures.

The Bx horizon has hue of 10YR to 2.5YR, value of 3 to 5, and chroma of 3 or 4. Texture is loam, fine sandy loam, very fine sandy loam, gravelly or very gravelly analogs of those textures. Consistence is firm or very firm.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Texture is loam, very fine sandy loam, fine sandy loam, or gravelly or very gravelly analogs of those textures.

Teel series

The Teel series consists of deep, moderately well drained to somewhat poorly drained soils on flood plains. The soils formed in silty alluvial sediments. The slope ranges from 0 to 3 percent. These soils are used mainly for field crops, vegetable crops, hay, and pasture.

The Teel soils are in a drainage sequence with the well drained Hamlin soils and the poorly drained and very poorly drained Wayland soils. Teel soils also are near and are similar to Alluvial land, but they have a less variable texture.

Typical pedon of Teel silt loam in the town of Galen, southwest of the village of Clyde, 0.9 mile west of County Road 346 and 400 feet north of River Road on the east bank of the Clyde River:

Ap—0 to 9 inches, dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many medium and fine roots; neutral; abrupt wavy boundary.

B21—9 to 18 inches, dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many medium and fine roots; many medium and common large pores; neutral; clear wavy boundary.

B22—18 to 32 inches, dark brown (10YR 4/3) silt loam; many medium distinct grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; friable; common fine roots; common medium and few large pores; neutral; abrupt wavy boundary.

C—32 to 50 inches, dark yellowish brown (10YR 4/4) silt loam; many medium distinct grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine and few medium pores; neutral.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 3 percent by volume in the solum and from 0 to 20 percent in the lower part of the substratum. Reaction ranges from slightly acid to neutral in the solum and from neutral to mildly alkaline in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The B horizon has hue of 2.5Y to 5YR, value of 3 or 4, and chroma of 2 to 4. Mottles are few to many and are faint or distinct in the lower part of the B horizon. Mottles are often absent in the upper part of the B horizon. Texture is silt loam or very fine sandy loam.

The C horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 1 to 4. Texture is silt loam to fine sandy loam and, in a few pedons, gravelly analogs of those textures.

Wallington series

The Wallington series consists of deep, somewhat poorly drained soils on lake plains. The soils formed in glacial lake sediments dominated by silt and very fine sand. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and pasture. Cleared and drained areas are used mainly for vegetable and fruit crops.

The Wallington soils are in a drainage sequence with the moderately well drained Williamson soils. Wallington soils are also near Niagara and Canandaigua soils, which are similar, but Wallington soils have a fragipan and are better drained than Canandaigua soils.

Typical pedon of Wallington silt loam in an abandoned apple orchard in the town of Sodus, 300 yards north of Sodus-Wolcott Road and 50 feet east of Shaker Tract Road:

Ap—0 to 8 inches, very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

A2g—8 to 10 inches, pinkish gray (7.5YR 6/2) silt loam; common medium distinct yellowish red (5YR 5/6) mottles; weak medium platy structure; friable; many fine and medium roots; many fine pores; medium acid; clear broken boundary.

B2—10 to 15 inches, brown (10YR 5/3) silt loam; many coarse distinct yellowish red (5YR 4/6) mottles; weak coarse subangular blocky structure; friable; common roots; common medium pores; ped surfaces are pinkish gray (7.5YR 6/2); strongly acid; clear wavy boundary.

Bx—15 to 34 inches, brown (10YR 5/3) very fine sandy loam; many medium distinct strong brown (7.5YR 5/6) and pinkish gray (7.5YR 6/2) mottles; weak very coarse prismatic structure, massive within prisims; firm; brittle; very few fine roots along prism faces; few medium pores, some with thin clay linings; prism faces pinkish gray (7.5YR 6/2); slightly acid; clear wavy boundary.

C—34 to 58 inches, brown (10YR 4/3) laminated very fine sandy loam and loamy very fine sand; massive; friable; slightly acid.

The solum is 30 to 50 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the solum and 0 to 6 percent in the substratum. Depth to the top of the fragipan ranges from 12 to 24 inches. Reaction ranges from very strongly acid to slightly acid in the solum and from medium acid to neutral in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3.

The A2g horizon has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 1 to 3. Texture is silt loam or very fine sandy loam.

The B2 horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 or 4. Surface of peds have chroma of 1 or 2. Mottles are common or many and are distinct or prominent. Texture is silt loam or very fine sandy loam.

The Bx horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 3 or 4. It has very weak or weak structure or it is massive. Texture is silt loam or very fine sandy loam. Consistence is firm or very firm.

The C horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 2 or 3. Texture is silt loam to very fine sand and is usually laminated.

Wassaic series

The Wassaic series consists of moderately deep, well drained and moderately well drained soils on bedrock-controlled till plains. The soils formed in glacial till deposits 20 to 40 inches deep over bedrock. The slope ranges from 0 to 8 percent but is dominantly 3 to 8 percent. These soils are used mainly for field crops, vegetable crops, hay, and pasture.

The Wassaic soils are in a drainage sequence with the somewhat poorly drained to poorly drained Newstead soils. Wassaic soils are also near Farmington and Hilton soils, which are similar, but Wassaic soils are deeper than Farmington soils and not so deep as Hilton soils.

Typical pedon of Wassaic silt loam, 3 to 8 percent slopes, in an idle field located in the town of Walworth on the west edge of RG&E right-of-way, 100 feet north of Plank Road:

Ap—0 to 10 inches, dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

A&B—10 to 16 inches, pinkish gray (7.5YR 6/2) loam; weak medium subangular blocky structure; friable; common fine roots; many fine and medium pores; reddish brown (5YR 4/4) ped interiors; 5 percent coarse fragments; neutral; abrupt irregular boundary.

B&A—16 to 19 inches, reddish brown (5YR 4/4) heavy loam; moderate coarse blocky structure; firm; few fine roots; few fine pores with clay linings; light reddish brown (5YR 6/3) ped coats 1 to 2 millimeters thick; 5 percent coarse fragments; neutral; abrupt irregular boundary.

B2t—19 to 30 inches, reddish brown (5YR 4/4) heavy loam; moderate coarse blocky structure; firm; few fine roots; few fine pores with clay linings; clay films on about half of ped surfaces; 5 percent coarse fragments; neutral; abrupt smooth boundary.

IIR—30 inches, grayish brown (10YR 5/2) coarse textured dolomitic limestone; slightly weathered in upper few inches.

The solum is 20 to 36 inches thick. Depth to bedrock is 20 to 40 inches. Coarse fragments range from 0 to 10 percent in the upper part of the solum and from 3 to 35 percent in the lower part of the solum. Reaction ranges from medium acid to neutral in the solum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2.

The A&B horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 2 or 3 in the A part, and the B part has colors similar to the B horizon. Texture is fine sandy loam to silt loam and, in a few places, the gravelly analogs of those textures.

The B&A horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4 in the B part. The A part has colors similar to the A&B horizon. Texture is heavy fine sandy loam to light silty clay loam and, in a few pedons, the gravelly analogs of those textures.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Texture is heavy fine sandy loam to light silty clay loam or the gravelly analogs of those textures.

Wayland series

The Wayland series consists of deep, poorly drained and very poorly drained soils on flood plains. The soils formed in silty alluvial sediments. The slope ranges from 0 to 3 percent. These soils are used mainly for hay and as pasture and woodland.

The Wayland soils are in a drainage sequence with the well drained Hamlin soils and the moderately well drained to somewhat poorly drained Teel soils. Wayland soils are also near nonalluvial soils which are at a higher elevation above the flood plain. In some places, they are near Palms soils, but they lack the organic mantle characteristic of those soils.

Typical pedon of Wayland silt loam in a wooded area in the town of Arcadia, 550 feet south of Hydesville Road and 0.35 mile northeast of the junction of Stebbins and Tellier Roads:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam, gray (7.5YR 5/1) dry; few fine distinct dark brown (7.5YR 3/2) mottles; moderate medium granular structure; friable; many roots; neutral; clear smooth boundary.

C1g—8 to 23 inches, dark gray (10YR 4/1) silt loam; common medium distinct dark brown (10YR 3/3) mottles; massive; friable; few fine roots and pores; neutral; gradual smooth boundary.

C2g—23 to 35 inches, dark gray (10YR 4/1) silt loam; common to many fine distinct brown (7.5YR 4/4) mottles; massive; firm; slightly plastic; few fine roots in upper part; few fine pores; neutral; clear smooth boundary.

C3g—35 to 50 inches, gray (10YR 5/1) heavy silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; massive; firm and plastic; few fine pores; mildly alkaline.

Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 3 percent by volume in the solum and in the substratum to a depth of at least 40 inches. Reaction ranges from neutral to mildly alkaline in the solum and the upper part of the substratum. In the lower part of the substratum, reaction is mildly alkaline to moderately alkaline.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 2, and chroma of 2 or 1.

The Cg horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 1 or 0. Mottles are common or many and are faint or distinct. Texture is silt loam or silty clay loam commonly becoming stratified in the lower part.

Williamson series

The Williamson series consists of deep, moderately well drained soils on lake plains and deltas. The soils formed in glacial lake sediments dominated by silt and very fine sand. The slope ranges from 0 to 12 percent but is dominantly 2 to 6 percent. These soils are used mainly for field crops, vegetable crops, fruits crops, hay, and pasture.

The Williamson soils are in a drainage sequence with the somewhat poorly drained Wallington soils. Williamson soils are also near Dunkirk and Collamer soils, which are similar, but Williamson soils are more acid and have a fragipan which is lacking in both other soils.

Typical pedon of Williamson silt loam, 2 to 6 percent slopes, adjacent to an incised stream in the town of Huron, about 1.0 mile east of the hamlet of Alton, 100 feet north of New York Highway 104, and 200 feet west of a steep slope:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

B2—8 to 15 inches, yellowish brown (10YR 5/4) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; many fine roots; many fine pores; strongly acid; clear wavy boundary.

A'2—15 to 20 inches, coarsely intermingled light yellowish brown (10YR 6/4) and pale brown (10YR 6/3) very fine sandy loam; common fine distinct dark yellowish brown (10YR 4/4) and few medium faint yellowish brown (10YR 5/6) mottles; massive; friable; common fine roots; common medium pores; strongly acid; abrupt irregular boundary.

B'x1—20 to 34 inches, brown (7.5YR 5/4) silt loam; prisms 10 to 20 inches across are separated by 1/2 to 1/16 inch of light brown (10YR 6/4) very fine sandy loam mottled with yellowish brown (10YR 5/6); massive plates 4 to 8 inches thick within prisms are separated by very thin bands of light brown (7.5YR 6/4) very fine sandy loam; very firm, brittle; many 2 to 4 millimeter vertical holes with clay linings; few roots along faces of prisms; strongly acid; gradual wavy boundary.

B'x2—34 to 48 inches, horizontal lamellae of dark brown (7.5YR 4/4) silt loam 1 to 4 inches thick separated by 1/8 to 1/2 inch lamellae of light brown (7.5YR 6/4) very fine sandy loam; common fine yellowish brown mottles; massive; firm, brittle; few roots; many 1 millimeter and common 2 to 4 millimeter vertical holes with clay linings; strongly acid; gradual boundary.

C—48 to 60 inches, layers of dark brown (7.5YR 4/4) firm silt loam and pinkish gray (7.5YR 6/2) friable very fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles in the lighter parts; massive within layers; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments range from 0 to 5 percent by volume in the surface layer, 0 to 3 percent in the subsoil, and 0 to 5 percent in the substratum. Depth to the top of the fragipan ranges from 15 to 24 inches. Unlimed reaction ranges from very strongly acid to medium acid in the solum and from strongly acid to neutral in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2.

The B2 horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam or very fine sandy loam.

The A'2 horizon has hue of 2.5Y to 7.5YR, value of 5 to 7, and chroma of 3 or 4. Texture is silt loam or very fine sandy loam.

The Bx horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 3 or 4. Mottles are few or common and are faint or distinct. Texture is silt loam or very fine sandy loam. Consistence is firm or very firm.

The C horizon has hue of 2.5Y to 5YR, value of 4 or 5, and chroma of 2 to 4. Texture is silt loam, very fine sandy loam or stratified silt, and very fine sand.

Formation of the soils

The first part of this section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation. The second part discusses some of the major soil horizons in the survey area and the processes of soil horizon differentiation as they relate to soil formation.

Factors of soil formation

Soils are formed by weathering and other processes that act on the parent material. The properties of the soil at any point on the earth depend on the combination of the following factors: the physical and chemical composition of the parent material, the climate, the plant and animal life, the topography, and the time. These factors of soil formation are so closely interrelated that few generalizations can be made about the effects of one. The relative influence of each factor differs from place to place, and each modifies the effect of the other four. For example, the effects of climate and of plant and animal life are influenced by relief and by the nature of the parent material. In some places the influence of one factor is dominant.

In the following pages, the five major factors of soil formation are discussed in relation to their effects on the soils in Wayne County.

Parent material

Parent material is the unconsolidated earthy mass in which soils form. It determines the mineralogical composition, and to a large extent, the chemical composition of soils. The type of parent material also influences the rate at which soil-forming processes take place as well as the color of soils.

Most of the soils in Wayne County formed in different types of unconsolidated deposits left as a result of glaciation. Glacial till is the most extensive parent material in the county, and smaller areas formed in glacio-lacustrine sediments, mixed till and residuum, and glacial outwash. Some soils formed in more recent deposits of stream alluvium and in accumulations of organic material.

Soils that formed in glacial till deposits range widely in their characteristics. Dense fragipan horizons and substrata are common in deep, acid soils, such as Sodus and Ira soils. In some areas the till parent material has a medium to high component of limestone and shale particles derived from nearby beds of limestone and shale rock. Soils that formed in this material, such as Ovid and Cazenovia soils, do not have a fragipan but have a calcareous substratum. Other areas of till deposits are strongly influenced by nearby beds of limestone and sandstone; consequently, many of the soils that formed in these deposits have a sandy loam or loam texture and a calcareous substratum. Examples are Ontario and Madrid soils. Soils that formed in lacustrine sediments are usually free of stone and gravel fragments. Lacustrine soils, such as Niagara and Rhinebeck soils, are mostly on former lake plains in the county. Examples of soils that formed in a mixture of glacial till and residuum are Riga and Lairdsville soils; both are moderately deep to the soft, weatherable, shale bedrock. Moderately deep Wassaic soils and shallow Farmington soils occur where the till mantle becomes thin over limestone bedrock. Although this bedrock weathers very slowly, some fragments are detached by the action of tree throw or frost and mixed with the overlying till deposits. Soils that formed in glacial outwash deposits are generally medium or moderately coarse textured and are commonly underlain by stratified sand and gravel deposits. Examples are Alton and Palmyra soils. Soils that formed in recent stream deposits along valley bottoms are called alluvial soils. They are usually quite silty and show little or no soil profile development. Hamlin and Wayland soils are examples. Soils, such as Carlisle and Edwards soils, that formed in organic deposits occupying low areas are called muck.

Topography

The shape of the land surface, the slope, and the position of the land surface in relation to the underlying water table have had strong influence on soil formation in Wayne County. Soils that formed in convex, sloping areas that accumulate little runoff or where runoff is moderate to rapid generally are well drained and have a bright colored, unmottled subsoil. These soils are usually leached to greater depths than low-lying wetter soils in the same general area. In more gently sloping areas where runoff is slower or where runoff is received from higher adjacent areas, the soils often exhibit some evidence of wetness, such as mottling in the subsoil. Soils that formed in level areas or in slight depressions where the water table is near the surface for prolonged periods, show strong evidence of wetness. These soils usually have a thick dark colored surface layer enriched by organic matter and a highly mottled or grayish colored subsoil. Factors that cause soils to be wet are a high ground water table, position on the landscape where water accumulates from higher areas, or impervious layers in the subsoil or substratum. The length, steepness, and configuration of slopes also influence drainage and, consequently, the kind of soil that is formed. Local differences in soils are largely the result of differences in parent material and topography.

Soils that formed in one kind of parent material but have different characteristics because of different degrees of wetness are said to be in a drainage sequence. Table 18 shows the relationship of parent material, position, and drainage of the soil series in Wayne County.

Climate

Climate, particularly temperature, precipitation, and frost action, is one of the most influential soil-forming factors. It determines to a large degree the kind of weathering processes that take place. It also influences the type of vegetative growth and the leaching and translocation of weathered minerals. Wayne County has a humid, temperate climate, which tends to promote the development of moderately weathered, leached soils. Although there is a slight average temperature increase near Lake Ontario and on south-facing slopes, the climate is not variable enough to cause major differences among soils within the county. For more detailed information on climate, see the section "General nature of the county".

Plant and animal life

All living organisms, including plants, animals, bacteria, and fungi, are important to soil formation. Vegetation is generally responsible for the content of organic matter, color, and structure of the surface layer and to some extent for the amount of nutrients. Animals, such as earthworms and ants, help keep the soil porous and more permeable to air and water. Their waste products cause aggregation of soil particles, which improves soil structure. Bacteria and fungi decompose the vegetation, which results in the release of nutrients for new plant growth.

The native hardwoods and conifers in Wayne County have probably had a greater influence on soil formation than any other living organisms. Man has also caused changes in soils through clearing of the forests and cultivation of the land. He has added nutrients through fertilizers, mixed some soil horizons by plowing, and has even transported soil materials from place to place.

Time

The time required for a soil to form depends on the other soil-forming factors, and in terms of years this is usually a long time. Less time is required for a soil to form in a warm, moist climate than in a cool, dry climate. Some parent material is more resistant to the soil-form-

ing processes than others. For example, quartz sand may change very little even if it is exposed for centuries. The relative degree of profile development, rather than the number of years a soil has been in the process of forming, determines the age of the soil. The soils in Wayne County formed since the last glacier retreated from the area about 10,000 years ago.

When soils begin to form in loose material, they have characteristics almost identical to those of the parent material. Such soils are said to be immature or youthful. Among the immature soils in Wayne County are the Hamlin and Teel soils. These soils are on flood plains where alluvial sediment still accumulates. They have indistinct soil horizons, weak color differences between horizons, and little other evidence of soil development. A soil is generally said to reach a degree of maturity when it has acquired well-developed profile characteristics. Examples of relatively mature soils in Wayne County are the Hilton and Palmyra soils that have been developing since glaciation. These soils are deep to bedrock, have distinct horizons, and the soil aggregates in them have a definite arrangement in relation to one another.

Processes of soil formation

This section contains a brief explanation of soil horizon nomenclature and a discussion of the processes involved in soil horizon development as they relate to soil formation.

The soil-forming factors result in distinguishing different layers called soil horizons. These horizons can be viewed in a vertical cut of soil known as a soil profile. The soil profile extends from the surface downward into material that is little altered by the soil-forming processes.

Most soils contain three major horizons called A, B, and C horizons. These major horizons can be further subdivided, as indicated by numbers and small letters, to designate changes within one horizon. For example, the B22t horizon represents a layer within the B horizon that contains an accumulation of translocated clay.

The A horizon is the surface layer. An A1 or Ap (plow layer) horizon is that part of the surface layer with the largest content of organic matter. The A horizon is also the layer of maximum leaching, or eluviation, of clay and iron. An A2 horizon designates that part of the A horizon where considerable leaching has taken place. Color of the A2 horizon, commonly called the subsurface layer, is often light brownish-gray as the result of iron removal.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, and other compounds leached from the overlying A horizon. In some soils, the B horizon is formed by alteration in place rather than from illuviation. The alteration may be caused by oxidation and reduction of iron or by the weathering of clay minerals. The fragipan (Bx horizon) in some soils of the county is believed to have formed from both illuviation and alteration in place. The B horizon commonly has blocky or prismatic structure and generally is firmer and lighter in color than the A1 or Ap horizon.

The C horizon is below the A or B horizon. It consists of parent material that is little altered by the soil-forming processes, but it may be slightly modified by weathering in some places.

In Wayne County, several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of salts and minerals, the reduction and transfer of iron, the translocation of silicate clay minerals, the formation of soil structure, and the change in soil density. These processes are continually taking place at a very slow rate and often at the same time throughout the soil profile.

The accumulation of organic matter takes place with the decomposition of plant residues. This process darkens the surface layer and helps form the A1 horizon. In Wayne County the organic-matter content of the surface layer of mineral soils averages about 3.5 to 4 percent.

For soils to develop distinct subsoil horizons, some of the lime and other soluble salts must be leached before other soil processes, such as clay translocation, can take place. Among the many factors that affect this leaching are the kinds of salts originally present, the rate and depth of soil solution percolation, and the texture of the soil.

Several well drained and moderately well drained soils in the county have strong brown, yellowish brown, or reddish brown subsoil horizons. These colors are mainly caused by thin coatings of iron oxides on sand and silt particles. However, in some soils, like the Lairdsville soil, the color is inherited from the reddish parent material in which it has formed. A bright colored subsoil with iron oxide coatings is commonly termed a color B horizon. It has normally developed subangular blocky structure, but contains little or no clay translocated from the overlying surface horizon.

One of the more important processes of soil horizon development in many of the Wayne County soils is the formation and translocation of clay minerals. Clay particles are eluviated downward from the A horizon and redeposited in the B horizon as films on ped faces, as linings along pore walls and root channels, and as coatings on some coarse fragments. The Ontario soil is an example of a soil in which clay content is higher in the B horizon than in the A horizon because of translocation.

A fragipan has developed in the subsoil of some soils in the county. This horizon is very firm and brittle when moist, and very hard when dry. Its genesis is not fully understood. Studies indicate that the swelling and shrinking that takes place in alternating wet and dry periods may account for the dense packing of soil particles, the low pore space, and the gross polygonal pattern of vertical cracks found in most fragipans (*9*). Clay, silica, and oxides of aluminum are the most likely cementing agents causing brittleness and hardness. The strength of a fragipan is best expressed in somewhat poorly drained

and moderately well drained soils. Ira and Williamson soils are examples of soils in Wayne County that have a very strong fragipan.

The reduction and transfer of iron compounds is mainly associated with wetter soils such as the poorly drained and very poorly drained Lyons and Madalin soils. This process is known as gleying (*4*). The subsoil and underlying parent material are grayish colored, indicating reduction and the removal and transfer of iron in solution. Moderately well drained and somewhat poorly drained soils have mottles, which indicate some segregation of iron.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

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.

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 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	Less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Basal till. Compact glacial till deposited beneath the ice.

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

Bedrock control. Configuration and relief of a landform is determined or strongly influenced by that of the underlying bedrock. For example, "a bedrock-controlled till plain."

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

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

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Compressible. Excessive decrease in volume of soft soil under load.

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).

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

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

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

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

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

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

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.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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.

Favorable. Favorable soil features for the specified use.

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.*

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

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.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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 outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

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

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substances.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

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

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

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

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. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

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.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are none, very slow, slow, medium, rapid, and very rapid.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Kettle hole (geology). A depression in the ground surface formed by the melting of a block of ice buried or partially buried by glacial drift, either outwash or till.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. An area dominated by low lying, nearly level or undulating land that was partially under water during part of the glacial period. It is part of the Ontario lowlands and is at lower elevations than the upland plateau.

Landslide. The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Lateral moraine. A ridge of till along the edge of a valley glacier. Composed largely of material that fell to the glacier from valley walls.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Limestone. A sedimentary rock containing a high proportion of calcium carbonate or magnesium carbonate.

Limestone, agricultural. A soil amendment consisting principally of calcium carbonate but including magnesium carbonate and perhaps other materials, and used to furnish calcium and magnesium as essential elements for the growth of plants and to neutralize soil acidity.

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.

Low strength. Inadequate strength for supporting loads.

Marl. Soft, whitish unconsolidated calcium carbonate, usually mixed with varying amounts of clay or other impurities.

Meander. A turn or sharp bend in a stream's course.

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.

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

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

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

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, 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 land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Oxbow (geology). An abandoned meander caused by a neck cutoff.

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.

Peat. Unconsolidated material, largely undecomposed organic matter that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

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

Percolation. The downward movement of water through the soil.

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

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).

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of 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.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

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.

Pore space. Total space not occupied by soil particles in a bulk volume of soil.

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.

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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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

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

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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

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

Shale. Sedimentary rock formed by the hardening of a clay deposit.

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.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

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* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

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

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

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

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

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

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

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

Substratum. The part of the soil below the solum.

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

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

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.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

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

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

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

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

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

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

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

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

Unstable fill. Risk of caving or sloughing in banks of fill material.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

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

Water table. The upper limit of the soil or underlying rock material that 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, 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.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Illustrations

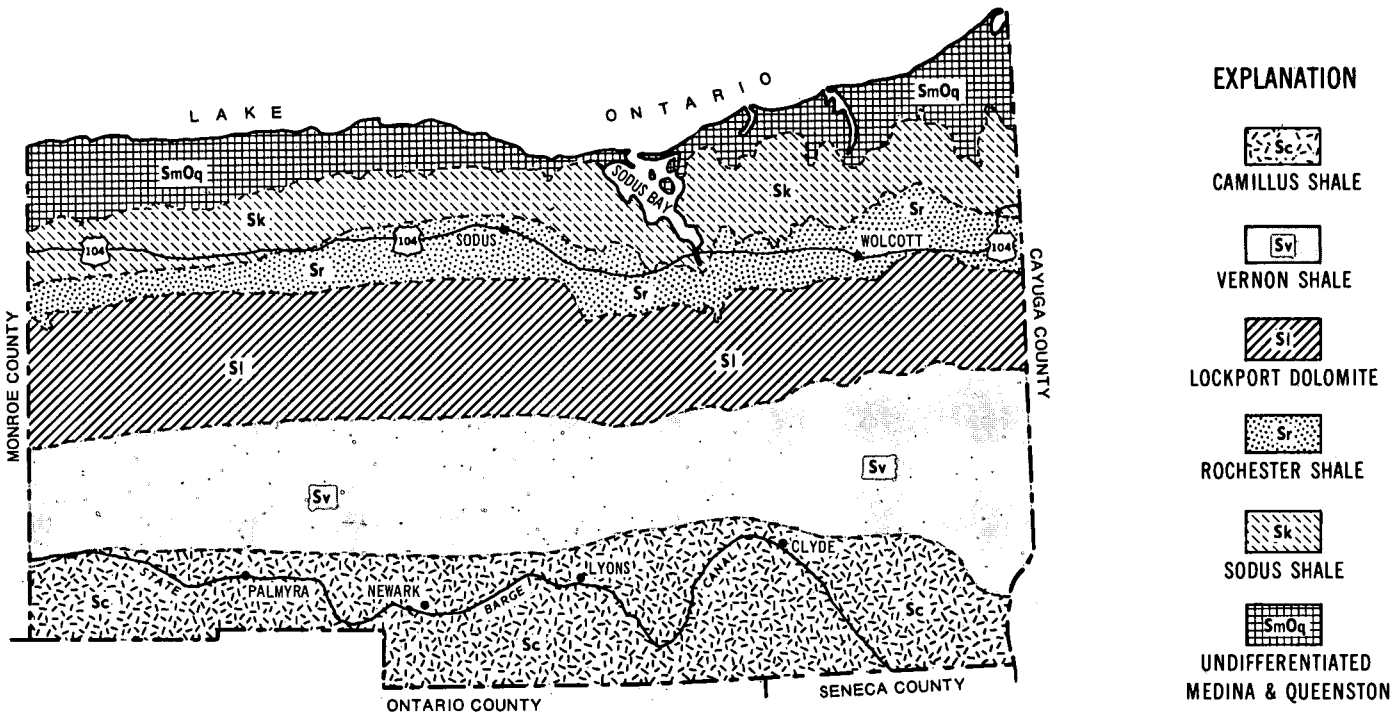

Figure 1.—Bedrock geology of Wayne County, plan view.

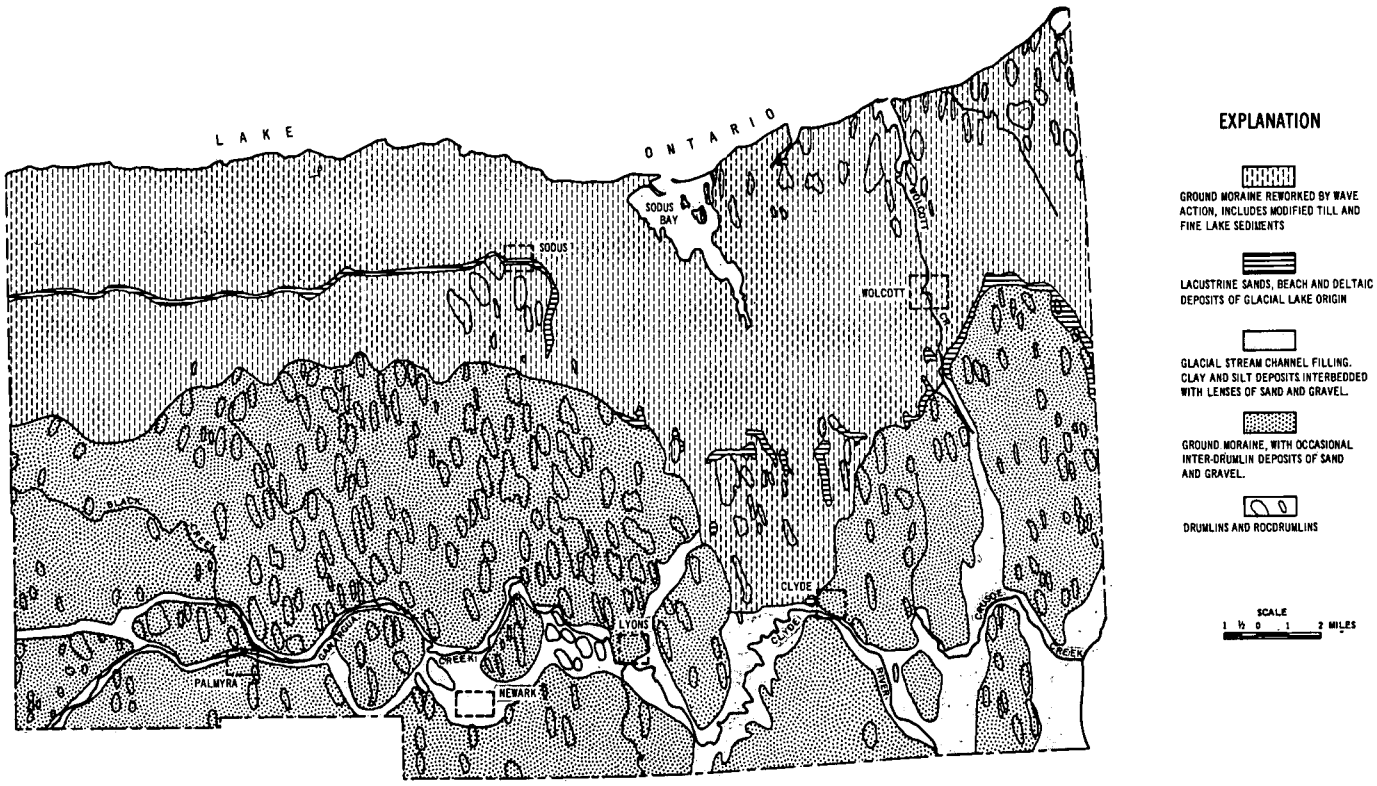

Figure 2.—Unconsolidated deposits in Wayne County, plan view.

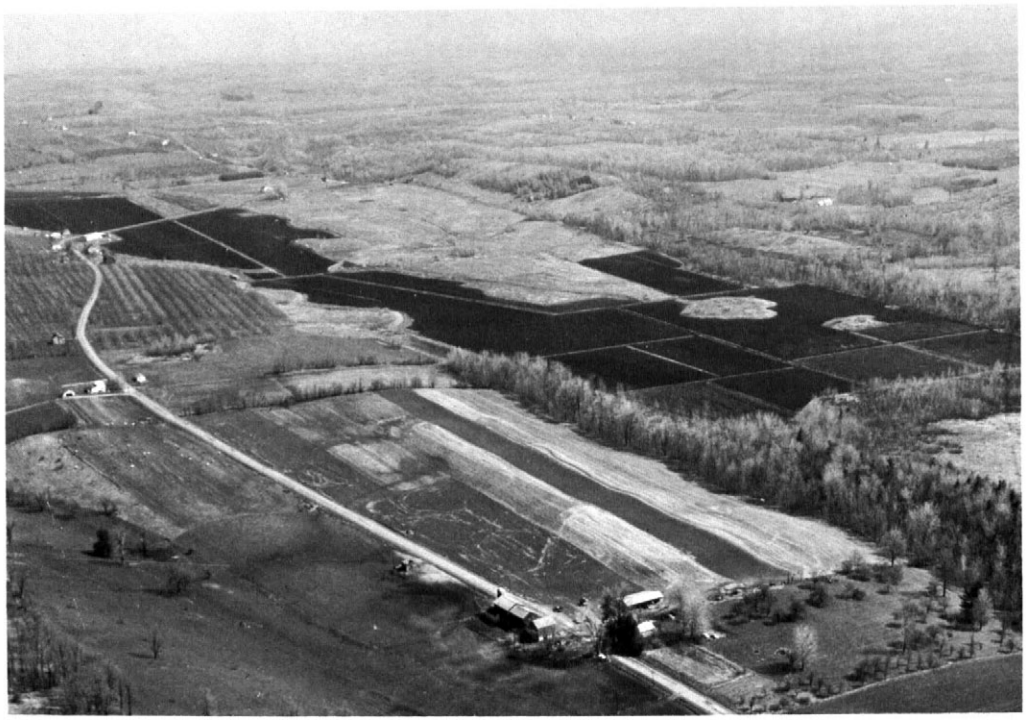

Figure 3.—Typical landscape of the Ontario-Hilton map unit.

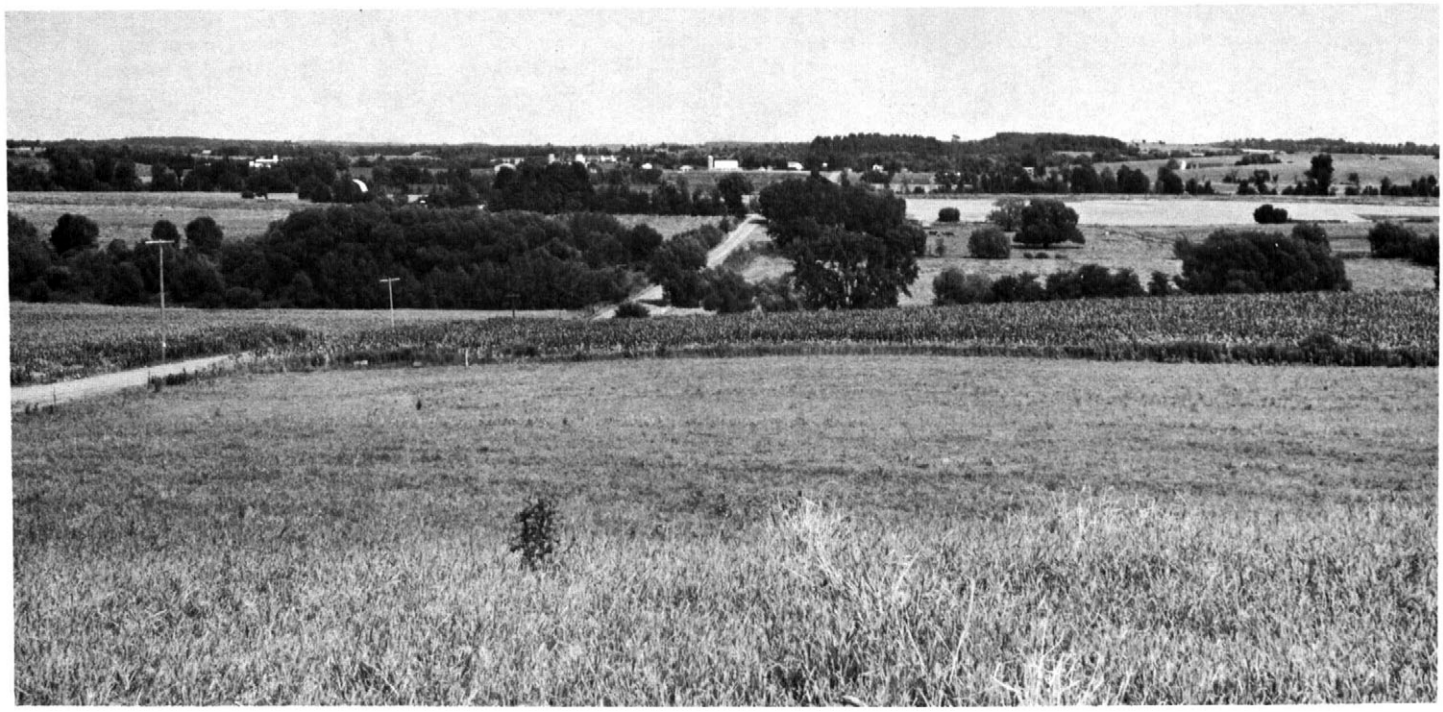

Figure 4.—The Madrid-Bombay map unit is mainly used for crop production.

Figure 5.—Typical landscape of Ontario gravelly loan, 15 to 25 percent slopes, in the higher foreground and drained area of Carlisle muck in the darker central area.

Figure 6.—Wassaic silt loam, 0 to 3 percent slopes, has potential as a site for stone quarries.

Figure 7.—Wayland silt loam commonly is subject to flooding early in spring.

Figure 8.—A typical area of Fresh water marsh.

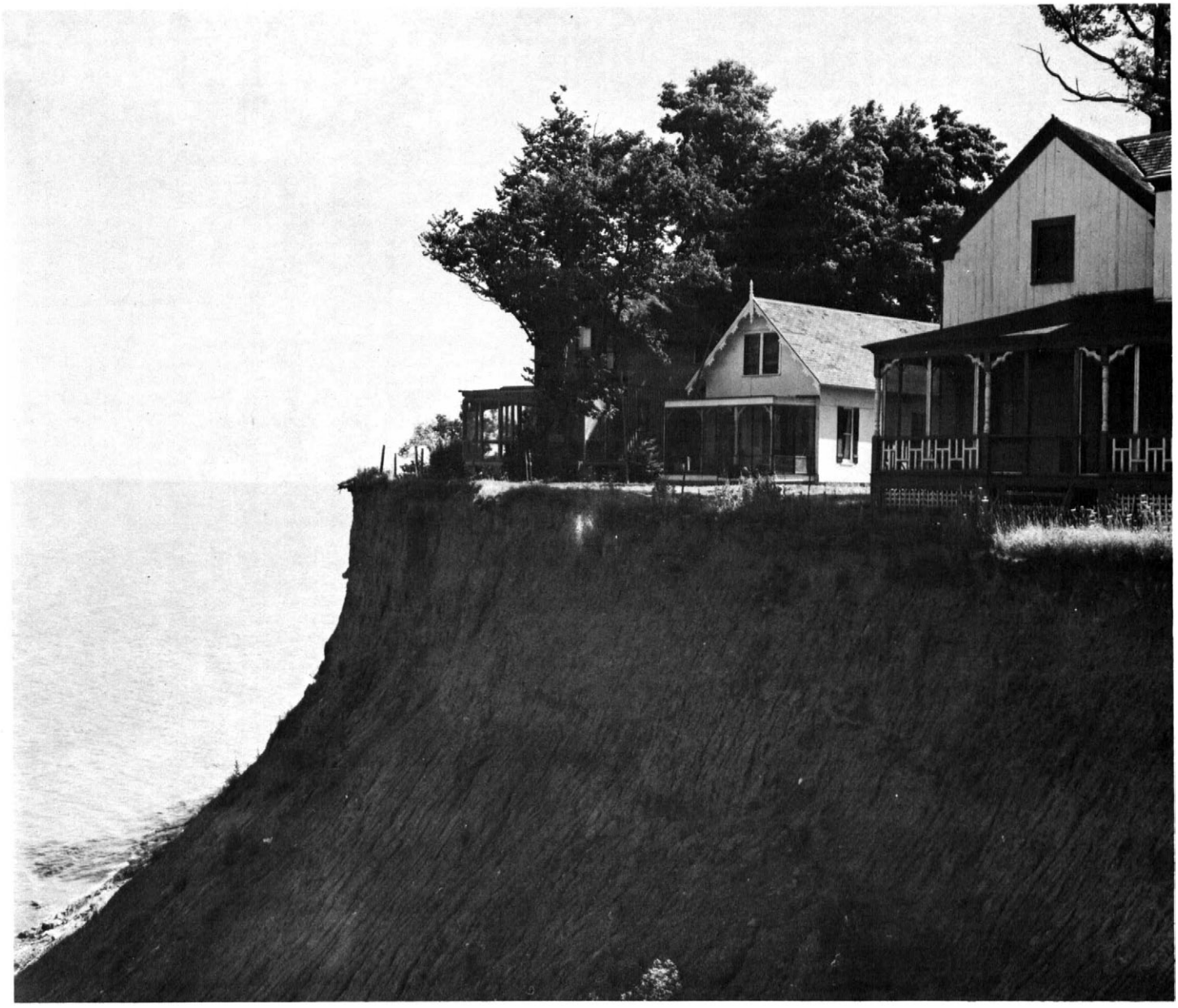

Figure 9.—Lakeshore erosion is hazardous to homesite development on Ira gravelly fine sandy loam, 0 to 3 percent slopes.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F	Units	In	In	In		In
January----	32.2	16.8	24.6	56	-12	10	2.53	1.72	3.26	8	25.0
February---	33.9	17.1	25.5	55	-10	7	2.61	1.35	3.63	6	21.8
March------	41.5	25.3	33.4	70	2	44	2.35	1.41	3.19	7	15.0
April------	56.1	36.3	46.2	83	20	212	3.00	1.95	3.93	7	1.3
May--------	67.1	45.1	56.1	89	28	499	3.20	2.09	4.21	8	.0
June-------	77.8	54.7	63.4	94	36	856	3.10	1.47	4.41	6	.0
July-------	81.8	59.5	70.7	95	45	952	2.79	1.61	3.74	6	.0
August-----	80.0	58.0	66.2	93	42	962	3.36	2.15	4.46	7	.0
September--	73.2	51.8	59.8	93	30	762	3.04	1.84	4.10	7	.0
October----	62.6	42.5	52.6	84	24	391	3.66	1.61	5.31	7	.0
November---	48.4	33.4	40.9	71	12	97	3.95	2.50	5.26	9	5.5
December---	36.0	22.6	29.3	62	-4	21	2.82	1.75	3.78	8	19.3
Year-----	57.6	38.6	47.4	95	-15	4,813	36.41	31.83	40.80	86	87.9

[1]Recorded in the period 1951-74 at Sodus Center, N. Y.

[2]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

Probability	Temperature[1]		
	24 F or lower	28 F or lower	32 F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 20	May 18	May 26
2 years in 10 later than--	April 15	May 10	May 19
5 years in 10 later than--	April 5	April 24	May 5
First freezing temperature in fall:			
1 year in 10 earlier than--	October 23	October 6	September 22
2 years in 10 earlier than--	October 29	October 12	September 28
5 years in 10 earlier than--	November 10	October 25	October 10

[1]Recorded in the period 1951-74 at Sodus Center, N. Y.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F	Higher than 28 F	Higher than 32 F
	Days	Days	Days
9 years in 10	193	149	131
8 years in 10	202	160	139
5 years in 10	218	183	156
2 years in 10	235	205	173
1 year in 10	243	217	182

[1]Recorded in the period 1951-74 at Sodus Center, N. Y.

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

Map symbol	Soil name	Acres	Percent
Aa	Adrian muck	2,376	0.6
AD	Alluvial land	1,096	0.3
AgA	Alton gravelly sandy loam, 0 to 3 percent slopes	2,760	0.7
AgB	Alton gravelly sandy loam, 3 to 8 percent slopes	5,719	1.5
AgC	Alton gravelly sandy loam, 8 to 15 percent slopes	1,369	0.4
AgD	Alton gravelly sandy loam, 15 to 25 percent slopes	397	0.1
AlA	Alton cobbly loam, 0 to 3 percent slopes	1,181	0.3
AlB	Alton cobbly loam, 3 to 8 percent slopes	597	0.1
Ap	Appleton loam, 0 to 5 percent slopes	10,410	2.7
Be	Beaches	226	0.1
BoA	Bombay gravelly fine sandy loam, 0 to 3 percent slopes	5,453	1.4
BoB	Bombay gravelly fine sandy loam, 3 to 8 percent slopes	9,882	2.5
BoC	Bombay gravelly fine sandy loam, 8 to 15 percent slopes	413	0.1
Ca	Canandaigua silt loam	22,074	5.7
Cd	Carlisle muck	12,339	3.2
CeB	Cazenovia silt loam, 3 to 8 percent slopes	1,688	0.4
CeC	Cazenovia silt loam, 8 to 15 percent slopes	375	0.1
CoA	Cazenovia gravelly silt loam, bedrock substratum, 0 to 3 percent slopes	738	0.2
CoB	Cazenovia gravelly silt loam, bedrock substratum, 3 to 8 percent slopes	1,200	0.3
Cp	Chippeny muck	225	0.1
CrB	Collamer silt loam, 2 to 6 percent slopes	3,763	1.0
CsA	Colonie loamy very fine sand, 0 to 2 percent slopes	263	0.1
CsB	Colonie loamy very fine sand, 2 to 6 percent slopes	1,293	0.3
CsC	Colonie loamy very fine sand, 6 to 12 percent slopes	447	0.1
CsD	Colonie loamy very fine sand, 12 to 20 percent slopes	478	0.1
CTE	Colonie and Dunkirk soils, hilly	3,178	0.8
DkB	Dunkirk silt loam, 2 to 6 percent slopes	194	(1)
DkC3	Dunkirk silt loam, 6 to 12 percent slopes, severely eroded	739	0.2
DkD	Dunkirk silt loam, 12 to 20 percent slopes	632	0.2
Ed	Edwards muck	905	0.2
ElA	Elnora loamy fine sand, 0 to 2 percent slopes	3,688	0.9
ElB	Elnora loamy fine sand, 2 to 6 percent slopes	3,044	0.8
FaB	Farmington silt loam, 0 to 8 percent slopes	901	0.2
Fr	Fredon loam	4,174	1.1
FW	Fresh water marsh	3,667	0.9
Ha	Halsey silt loam	2,456	0.6
Hm	Hamlin silt loam	700	0.2
HnA	Hilton gravelly loam, 0 to 3 percent slopes	9,075	2.3
HnB	Hilton gravelly loam, 3 to 8 percent slopes	22,970	5.9
HnC	Hilton gravelly loam, 8 to 15 percent slopes	1,117	0.3
HoA	Hilton gravelly loam, bedrock substratum, 0 to 3 percent slopes	1,357	0.3
HoB	Hilton gravelly loam, bedrock substratum, 3 to 8 percent slopes	1,734	0.4
IrA	Ira gravelly fine sandy loam, 0 to 3 percent slopes	2,663	0.7
IrB	Ira gravelly fine sandy loam, 3 to 8 percent slopes	9,483	2.4
IrC	Ira gravelly fine sandy loam, 8 to 15 percent slopes	770	0.2
Jo	Joliet loam	1,786	0.5
Ju	Junius loamy very fine sand	372	0.1
LdB	Lairdsville and Riga silty clay loams, 2 to 6 percent slopes	938	0.2
LdC3	Lairdsville and Riga silty clay loams, 6 to 20 percent slopes, severely eroded	310	0.1
LEE	Lairdsville and Riga silty clay loams, hilly	229	0.1
Lk	Lakemont silty clay loam, shale bedrock substratum	1,170	0.3
Lm	Lamson very fine sandy loam	6,415	1.6
LoA	Lockport and Brockport silty clay loams, 0 to 3 percent slopes	3,609	0.9
LoB	Lockport and Brockport silty clay loams, 3 to 8 percent slopes	804	0.2
Ls	Lyons mucky silt loam	2,417	0.6
Ly	Lyons very stony silt loam	646	0.2
Ma	Madalin silty clay loam	1,321	0.3
MdB	Madrid gravelly fine sandy loam, 2 to 8 percent slopes	10,600	2.7
MdC	Madrid gravelly fine sandy loam, 8 to 15 percent slopes	3,937	1.0
MdD	Madrid gravelly fine sandy loam, 15 to 25 percent slopes	802	0.2
Me	Martisco muck	3,064	0.8
MfA	Massena gravelly loam, 0 to 3 percent slopes	5,831	1.5
MfB	Massena gravelly loam, 3 to 8 percent slopes	363	0.1
Mg	Massena very stony loam	989	0.3
Mn	Minoa very fine sandy loam	10,607	2.7
Ne	Newstead gravelly fine sandy loam	1,385	0.4
Ng	Niagara silt loam	1,778	0.5
OaB	Oakville loamy fine sand, 0 to 6 percent slopes	1,848	0.5
OnB	Ontario gravelly loam, 3 to 8 percent slopes	29,425	7.6

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
OnC	Ontario gravelly loam, 8 to 15 percent slopes	16,563	4.3
OnD	Ontario gravelly loam, 15 to 25 percent slopes	7,523	1.9
OSE	Ontario soils, steep	14,913	3.8
OvA	Ovid silt loam, 0 to 3 percent slopes	1,626	0.4
OvB	Ovid silt loam, 3 to 8 percent slopes	1,020	0.3
Pa	Palms muck	2,241	0.6
PcA	Palmyra gravelly loam, 0 to 3 percent slopes	5,866	1.5
PcB	Palmyra gravelly loam, 3 to 8 percent slopes	12,008	3.1
PcC	Palmyra gravelly loam, 8 to 15 percent slopes	2,295	0.6
PgA	Palmyra cobbly loam, 0 to 3 percent slopes	405	0.1
PgB	Palmyra cobbly loam, 3 to 8 percent slopes	769	0.2
PhD	Palmyra soils, 15 to 25 percent slopes	427	0.1
PLE	Palmyra and Alton soils, steep	546	0.1
PoA	Phelps gravelly loam, 0 to 3 percent slopes	7,238	1.9
PoB	Phelps gravelly loam, 3 to 8 percent slopes	4,694	1.2
PpA	Phelps cobbly loam, 0 to 3 percent slopes	300	0.1
RaA	Rhinebeck silty clay loam, 0 to 2 percent slopes	4,475	1.2
RaB	Rhinebeck silty clay loam, 2 to 6 percent slopes	531	0.1
SdB	Sodus gravelly fine sandy loam, 3 to 8 percent slopes	5,054	1.3
SdC	Sodus gravelly fine sandy loam, 8 to 15 percent slopes	2,310	0.6
SdD	Sodus gravelly fine sandy loam, 15 to 25 percent slopes	1,333	0.3
SSE	Sodus soils, steep	1,984	0.5
Te	Teel silt loam	2,992	0.8
Wa	Wallington silt loam	4,818	1.2
WcA	Wassaic silt loam, 0 to 3 percent slopes	626	0.2
WcB	Wassaic silt loam, 3 to 8 percent slopes	1,107	0.3
Wd	Wayland silt loam	7,639	2.0
WnA	Williamson silt loam, 0 to 2 percent slopes	4,475	1.2
WnB	Williamson silt loam, 2 to 6 percent slopes	12,275	3.2
WnC	Williamson silt loam, 6 to 12 percent slopes	3,577	0.9
	Cut and fill land	3,354	0.9
	Gravel pits	753	0.2
	Quarries	99	(1)
	Water	1,763	0.5
	Dumps	26	(1)
	Total	388,480	100.0

[1]Less than 0.1 percent.

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

[Yields are those that can be expected under a high level of management. The estimates were made in 1975. Absence of data indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Alfalfa hay	Apples[1]	Cherries	Corn	Beans, snap	Trefoil-grass hay	Wheat
	Ton	Bu	Ton	Bu	Bu	Ton	Bu
Adrian:							
Aa	---	---	---	---	---	---	---
Alluvial land:							
AD	---	---	---	---	---	3.0	---
Alton:							
AgA	4.5	550	6.0	100	---	3.0	45
AgB	4.5	550	6.0	100	---	3.0	45
AgC	4.5	---	5.9	90	---	2.5	40
AgD	---	---	---	80	---	2.5	35
AlA	4.0	500	5.9	90	---	3.0	40
AlB	4.0	500	5.9	90	---	3.0	40
Appleton:							
Ap	5.5	800	---	100	240	4.0	50
Beaches:							
Be							
Bombay:							
BoA	5.0	800	5.9	130	265	4.0	60
BoB	5.0	800	5.9	130	265	4.0	60
BoC	4.5	700	5.9	120	---	4.0	50
Canandaigua:							
Ca	---	---	---	90	220	3.5	40
Carlisle:							
Cd	---	---	---	---	---	---	---
Cazenovia:							
CeB	5.5	900	6.0	120	265	4.0	65
CeC	5.0	800	5.9	110	---	4.0	55
CoA	6.0	900	6.0	110	265	4.0	65
CoB	6.0	900	6.0	120	265	4.0	65
Chippeny:							
Cp	---	---	---	---	---	---	---
Collamer:							
CrB	5.0	900	5.9	110	265	4.0	60
Colonie:							
CsA, CsB	4.0	550	6.0	80	---	2.5	35
CsC	3.5	500	5.9	70	---	2.5	30
CsD	3.0	---	---	---	---	2.0	---
[2]CTE	---	---	---	---	---	---	---
Dunkirk:							
DkB	5.0	900	6.0	110	265	4.0	60
DkC3	4.5	800	5.9	90	---	3.5	45

See footnotes at end of table.

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

Soil name and map symbol	Alfalfa hay	Apples[1]	Cherries	Corn	Beans, snap	Trefoil-grass hay	Wheat
	Ton	Bu	Ton	Bu	Bu	Ton	Bu
Dunkirk:							
DkD	4.5	---	---	90	---	3.5	40
Edwards:							
Ed	---	---	---	90	---	---	---
Elnora:							
ElA	3.5	500	5.9	80	200	3.0	35
ElB	3.5	500	5.9	80	200	3.0	35
Farmington:							
FaB	---	---	---	70	---	3.0	---
Fredon:							
Fr	3.5	800	---	100	240	4.0	40
Fresh water marsh:							
FW	---	---	---	---	---	---	---
Halsey:							
Ha	3.5	---	---	100	---	3.5	---
Hamlin:							
Hm	4.5	800	---	120	265	4.0	45
Hilton:							
HnA, HoA, HoB	5.0	900	5.9	130	265	4.0	60
HnB	5.0	900	5.9	130	265	4.0	60
HnC	5.0	800	5.9	120	---	4.0	55
Ira:							
IrA	4.0	600	5.9	90	240	4.0	40
IrB	4.0	600	5.9	90	240	4.0	40
IrC	4.0	500	5.9	85	---	4.0	40
Joliet:							
Jo	---	---	---	---	---	3.0	---
Junius:							
Ju	---	---	---	90	---	3.0	45
Lairdsville:							
[2]LdB	5.0	650	6.0	90	185	4.0	50
[2]LdC3	4.5	---	5.9	80	---	3.5	46
[2]LEE	---	---	---	---	---	---	---
Lakemont:							
Lk	---	---	---	---	---	3.5	---
Lamson:							
Lm	---	---	---	90	---	3.5	---
Lockport:							
[2]LoA	4.3	---	---	90	---	3.5	58
[2]LoB	4.3	---	---	90	---	3.5	58
Lyons:							
Ls, Ly	---	---	---	---	---	3.5	---
Madalin:							
Ma	---	---	---	---	---	3.5	---

See footnotes at end of table.

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

Soil name and map symbol	Alfalfa hay	Apples[1]	Cherries	Corn	Beans, snap	Trefoil-grass hay	Wheat
	Ton	Bu	Ton	Bu	Bu	Ton	Bu
Madrid:							
MdB	6.0	800	6.0	110	265	4.0	65
MdC	6.0	700	5.9	100	---	4.0	65
MdD	5.0	---	---	75	---	3.5	45
Martisco:							
Me	---	---	---	90	---	---	---
Massena:							
MfA	4.0	700	---	90	240	3.5	45
MfB	4.0	700	---	90	240	3.5	45
Mg	---	---	---	---	---	---	---
Minoa:							
Mn	3.5	750	---	95	240	3.0	45
Newstead:							
Ne	---	---	---	---	---	3.0	---
Niagara:							
Ng	4.0	800	---	100	240	4.0	50
Oakville:							
OaB	3.5	500	5.9	50	---	2.5	30
Ontario:							
OnB	6.0	900	6.0	130	265	4.0	65
OnC	5.5	800	5.9	120	---	4.0	55
OnD	4.5	---	---	100	---	3.5	---
[2]OSE	---	---	---	---	---	---	---
Ovid:							
OvA	5.0	800	---	90	240	4.0	60
OvB	5.0	800	---	90	240	4.0	60
Palms:							
Pa	---	---	---	---	---	---	---
Palmyra:							
PcA	5.0	800	6.0	110	265	4.0	45
PcB	5.0	800	6.0	110	265	4.0	45
PcC	4.5	600	5.9	90	---	3.5	40
PgA	4.5	750	5.9	100	250	4.0	40
PgB	4.5	750	5.9	100	250	4.0	40
[2]PhD	4.0	---	---	---	---	---	35
[2]PLE	---	---	---	---	---	---	---
Phelps:							
PoA, PpA	4.0	800	5.9	120	265	4.0	55
PoB	4.0	800	---	110	---	4.0	65
Rhinebeck:							
RaA	3.0	750	---	85	240	4.0	30
RaB	3.0	750	---	85	240	4.0	30
Sodus:							
SdB	4.0	600	6.0	95	240	4.0	55

See footnotes at end of table.

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

Soil name and map symbol	Alfalfa hay	Apples[1]	Cherries	Corn	Beans, snap	Trefoil-grass hay	Wheat
	Ton	Bu	Ton	Bu	Bu	Ton	Bu
Sodus:							
SdC	4.0	500	5.9	90	---	4.0	45
SdD	3.5	---	---	---	---	3.5	---
[2]SSE	---	---	---	---	---	---	---
Teel:							
Te	4.5	---	---	120	---	4.0	45
Wallington:							
Wa	3.5	500	---	90	---	3.0	35
Wassaic:							
WcA	3.5	---	5.9	105	240	3.5	50
WcB	3.5	---	5.9	105	240	3.5	50
Wayland:							
Wd	---	---	---	100	---	3.0	---
Williamson:							
WnA	4.0	600	5.9	95	240	3.5	45
WnB	4.0	600	5.9	95	240	3.5	45
WnC	4.0	500	5.9	90	---	3.5	40

[1]Yields are for free-standing trees. For staked trees add 40 percent to yield figures.
[2]This map unit is made up of two or more dominant kinds of soil. See the map unit description for the composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Dashes mean no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	6,566	---	---	---	---
II	171,552	126,982	34,917	9,653	---
III	129,945	32,762	92,948	4,235	---
IV	46,248	12,163	31,790	2,295	---
V	1,096	---	1,096	---	---
VI	22,314	20,850	---	1,464	---
VII	871	---	225	646	---
VIII	3,667	---	3,667	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Adrian:								
Aa	4w	Slight	Severe	Severe	Severe	Red maple	46	Generally unplantable.
Alton:								
AgA, AgB, AgC, AlA, AlB	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak	60 70	Eastern white pine, red pine, European larch, Scotch pine[1].
AgD	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak	60 70	Eastern white pine, red pine, European larch, Scotch pine[1].
Appleton:								
Ap	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 70	European larch, Norway spruce, eastern white pine, Scotch pine[1].
Bombay:								
BoA, BoB, BoC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	75 80 80	Eastern white pine, European larch, Norway spruce, Austrian pine[1].
Canandaigua:								
Ca	4w	Slight	Severe	Severe	Severe	Red maple White ash	65 55	Northern white cedar, white spruce.
Carlisle:								
Cd	5w	Slight	Severe	Severe	Severe	Red maple Northern white cedar White ash	46 50 55	Generally unplantable.
Cazenovia:								
CeB, CeC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar Black cherry	70 80 85 80	Norway spruce, black locust, eastern white pine, Austrian pine[1], European larch.
CoA, CoB	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar American basswood	80 80 85 70	Eastern white pine, black locust, European larch, Austrian pine[1].
Chippeny:								
Cp	5w	Slight	Severe	Severe	Severe	Northern white-cedar Red maple	40 46	Northern white-cedar.
Collamer:								
CrB	2o	Slight	Slight	Slight	Slight	Sugar maple Black cherry White ash Northern red oak American basswood	65 80 70 80 70	Eastern white pine, Norway spruce, black locust, European larch, Scotch pine[1], Austrian pine[1], Douglas-fir[1].

See footnotes at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Colonie:								
CsA, CsB, CsC	4s	Slight	Slight	Severe	Slight	Eastern white pine	65	Eastern white pine, European larch, Scotch pine[1].
						Northern red oak	60	
						Sugar maple	55	
						White oak	60	
CsD	4s	Slight	Moderate	Severe	Slight	Eastern white pine	65	Eastern white pine, European larch, Scotch pine[1].
						Northern red oak	60	
						Sugar maple	55	
						White oak	60	
[2]CTE:								
Colonie part	4s	Moderate	Moderate	Severe	Slight	Eastern white pine	65	Eastern white pine, European larch, Scotch pine[1].
						Northern red oak	60	
						Sugar maple	55	
						White oak	60	
Dunkirk part	2r	Severe	Moderate	Slight	Slight	Sugar maple	65	Eastern white pine, Norway spruce, European larch, black walnut, Scotch pine[1], Austrian pine[1].
						American basswood	70	
						White ash	70	
						Black walnut	65	
						Northern red oak	80	
						Black cherry	80	
Dunkirk:								
DkB	2o	Slight	Slight	Slight	Slight	Sugar maple	65	Eastern white pine, Norway spruce, European larch, black walnut, Scotch pine[1], Austrian pine[1].
						American basswood	70	
						White ash	70	
						Black walnut	65	
						Northern red oak	80	
						Black cherry	80	
DkC3	2r	Moderate	Slight	Slight	Slight	Sugar maple	65	Eastern white pine, Norway spruce, European larch, black walnut, Scotch pine[1], Austrian pine[1].
						American basswood	70	
						White ash	70	
						Black walnut	65	
						Northern red oak	80	
						Black cherry	80	
DkD	2r	Severe	Moderate	Slight	Slight	Sugar maple	65	Eastern white pine, Norway spruce, European larch, black walnut, Scotch pine[1], Austrian pine[1].
						American basswood	70	
						White ash	70	
						Black walnut	65	
						Northern red oak	80	
						Black cherry	80	
Elnora:								
ElA, ElB	4s	Slight	Slight	Moderate	Slight	Northern red oak	60	Eastern white pine, Norway spruce, European larch, Scotch pine[1].
						Eastern white pine	65	
						Sugar maple	50	
Farmington:								
FaB	5d	Slight	Slight	Severe	Moderate	Sugar maple	50	Eastern white pine, red pine, European larch.
						Northern red oak	50	
						White oak	50	
Fredon:								
Fr	3w	Slight	Severe	Severe	Severe	Yellow-poplar	80	Eastern white pine, white spruce, Norway spruce, Scotch pine[1].
						Red maple	75	
						White ash	60	

See footnotes at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Halsey:								
Ha	5w	Slight	Severe	Severe	Severe	Red maple White ash	55 50	Northern white cedar, white spruce.
Hamlin:								
Hm	2o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Black walnut Black cherry	80 70 65 80	Eastern white pine, black locust, Norway spruce, black walnut, European larch, Scotch pine[1].
Hilton:								
HnA, HnB, HnC, HoA, HoB	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White oak Black cherry	65 80 80 65	Eastern white pine, European larch, Norway spruce, Austrian pine[1], Scotch pine[1].
Ira:								
IrA, IrB, IrC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Black cherry	65 55 75	Eastern white pine, Norway spruce, European larch, Scotch pine[1], Austrian pine[1].
Joliet:								
Jo	5w	Slight	Moderate	Severe	Severe	Red maple Northern white-cedar	46 40	White spruce, northern white-cedar.
Junius:								
Ju	4w	Slight	Moderate	Moderate	Moderate	Red maple White ash	70 65 55	Eastern white pine, northern white-cedar, white spruce.
Lairdsville:								
[2]LdB:								
Lairdsville part	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 70 70	Eastern white pine, Norway spruce, Austrian pine[1].
Riga part	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	60 70 70	Eastern white pine, Norway spruce, Austrian pine[1].
[2]LdC3:								
Lairdsville part	3o	Moderate	Moderate	Moderate	Slight	Sugar maple Northern red oak Black cherry	60 70 70	Eastern white pine, Norway spruce, Austrian pine[1].
Riga part	3o	Moderate	Moderate	Moderate	Slight	Sugar maple Northern red oak Black cherry	60 70 70	Eastern white pine, Norway spruce, Austrian pine[1].
[2]LEE:								
Lairdsville part	3r	Severe	Moderate	Moderate	Slight	Sugar maple Northern red oak Eastern white pine	60 70 75	Eastern white pine, Norway spruce, Austrian pine[1].
Riga part	3r	Severe	Moderate	Moderate	Slight	Sugar maple Northern red oak Eastern white pine	60 70 75	Eastern white pine, Norway spruce, Austrian pine[1].
Lakemont:								
Lk	5w	Slight	Severe	Severe	Severe	White ash Red maple	50 50	Northern white-cedar, white spruce.

See footnotes at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Lamson:								
Lm	4w	Slight	Severe	Severe	Severe	Red maple White ash	60 55	Northern white-cedar, white spruce.
Lockport:								
[2]LoA:								
Lockport part	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 60	Eastern white pine, white spruce, Scotch pine[1].
Brockport part	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 60	Eastern white pine, white spruce, Scotch pine[1].
[2]LoB:								
Lockport part	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 60	Eastern white pine, white spruce, Scotch pine[1].
Brockport part	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 60	Eastern white pine, white spruce, Scotch pine[1].
Lyons:								
Ls, Ly	5w	Slight	Severe	Severe	Severe	Red maple	50	Northern white-cedar.
Madalin:								
Ma	5w	Slight	Severe	Severe	Severe	Red maple White ash	50 50	Northern white-cedar, white spruce.
Madrid:								
MdB, MdC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White oak Yellow-poplar American basswood Black cherry Black walnut	70 80 80 85 70 80 70	Eastern white pine, Douglas fir[1], black walnut, black cherry, Norway spruce, Austrian pine[1], European larch, black locust.
MdD	2r	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak American basswood Black walnut	70 80 70 70	Douglas-fir[1], Austrian pine[1], black locust, European larch, eastern white pine.
Martisco:								
Me	5w	Slight	Severe	Severe	Severe	Red maple White ash	45 55	Northern white cedar, white spruce.
Massena:								
MfA, MfB, Mg	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Red maple White ash	65 60 75 60	Eastern white pine, white spruce, Scotch pine[1].
Minoa:								
Mn	3w	Slight	Moderate	Moderate	Moderate	Sugar maple White ash Northern red oak	60 65 70	Eastern white pine, Norway spruce[1], European larch, white spruce.
Newstead:								
Ne	4w	Slight	Severe	Severe	Severe	Red maple White ash	65 55	Northern white cedar, white spruce.

See footnotes at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Niagara:								
Ng	3w	Slight	Moderate	Moderate	Moderate	Sugar maple Northern red oak White ash Black cherry	60 70 65 60	Eastern white pine, white spruce, Norway spruce[1], Scotch pine[1].
Oakville:								
OaB	4s	Slight	Slight	Severe	Slight	Sugar maple Northern red oak Black cherry	50 60 50	Eastern white pine, red pine, Scotch pine[1].
Ontario:								
OnB, OnC	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Yellow-poplar Black cherry	70 80 85 70	Eastern white pine, black walnut, Douglas fir[1], black locust.
OnD, [2]OSE	2r	Moderate	Moderate	Slight	Slight	Sugar maple Northern red oak Yellow-poplar Black cherry	70 80 85 70	Eastern white pine, black walnut, Douglas fir[1], black locust.
Ovid:								
OvA, OvB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple Black cherry	70 60 70 60	Eastern white pine, white spruce, Norway spruce[1].
Palms:								
Pa	4w	Slight	Severe	Severe	Severe	Red maple White ash	46 55	Generally unplantable.
Palmyra:								
PcA, PcB, PcC, PgA, PgB	2o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	70 80 70	Eastern white pine, European larch, Douglas fir[1].
[2]PhD	2r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry	70 80 70	Eastern white pine, European larch, Douglas fir[1].
[2]PLE:								
Palmyra part	2r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry	70 80 70	Eastern white pine, European larch, Douglas fir[1].
Alton part	3r	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak Black cherry	60 70 60	Eastern white pine, Scotch pine[1], European larch.
Phelps:								
PoA, PoB, PpA	2o	Slight	Slight	Slight	Slight	Sugar maple White ash Northern red oak	65 70 80	Eastern white pine, Austrian pine[1], Norway spruce[1], European larch.
Rhinebeck:								
RaA, RaB	3w	Slight	Moderate	Moderate	Slight	Sugar maple Northern red oak White oak	65 70 70	Eastern white pine, Norway spruce[1], Scotch pine[1].
Sodus:								
SdB, SdC	3o	Slight	Slight	Slight	Slight	Sugar maple Black cherry Northern red oak	65 80 65	Eastern white pine, red pine, Scotch pine[1], Norway spruce[1], European larch.

See footnotes at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
SdD, [2]SSE	3r	Slight	Moderate	Slight	Slight	Sugar maple Black cherry Northern red oak	65 80 65	Eastern white pine, red pine, Scotch pine[1], Norway spruce[1], European larch.
Teel: Te	2o	Slight	Slight	Slight	Slight	Sugar maple Black walnut Black cherry	70 70 80	Eastern white pine, Norway spruce[1], black walnut, European larch.
Wallington: Wa	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple White ash	65 65 75	Eastern white pine, white spruce, Scotch pine[1].
Wassaic: WcA, WcB	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak White ash Black cherry	73 80 75 70	Black locust, Austrian pine[1], European larch, Norway spruce[1].
Wayland: Wd	4w	Slight	Severe	Severe	Severe	Red maple	65	White spruce.
Williamson: WnA, WnB	3o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	65 70 70	Eastern white pine, red pine, European larch, Norway spruce[1], white spruce, Scotch pine[1].
WnC	3r	Moderate	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry	65 70 70	Eastern white pine, red pine, European larch, Norway spruce[1], white spruce, Scotch pine[1].

[1]Christmas tree species.
[2]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Adrian:					
Aa	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods, subsides.	Severe: wetness, floods, subsides.	Severe: wetness, floods, subsides.	Severe: wetness, excess humus, low strength.
Alluvial land:					
AD	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Alton:					
AgA, AlA	Moderate: small stones.	Slight	Slight	Slight	Slight.
AgB, AlB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
AgC	Moderate: small stones, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
AgD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Appleton:					
Ap	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Beaches:					
Be.					
Bombay:					
BoA, BoB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
BoC	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Canandaigua:					
Ca	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Carlisle:					
Cd	Severe: floods, wetness, cutbanks cave.	Severe: wetness, subsides, floods.	Severe: wetness, subsides, floods.	Severe: wetness, subsides, floods.	Severe: wetness, low strength, excess humus.
Cazenovia:					
CeB	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
CeC	Moderate: wetness, slope.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
CoA	Moderate: depth to rock, wetness.	Moderate: frost action.	Moderate: depth to rock, wetness.	Moderate: frost action.	Moderate: frost action.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Cazenovia:					
CoB	Moderate: depth to rock, wetness.	Moderate: frost action.	Moderate: depth to rock, wetness.	Moderate: slope, frost action.	Moderate: frost action.
Chippeny:					
Cp	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, subsides.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, subsides.	Severe: wetness, floods, low strength.
Collamer:					
CrB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: low strength, frost action.
Colonie:					
CsA	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
CsB	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
CsC	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
CsD	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]CTE:					
Colonie part	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dunkirk part	Severe: slope.	Severe: slope, frost action.	Severe: slope.	Severe: slope, frost action.	Severe: slope, frost action.
Dunkirk:					
DkB	Slight	Severe: frost action.	Slight	Severe: frost action.	Severe: frost action.
DkC3	Moderate: slope.	Severe: frost action.	Moderate: slope.	Severe: slope, frost action.	Severe: frost action.
DkD	Severe: slope.	Severe: slope, frost action.	Severe: slope.	Severe: slope, frost action.	Severe: slope, frost action.
Edwards:					
Ed	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness, subsides.	Severe: floods, wetness, subsides.	Severe: floods, wetness, subsides.	Severe: floods, wetness, low strength.
Elnora:					
ElA	Severe: cutbanks cave, wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
ElB	Severe: cutbanks cave, wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: slope, wetness, frost action.	Moderate: frost action.
Farmington:					
FaB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Fredon:					
Fr	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Fresh water marsh:					
FW	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Halsey:					
Ha	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Hamlin:					
Hm	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action.
Hilton:					
HnA, HnB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
HnC	Severe: wetness.	Moderate: wetness, frost action, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
HoA	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: frost action.
HoB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: slope, wetness, frost action.	Moderate: frost action.
Ira:					
IrA, IrB	Severe: wetness.	Moderate: frost action, wetness.	Severe: wetness.	Moderate: frost action, wetness.	Moderate: frost action.
IrC	Severe: wetness.	Moderate: frost action, wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: frost action, slope.
Joliet:					
Jo	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, depth to rock.
Junius:					
Ju	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.
Lairdsville:					
[1]LdB:					
Lairdsville part	Moderate: depth to rock, too clayey.	Moderate: frost action, shrink-swell.	Moderate: depth to rock, wetness, shrink-swell.	Moderate: slope, frost action, shrink-swell.	Severe: low strength.
Riga part	Moderate: depth to rock, too clayey.	Moderate: frost action, shrink-swell.	Moderate: wetness, depth to rock.	Moderate: slope, frost action, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Lairdsville:					
[1]LdC3:					
Lairdsville part-	Moderate: slope, depth to rock, too clayey.	Moderate: slope, frost action, shrink-swell.	Moderate: slope, depth to rock, wetness.	Severe: slope.	Severe: low strength.
Riga part	Moderate: slope, depth to rock, too clayey.	Moderate: slope, frost action, shrink-swell.	Moderate: wetness, slope, depth to rock.	Severe: slope.	Severe: low strength.
[1]LEE:					
Lairdsville part-	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Riga part	Severe: slope.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, low strength.
Lakemont:					
Lk	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Lamson:					
Lm	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Lockport:					
[1]LoA:					
Lockport part	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: shrink-swell, wetness, low strength.
Brockport part	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell, low strength.
[1]LoB:					
Lockport part	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: shrink-swell, wetness, low strength.
Brockport part	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell, low strength.
Lyons:					
Ls, Ly	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Madalin:					
Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.
Madrid:					
MdB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
MdC	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Madrid:					
MdD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Martisco:					
Me	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.
Massena:					
MfA, MfB, Mg	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Minoa:					
Mn	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Newstead:					
Ne	Severe: depth to rock, wetness.	Severe: wetness, frost action.	Severe: depth to rock, wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Niagara:					
Ng	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Oakville:					
OaB	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Ontario:					
OnB	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: frost action, slope.	Moderate: frost action.
OnC	Moderate: small stones, slope.	Moderate: frost action, slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.
OnD, [1]OSE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ovid:					
OvA, OvB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Palms:					
Pa	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods, subsides.	Severe: wetness, floods, subsides.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.
Palmyra:					
PcA, PgA	Moderate: small stones.	Slight	Slight	Slight	Slight.
PcB, PgB	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
PcC	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Palmyra:					
[1]PhD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]PLE:					
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alton part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Phelps:					
PoA, PpA	Severe: wetness, cutbanks cave, small stones.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
PoB	Severe: wetness, cutbanks cave.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
Rhinebeck:					
RaA, RaB	Severe: wetness, too clayey.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.
Sodus:					
SdB	Moderate: wetness, small stones.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action.
SdC	Moderate: wetness, slope, small stones.	Moderate: frost action, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: frost action, slope.
SdD, [1]SSE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Teel:					
Te	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Moderate: floods.
Wallington:					
Wa	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Wassaic:					
WcA	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock, frost action.
WcB	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: slope, depth to rock, frost action.	Moderate: depth to rock, frost action.
Wayland:					
Wd	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Williamson:					
WnA, WnB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
WnC	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: slope, frost action.	Severe: frost action.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

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

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Adrian:					
Aa	Severe: wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.
Alluvial land:					
AD	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Poor: wetness.
Alton:					
[1]AgA, AgB, AlA, AlB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
[1]AgC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer, slope.
[1]AgD	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
Appleton:					
Ap	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Fair: thin layer.
Beaches:					
Be.					
Bombay:					
BoA, BoB	Severe: percs slowly, wetness.	Moderate: seepage, slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
BoC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, small stones.
Canandaigua:					
Ca	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Carlisle:					
Cd	Severe: floods, wetness.	Severe: wetness, excess humus, floods.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Cazenovia:					
CeB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones, too clayey.
CeC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope, too clayey.
CoA	Severe: percs slowly, wetness.	Moderate: small stones, depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: small stones, too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Cazenovia:					
CoB	Severe: percs slowly, wetness.	Moderate: slope, small stones, depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: small stones, too clayey.
Chippeny:					
Cp	Severe: wetness, floods, depth to rock.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods.	Poor: excess humus, wetness.
Collamer:					
CrB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Good.
Colonie:					
[1]CsA, CsB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
[1]CsC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, too sandy.
[1]CsD	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
[2]CTE:					
[1]Colonie part	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Dunkirk part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Dunkirk:					
DkB	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
DkC3	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
DkD	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Edwards:					
Ed	Severe: floods, wetness.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness, hard to pack.
Elnora:					
[1]ElA, ElB	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: seepage.	Fair: too sandy.
Farmington:					
[1]FaB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Fredon:					
[1]Fr	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: small stones, thin layer.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fresh water marsh:					
FW	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Halsey:					
[1]Ha	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Hamlin:					
Hm	Severe: floods.	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Hilton:					
HnA, HnB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
HnC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
HoA	Severe: percs slowly, wetness.	Moderate: small stones, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness.	Fair: small stones.
HoB	Severe: percs slowly, wetness.	Moderate: slope, small stones, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness.	Fair: small stones.
Ira:					
IrA, IrB	Severe: percs slowly, wetness.	Moderate: small stones, slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
IrC	Severe: percs slowly, wetness, slope.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
Joliet:					
[1]Jo	Severe: depth to rock, wetness, floods.	Severe: depth to rock, floods.	Severe: depth to rock, wetness, floods.	Severe: wetness, floods.	Poor: thin layer, wetness.
Junius:					
[1]Ju	Severe: wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy.
Lairdsville:					
[2]LdB:					
Lairdsville part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
Riga part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
[2]LdC3:					
Lairdsville part	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: slope, thin layer, too clayey.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lairdsville:					
[2]LdC3:					
Riga part	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
[2]LEE:					
Lairdsville part	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness, slope.	Severe: slope, wetness.	Poor: slope.
Riga part	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, wetness, slope.	Severe: slope, wetness.	Poor: slope.
Lakemont:					
Lk	Severe: percs slowly, wetness, depth to rock.	Moderate: depth to rock.	Severe: wetness, depth to rock, too clayey.	Severe: wetness.	Poor: wetness.
Lamson:					
Lm	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Lockport:					
[2]LoA:					
Lockport part	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
Brockport part	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
[2]LoB:					
Lockport part	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
Brockport part	Severe: depth to rock, percs slowly, wetness.	Severe: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
Lyons:					
Ls, Ly	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Madalin:					
Ma	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
Madrid:					
MdB	Moderate: percs slowly.	Moderate: slope, seepage, small stones.	Slight	Slight	Fair: small stones.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Madrid:					
MdC	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope, small stones.
MdD	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
Martisco:					
Me	Severe: wetness, percs slowly, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Poor: wetness, excess humus, hard to pack.
Massena:					
MfA, MfB	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
Mg	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: large stones, thin layer.
Minoa:					
Mn	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness.	Good.
Newstead:					
Ne	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Fair: thin layer, small stones.
Niagara:					
Ng	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Good.
Oakville:					
[1]OaB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Ontario:					
OnB	Severe: percs slowly.	Moderate: slope, small stones.	Slight	Slight	Fair: small stones.
OnC	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: small stones, slope.
OnD	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
[2]OSE	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Ovid:					
OvA	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Fair: thin layer.
OvB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: thin layer.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Palms:					
Pa	Severe: wetness, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: excess humus, hard to pack, wetness.
Palmyra:					
[1]PcA, PcB, PgA, PgB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
[1]PcC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
[1] [2]PhD	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
[2]PLE:					
[1]Palmyra part	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
[1]Alton part	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Phelps:					
[1]PoA, PoB, PpA	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Moderate: seepage, wetness.	Fair: thin layer, small stones.
Rhinebeck:					
RaA	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey, thin layer.
RaB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey, thin layer.
Sodus:					
SdB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.	Fair: small stones.
SdC	Severe: percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.	Fair: small stones, slope.
SdD	Severe: slope, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Severe: slope.	Poor: slope.
[2]SSE	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Teel:					
Te	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, seepage.	Good.
Wallington:					
Wa	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Good.

See footnotes at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Wassaic:					
WcA, WcB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, small stones.
Wd	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Williamson:					
WnA, WnB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Good.
WnC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: slope.

[1]Permeability or depth to fractured bedrock may permit ground water pollution.
[2]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

["Frost action" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Adrian:				
Aa	Poor: excess humus, wetness, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Alluvial land:				
AD	Poor: wetness, area reclaim.	Poor: excess fines.	Poor: excess fines.	Poor: wetness, small stones.
Alton:				
AgA, AgB, AgC, AlA, AlB	Good	Fair: excess fines, thin layer.	Good	Poor: small stones.
AgD	Fair: slope.	Fair: excess fines, thin layer.	Good	Poor: slope, small stones.
Appleton:				
Ap	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
Beaches:				
Be.				
Bombay:				
BoA, BoB, BoC	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Canandaigua:				
Ca	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Carlisle:				
Cd	Poor: frost action, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Cazenovia:				
CeB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, thin layer.
CeC	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones, thin layer.
CoA, CoB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Chippeny:				
Cp	Poor: wetness, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Collamer:				
CrB	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
Colonie:				
CsA, CsB	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
CsC	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
CsD	Fair: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope, too sandy.
[1]CTE:				
Colonie part	Poor: slope.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope, too sandy.
Dunkirk part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Dunkirk:				
DkB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
DkC3	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
DkD	Poor: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Edwards:				
Ed	Poor: frost action, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Elnora:				
ElA, ElB	Fair: frost action.	Fair: excess fines.	Unsuited: excess fines.	Poor: area reclaim, too small.
Farmington:				
FaB	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: thin layer.	Poor: area reclaim.
Fredon:				
Fr	Fair: wetness.	Poor: thin layer, excess fines.	Fair: excess fines.	Poor: wetness, thin layer.
Fresh water marsh:				
FW	Poor: wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Halsey:				
Ha	Poor: wetness.	Poor: excess fines, thin layer.	Fair: excess fines.	Poor: wetness.
Hamlin:				
Hm	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hilton:				
HnA, HnB, HnC	Fair: frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
HoA, HoB	Fair: thin layer, frost action.	Unsuited: excess fines, small stones.	Unsuited: excess fines.	Poor: small stones.
Ira:				
IrA, IrB, IrC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Joliet:				
Jo	Poor: wetness, frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, area reclaim.
Junius:				
Ju	Fair: wetness, frost action.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Lairdsville:				
[1]LdB:				
Lairdsville part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
Riga part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
[1]LdC3:				
Lairdsville part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey, thin layer.
Riga part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey, thin layer.
[1]LEE:				
Lairdsville part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Riga part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Lakemont:				
Lk	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Lamson:				
Lm	Poor: wetness, frost action.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lockport:				
[1]LoA:				
Lockport part	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Brockport part	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
[1]LoB:				
Lockport part	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Brockport part	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Lyons:				
Ls	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ly	Poor: wetness, frost action.	Unsuited: excess fines, large stones.	Unsuited: excess fines, large stones.	Poor: wetness, large stones.
Madalin:				
Ma	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Madrid:				
MdB, MdC	Fair: low strength, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
MdD	Fair: slope, low strength, frost action.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Martisco:				
Me	Poor: frost action, excess humus, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness.
Massena:				
MfA, MfB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Mg	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Minoa:				
Mn	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Newstead:				
Ne	Poor: thin layer, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
Niagara:				
Ng	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Oakville:				
OaB	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Ontario:				
OnB, OnC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
OnD	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
[1]OSE	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Ovid:				
OvA, OvB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Palms:				
Pa	Poor: wetness, excess humus, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Palmyra:				
PcA, PcB, PcC, PgA, PgB	Good	Good	Good	Poor: small stones.
[1]PhD	Fair: slope.	Good	Good	Poor: slope, small stones.
[1]PLE:				
Palmyra part	Poor: slope.	Good	Good	Poor: slope, small stones.
Alton part	Poor: slope.	Fair: excess fines.	Good	Poor: slope, small stones.
Phelps:				
PoA, PoB, PpA	Good	Good	Good	Poor: small stones.
Rhinebeck:				
RaA, RaB	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
Sodus:				
SdB, SdC	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
SdD	Fair: frost action, slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
[1]SSE	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Teel:				
Te	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wallington: Wa	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Wassaic: WcA, WcB	Poor: thin layer.	Unsuited: excess fines.	Poor: excess fines.	Fair: small stones, thin layer.
Wayland: Wd	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Williamson: WnA, WnB	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
WnC	Poor: frost action.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Adrian: Aa	Seepage, excess humus.	Excess humus, hard to pack, unstable fill.	Subsides, cutbanks cave.	Floods, wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Alluvial land: AD	Seepage	Piping, low strength.	Favorable	Floods, wetness, cutbanks cave.	Not needed	Not needed.
Alton: AgA, AgB, AgC, AgD, AlA, AlB	Seepage	Seepage, piping.	No water	Not needed	Piping	Droughty, slope.
Appleton: Ap	Favorable	Favorable	Favorable	Percs slowly	Percs slowly	Percs slowly.
Beaches: Be.						
Bombay: BoA, BoB, BoC	Slope	Favorable	Deep to water	Favorable	Favorable	Favorable.
Canandaigua: Ca	Favorable	Low strength, unstable fill, piping.	Slow refill	Poor outlets, cutbanks cave.	Not needed	Wetness.
Carlisle: Cd	Seepage, excess humus.	Excess humus, unstable fill.	Subsides	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Cazenovia: CeB, CeC	Favorable, slope.	Favorable	Deep to water	Slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
CoA, CoB	Slope, depth to rock.	Favorable, thin layer.	No water, depth to rock.	Percs slowly, depth to rock.	Erodes easily, depth to rock.	Erodes easily, percs slowly.
Chippeny: Cp	Depth to rock	Excess humus, unstable fill, thin layer.	Depth to rock	Wetness, floods, depth to rock.	Not needed	Not needed.
Collamer: CrB	Slope	Low strength, seepage, piping.	Slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, piping.	Erodes easily, piping.
Colonie: CsA, CsB, CsC, CsD	Seepage, slope.	Seepage, piping, erodes easily.	No water	Not needed	Not needed	Droughty, soil blowing.
[1]CTE: Colonie part	Seepage, slope.	Seepage, piping, erodes easily.	No water	Not needed	Not needed	Droughty, soil blowing.
Dunkirk part	Seepage, slope.	Low strength, piping.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Dunkirk: DkB, DkC3, DkD	Seepage, slope.	Low strength, piping.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Edwards: Ed	Seepage, excess humus.	Hard to pack, low strength, unstable fill.	Subsides	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Elnora: ElA, ElB	Seepage	Seepage, piping.	Deep to water, cutbanks cave.	Cutbanks cave	Too sandy	Droughty.
Farmington: FaB	Depth to rock, seepage.	Depth to rock, thin layer.	Depth to rock	Not needed	Depth to rock	Rooting depth.
Fredon: Fr	Seepage	Seepage	Favorable	Poor outlets	Wetness	Wetness.
Fresh water marsh: FW	Excess humus	Unstable fill, low strength.	Subsides	Poor outlets	Not needed	Not needed.
Halsey: Ha	Seepage	Seepage	Favorable	Wetness, poor outlets.	Not needed	Wetness.
Hamlin: Hm	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Not needed	Not needed	Erodes easily, piping.
Hilton: HnA, HnB, HnC	Favorable, slope.	Favorable	Deep to water	Percs slowly, slope.	Percs slowly	Slope, percs slowly.
HoA, HoB	Depth to rock	Favorable	Deep to water, depth to rock.	Percs slowly, depth to rock.	Percs slowly, depth to rock.	Percs slowly.
Ira: IrA, IrB, IrC	Slope	Favorable	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly, slope.
Joliet: Jo	Depth to rock	Thin layer	Depth to rock, seepage.	Poor outlets, depth to rock.	Not needed	Not needed.
Junius: Ju	Seepage	Seepage, piping.	Favorable, cutbanks cave.	Cutbanks cave	Wetness, piping.	Wetness, piping.
Lairdsville: [1]LdB: Lairdsville part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
Riga part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
[1]LdC3: Lairdsville part	Depth to rock, slope.	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
Riga part	Depth to rock, slope.	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth.
[1]LEE: Lairdsville part	Depth to rock, slope.	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Lairdsville: Riga part	Depth to rock, slope.	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly.	Depth to rock, erodes easily.	Erodes easily, rooting depth, slope.
Lakemont: Lk	Depth to rock	Low strength, piping, thin layer.	Depth to rock, slow refill.	Wetness, percs slowly, poor outlets, depth to rock.	Not needed	Wetness, percs slowly.
Lamson: Lm	Seepage	Piping, unstable fill, erodes easily.	Favorable, cutbanks cave.	Wetness, poor outlets, cutbanks cave.	Not needed	Wetness, piping.
Lockport: [1]LoA: Lockport part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly, wetness.	Depth to rock, percs slowly.	Percs slowly, rooting depth, wetness.
Brockport part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Wetness, depth to rock, percs slowly.	Depth to rock, percs slowly.	Wetness, percs slowly, rooting depth.
[1]LoB: Lockport part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Depth to rock, percs slowly, wetness.	Depth to rock, percs slowly.	Percs slowly, rooting depth, wetness.
Brockport part	Depth to rock	Low strength, thin layer.	Depth to rock, slow refill.	Wetness, depth to rock, percs slowly.	Depth to rock, percs slowly.	Wetness, percs slowly, rooting depth.
Lyons: Ls	Favorable	Favorable	Favorable	Wetness, percs slowly, poor outlets.	Not needed	Wetness.
Ly	Favorable	Large stones	Large stones	Wetness, percs slowly, poor outlets.	Not needed	Wetness, large stones.
Madalin: Ma	Favorable	Low strength, piping.	Slow refill	Wetness, percs slowly, poor outlets.	Not needed	Wetness, percs slowly.
Madrid: MdB, MdC, MdD	Slope	Piping	No water	Not needed	Favorable	Slope.
Martisco: Me	Excess humus, seepage.	Low strength, unstable fill, hard to pack.	Subsides	Percs slowly, poor outlets, wetness.	Not needed	Not needed.
Massena: MfA, MfB	Favorable	Favorable	Favorable, slow refill.	Percs slowly	Percs slowly	Wetness, percs slowly.
Mg	Favorable	Large stones	Large stones	Wetness, percs slowly.	Large stones, percs slowly.	Wetness, percs slowly, large stones.
Minoa: Mn	Seepage, slope.	Seepage, piping, low strength.	Cutbanks cave	Favorable, cutbanks cave.	Piping	Piping.
Newstead: Ne	Depth to rock	Thin layer	Depth to rock	Depth to rock	Depth to rock, wetness.	Wetness.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Niagara: Ng	Favorable	Low strength, piping.	Slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, piping.	Erodes easily, piping.
Oakville: OaB	Seepage	Piping, erodes easily.	No water	Not needed	Complex slope, soil blowing.	Droughty, soil blowing.
Ontario: OnB, OnC, OnD, [1]OSE	Slope	Favorable	No water	Not needed	Favorable, slope.	Slope.
Ovid: OvA, OvB	Slope	Favorable	Favorable, slow refill.	Percs slowly	Percs slowly	Percs slowly.
Palms: Pa	Seepage, excess humus.	Compressible, hard to pack, low strength, unstable fill.	Subsides	Wetness, cutbanks cave, poor outlets.	Not needed	Not needed.
Palmyra: PcA, PcB, PcC, PgA, PgB, [1]PhD	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Piping, slope.
[1]PLE: Palmyra part	Seepage, slope.	Piping, seepage.	No water	Not needed	Not needed	Piping, slope.
Alton part	Seepage	Seepage, piping.	No water	Not needed	Piping	Droughty, slope.
Phelps: PoA, PoB, PpA	Seepage, slope.	Seepage, piping.	Deep to water	Favorable	Piping	Favorable, piping.
Rhinebeck: RaA, RaB	Favorable	Low strength, erodes easily.	Slow refill	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Sodus: SdB, SdC, SdD, [1]SSE	Slope	Favorable	No water	Not needed	Slope, percs slowly, erodes easily.	Percs slowly, slope.
Teel: Te	Favorable	Piping, low strength.	Deep to water, cutbanks cave.	Floods, poor outlets.	Not needed	Erodes easily, piping.
Wallington: Wa	Favorable	Piping, low strength, erodes easily.	Cutbanks cave	Percs slowly, cutbanks cave.	Percs slowly, erodes easily, piping.	Percs slowly, erodes easily, piping.
Wassaic: WcA, WcB	Depth to rock	Depth to rock, thin layer.	Depth to rock	Not needed	Depth to rock	Depth to rock, rooting depth.
Wayland: Wd	Favorable	Piping, erodes easily, low strength.	Favorable, cutbanks cave.	Wetness, floods, poor outlets.	Not needed	Wetness, erodes easily.
Williamson: WnA, WnB, WnC	Slope	Piping, low strength.	Deep to water, cutbanks cave.	Percs slowly, cutbanks cave.	Percs slowly, erodes easily.	Percs slowly, slope, erodes easily.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Adrian:				
Aa	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Alluvial land:				
AD	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.
Alton:				
AgA, AgB, AlA, AlB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
AgC	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
AgD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones.
Appleton:				
Ap	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Beaches:				
Be	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Bombay:				
BoA	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
BoB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
BoC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Canandaigua:				
Ca	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Carlisle:				
Cd	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.
Cazenovia:				
CeB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
CeC	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
CoA, CoB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Chippeny: Cp	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Collamer: CrB	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
Colonie: CsA	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil bowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy.
CsB	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: slope, too sandy.	Moderate: too sandy.
CsC	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
CsD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.
[1]CTE: Colonie part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dunkirk part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dunkirk: DkB	Slight	Slight	Moderate: slope, percs slowly.	Slight.
DkC3	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
DkD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Edwards: Ed	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Elnora: ElA	Moderate: too sandy.	Moderate: too sandy.	Moderate: wetness, too sandy.	Moderate: too sandy.
ElB	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy, wetness.	Moderate: too sandy.
Farmington: FaB	Slight	Slight	Severe: depth to rock.	Slight.
Fredon: Fr	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Fresh water marsh:				
FW	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Halsey:				
Ha	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Hamlin:				
Hm	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight.
Hilton:				
HnA, HnB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
HnC	Moderate: percs slowly, small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
HoA	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
HoB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Ira:				
IrA, IrB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
IrC	Moderate: percs slowly, small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
Joliet:				
Jo	Severe: wetness.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.
Junius:				
Ju	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.
Lairdsville:				
[1]LdB:				
Lairdsville part	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
Riga part	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
[1]LdC3:				
Lairdsville part	Severe: percs slowly.	Moderate: slope, too clayey.	Severe: slope, percs slowly.	Moderate: too clayey.
Riga part	Severe: percs slowly.	Moderate: slope, too clayey.	Severe: slope, percs slowly.	Moderate: too clayey.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Lairdsville:				
[1]LEE:				
Lairdsville part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope, too clayey.
Riga part	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope, too clayey.
Lakemont:				
Lk	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Lamson:				
Lm	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lockport:				
LoA:				
Lockport part	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Brockport part	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
[1]LoB:				
Lockport part	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Brockport part	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
Lyons:				
Ls, Ly	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Madalin:				
Ma	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Madrid:				
MdB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
MdC	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
MdD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
Martisco:				
Me	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Massena:				
MfA, MfB	Moderate: percs slowly, wetness, small stones.	Moderate: small stones, wetness.	Severe: small stones, wetness.	Moderate: small stones, wetness.
Mg	Moderate: percs slowly, wetness, large stones.	Moderate: large stones, wetness.	Severe: wetness, large stones, small stones,	Moderate: large stones, wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Minoa:				
Mn	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Newstead:				
Ne	Moderate: wetness, small stones.	Moderate: wetness, small stones.	Severe: wetness, small stones.	Moderate: wetness, small stones.
Niagara:				
Ng	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Oakville:				
OaB	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Moderate: too sandy.
Ontario:				
OnB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
OnC	Moderate: percs slowly, slope, small stones.	Moderate: small stones, slope.	Severe: slope, small stones.	Moderate: small stones.
OnD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
[1]OSE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Ovid:				
OvA, OvB	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Palms:				
Pa	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Palmyra:				
PcA, PcB, PgA, PgB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
PcC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]PhD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
[1]PLE:				
Palmyra part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Alton part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Phelps:				
PoA, PoB, PpA	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Rhinebeck:				
RaA, RaB	Moderate: percs slowly, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Sodus:				
SdB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
SdC	Moderate: percs slowly, slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
SdD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
[1]SSE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Teel:				
Te	Moderate: floods.	Moderate: floods.	Moderate: floods.	Slight.
Wallington:				
Wa	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Wassaic:				
WcA	Slight	Slight	Moderate: small stones.	Slight.
WcB	Slight	Slight	Moderate: slope, small stones.	Slight.
Wayland:				
Wd	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
Williamson:				
WnA, WnB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
WnC	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Adrian:										
Aa	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Alluvial land:										
AD.										
Alton:										
AgA, AgB, AgC, AlA, AlB	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AgD	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Appleton:										
Ap	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Beaches:										
Be.										
Bombay:										
BoA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BoB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BoC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Canandaigua:										
Ca	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Carlisle:										
Cd	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Cazenovia:										
CeB, CoB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoA	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Chippeny:										
Cp	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Collamer:										
CrB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Colonie:										
CsA, CsB, CsC	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CsD	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 13.--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
Colonie:										
[1]CTE:										
Colonie part----	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Dunkirk part.	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Dunkirk:										
DkB----------	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DkC3, DkD---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Edwards:										
Ed----------	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Elnora:										
ElA----------	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
ElB----------	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Farmington:										
FaB----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Fredon:										
Fr----------	Poor	Fair	Fair	Fair	Fair	Poor	Good	Fair	Fair	Good.
Fresh water marsh:										
FW----------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Halsey:										
Ha----------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Hamlin:										
Hm----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hilton:										
HnA, HoA----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HnB, HoB----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HnC----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ira:										
IrA----------	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
IrB----------	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
IrC----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Joliet:										
Jo----------	Fair	Fair	Fair	Fair	Poor	Good	Poor	Fair	Fair	Fair.
Junius:										
Ju----------	Poor	Fair	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor.
Lairdsville:										
[1]LdB:										
Lairdsville part	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--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
Lairdsville:										
Riga part	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
[1]LdC3:										
Lairdsville part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Riga part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
[1]LEE:										
Lairdsville part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Riga part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lakemont:										
Lk	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lamson:										
Lm	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Lockport:										
[1]LoA:										
Lockport part	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Brockport part	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
[1]LoB:										
Lockport part	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Brockport part	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lyons:										
Ls, Ly	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Madalin:										
Ma	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Madrid:										
MdB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MdC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MdD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Martisco:										
Me	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Massena:										
MfA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
MfB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--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
Massena:										
Mg	Very poor.	Poor	Good	Good	Good	Fair	Fair	Poor	Good	Fair.
Minoa:										
Mn	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Newstead:										
Ne	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Niagara:										
Ng	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Oakville:										
OaB	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Ontario:										
OnB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OnC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
OnD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]OSE	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ovid:										
OvA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
OvB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Palms:										
Pa	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Palmyra:										
PcA, PcB, PgA, PgB	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	Good	Very poor.
PcC	Fair	Good	Good	Fair	Good	Very poor.	Very poor.	Good	Good	Very poor.
[1]PhD	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]PLE:										
Palmyra part	Very poor.	Fair	Good	Fair	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Alton part	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Phelps:										
PoA, PpA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PoB	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rhinebeck:										
RaA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--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
Sodus:										
SdB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SdC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SdD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]SSE	Very poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Teel:										
Te	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Wallington:										
Wa	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Wassaic:										
WcA, WcB	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Wayland:										
Wd	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Williamson:										
WnA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WnB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WnC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

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

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Adrian:											
Aa	0-21	Sapric material	Pt	A-8	---	---	---	---	---	---	---
	21-56	Sand, loamy sand	SP, SM	A-2, A-3	0	100	90-100	50-75	0-20	---	NP
Alluvial land:											
AD	0-60	Variable	---	---	0-35	---	---	---	---	---	---
Alton:											
AgA, AgB, AgC, AgD	0-8	Gravelly sandy loam.	SM, GM	A-2, A-1	0-5	65-75	60-70	30-50	15-30	<10	NP-5
	8-42	Gravelly fine sandy loam, very gravelly sandy loam.	GM, SM	A-2, A-1, A-4	0-15	45-70	30-70	20-60	10-40	<10	NP-5
	42-60	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP
AlA, AlB	0-8	Cobbly loam	SM, ML, GM	A-4	10-25	65-80	60-75	50-70	35-60	<10	NP-5
	8-42	Gravelly fine sandy loam, very gravelly sandy loam.	GM, SM, GW-GM	A-2, A-1, A-4	0-25	45-75	35-70	20-60	10-40	<10	NP-5
	42-60	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	35-50	20-40	2-15	---	NP
Appleton:											
Ap	0-9	Loam	ML, SM	A-6, A-7	0	80-100	75-90	65-85	45-70	35-45	10-15
	9-18	Loam, gravelly fine sandy loam.	ML, SM, SM-SC, CL-ML	A-2, A-4	0-5	65-95	60-95	45-90	25-70	25-35	5-10
	18-32	Loam, sandy clay loam, gravelly silt loam.	CL, SC, GC, CL-ML	A-4, A-2	0-5	65-95	60-90	50-85	25-80	20-30	5-10
	32-50	Loam, gravelly silt loam.	CL, SC, CL-ML, GM-GC	A-4, A-2	0-5	65-90	60-85	50-80	30-75	15-25	5-10
Beaches:											
Be.											
Bombay:											
BoA, BoB, BoC	0-10	Gravelly fine sandy loam.	SM, GM	A-2, A-4, A-5, A-1	0-5	60-80	55-75	40-65	20-40	35-45	5-10
	10-45	Gravelly loam, gravelly fine sandy loam, silt loam.	SC, CL, CL-ML, SM-SC	A-2, A-4	0-5	70-100	65-85	45-85	25-75	20-30	5-10
	45-60	Gravelly fine sandy loam, gravelly loam.	SC, CL, GM-GC, GC	A-2, A-4, A-1	0-5	60-85	55-80	40-70	20-60	20-30	5-10

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Canandaigua:											
Ca	0-8	Silt loam	ML, OL, MH	A-4, A-5, A-6, A-7	0	95-100	95-100	90-100	70-90	35-55	5-15
	8-36	Silt loam, very fine sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	20-40	5-15
	36-40	Silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4	0	95-100	95-100	90-100	70-95	20-30	3-10
Carlisle:											
Cd	0-66	Sapric material	Pt	A-8	---	---	---	---	---	---	---
Cazenovia:											
CeB, CeC	0-15	Silt loam	ML	A-4, A-6, A-7	0	80-100	75-100	70-95	55-90	35-45	5-15
	15-36	Silty clay loam, clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-5	65-100	65-95	60-95	55-90	25-35	5-15
	36-50	Gravelly silty clay loam, gravelly loam, silt loam.	CL, CL-ML, GM-GC	A-4, A-6, A-2	0-5	55-90	50-90	40-85	30-80	20-35	5-15
CoA, CoB	0-15	Gravelly silt loam.	ML, SM, GM	A-4, A-6, A-7, A-2	0-5	65-80	60-75	55-75	40-65	35-45	5-15
	15-36	Silty clay loam, clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-5	65-100	65-95	60-95	55-90	25-35	5-15
	36-50	Gravelly silty clay loam, gravelly loam, silt loam.	CL, CL-ML, GM-GC	A-4, A-6, A-2	0-5	55-90	50-90	40-85	30-80	20-35	5-15
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Chippeny:											
Cp	0-20	Sapric material	Pt	A-8	---	---	---	---	---	---	---
	20-22	Sandy loam, loam, silty clay loam.	SM, ML, CL-ML	A-2, A-4, A-7	0-10	95-100	90-100	55-100	25-90	10-40	NP-25
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Collamer:											
CrB	0-9	Silt loam	CL, CL-ML	A-4	0	95-100	90-100	80-95	65-85	20-30	5-10
	9-14	Silt loam, very fine sandy loam, fine sandy loam.	SM, SC, CL, CL-ML, SM-SC	A-4	0	95-100	95-100	65-95	40-85	20-30	5-10
	14-37	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-30	5-15
	37-52	Stratified silt to very fine sand.	ML, SM	A-4	0	95-100	95-100	70-100	40-100	<15	NP-4
Colonie:											
CsA, CsB, CsC, CsD	0-7	Loamy very fine sand.	SM, ML	A-4	0	100	95-100	85-95	40-65	---	NP
	7-42	Loamy fine sand, fine sand, very fine sand.	SM	A-2, A-4	0	100	95-100	65-85	20-50	---	NP
	42-60	Fine sand	SM	A-2	0	100	95-100	60-80	20-35	---	NP

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Colonie:											
[1]CTE:											
Colonie part----	0-7	Loamy very fine sand.	SM, ML	A-4	0	100	95-100	85-95	40-65	---	NP
	7-42	Loamy fine sand, fine sand, very fine sand.	SM	A-2, A-4	0	100	95-100	65-85	20-50	---	NP
	42-60	Fine sand-------	SM	A-2	0	100	95-100	60-80	20-35	---	NP
Dunkirk part----	0-7	Silt loam-------	CL, CL-ML	A-4	0	95-100	90-100	80-100	65-90	20-30	5-10
	7-14	Silt loam, very fine sandy loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4	0	95-100	90-100	70-100	40-90	20-30	5-10
	14-40	Silt loam, silty clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	90-100	60-95	20-30	5-15
	40-80	Stratified silt to very fine sand.	ML, SM	A-4	0	95-100	90-100	70-100	40-95	<15	NP-4
Dunkirk:											
DkB, DkC3, DkD----	0-7	Silt loam-------	ML, CL-ML	A-4	0	95-100	90-100	80-100	65-90	20-30	5-10
	7-14	Silt loam, very fine sandy loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-4	0	95-100	90-100	70-100	40-90	20-30	5-10
	14-40	Silt loam, silty clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	90-100	60-95	20-30	5-15
	40-80	Stratified silt to very fine sand.	ML, SM	A-4	0	95-100	90-100	70-100	40-95	<15	NP-4
Edwards:											
Ed----------	0-30	Sapric material	Pt	A-8	0	---	---	---	---	---	---
	30-54	Marl----------	---	---	0	100	95-100	80-90	60-80	---	---
Elnora:											
ElA, ElB----------	0-10	Loamy fine sand	SM	A-2, A-4	0	100	95-100	70-85	25-40	---	NP
	10-21	Loamy fine sand, fine sand.	SM	A-2, A-4	0	100	95-100	70-85	25-45	---	NP
	21-60	Fine sand, loamy fine sand.	SM	A-2, A-4	0	100	90-100	60-85	20-45	---	NP
Farmington:											
FaB----------	0-9	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0-5	85-95	80-90	70-90	55-80	20-35	3-15
	9-15	Silt loam, loam, gravelly fine sandy loam.	ML, CL, GC, SM	A-2, A-4, A-1, A-6	0-5	60-95	55-90	35-85	20-80	20-35	3-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fredon:											
Fr----------	0-8	Loam----------	ML, CL, SC, SM	A-4	0-2	80-95	75-95	65-90	45-70	20-30	NP-10
	8-24	Fine sandy loam, loam, sandy loam.	SM, SC, ML, CL	A-2, A-4	0-2	80-100	75-95	65-85	30-70	20-30	NP-10
	24-50	Very gravelly sandy loam, very gravelly sand.	GP, GM, GW, GW-GM	A-1	0-5	30-55	20-50	10-40	0-15	---	NP
Fresh water marsh:											
FW----------	0-60	Variable--------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--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	
Halsey:											
Ha	0-9	Silt loam	CL, CL-ML	A-4	0-2	95-100	85-100	75-100	60-90	20-30	5-10
	9-28	Loam, fine sandy loam, very fine sandy loam.	SM-SC, CL, CL-ML	A-2, A-4	0-2	90-100	85-100	55-75	30-60	20-30	5-10
	28-50	Gravelly sand, very gravelly sand.	SP, GP, GM, SM	A-1, A-2, A-3	5-10	45-75	40-70	20-55	0-20	---	NP
Hamlin:											
Hm	0-9	Silt loam	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	25-35	5-10
	9-40	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	85-100	50-90	25-35	5-10
	40-64	Silt loam, very fine sandy loam, fine sandy loam.	ML, SM	A-4	0	90-100	90-100	65-100	40-90	20-30	1-6
Hilton:											
HnA, HnB, HnC	0-11	Gravelly loam	SM, ML, GM	A-4	0-5	70-85	60-75	55-70	40-60	20-30	2-10
	11-31	Gravelly loam, loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-2	0-10	65-95	60-90	55-85	20-65	15-25	5-10
	31-50	Gravelly loam, gravelly fine sandy loam.	SM, GM, SC, CL-ML	A-4, A-2, A-1	5-10	55-85	50-80	40-75	20-60	15-25	2-10
HoA, HoB	0-11	Gravelly loam	SM, ML, GM	A-4	0-5	70-85	60-75	55-70	40-60	25-35	2-10
	11-31	Gravelly loam, loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-2	0-10	65-95	60-90	50-85	20-65	15-25	5-10
	31-40	Gravelly loam, gravelly fine sandy loam.	SM, GM, SC, CL-ML	A-4, A-2	5-10	55-85	50-80	40-75	20-60	15-25	2-10
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ira:											
IrA, IrB, IrC	0-5	Gravelly fine sandy loam.	SM, GM	A-1, A-2, A-4	0-5	55-80	55-70	40-65	20-40	<15	NP-2
	5-21	Fine sandy loam, gravelly loam, gravelly sandy loam.	SM, ML, GM	A-1, A-2, A-4	0-5	55-90	55-85	35-80	15-60	<15	NP-2
	21-44	Gravelly fine sandy loam, gravelly loam, loam.	GM, ML, SM	A-2, A-4	0-5	60-90	60-85	40-80	25-60	<15	NP-2
	44-50	Gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, SM, GW-GM, SW-SM	A-2, A-4, A-1	5-10	45-75	35-70	25-60	10-45	<15	NP-2
Joliet:											
Jo	0-11	Loam	CL, OL, ML	A-6, A-4	0-15	90-100	90-100	80-100	60-75	30-40	7-15
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Junius:											
Ju	0-10	Loamy very fine sand.	SM	A-2, A-4	0	100	95-100	65-85	20-40	---	NP
	10-50	Fine sand to loamy fine sand.	SM	A-2, A-4	0	95-100	90-100	65-85	15-40	---	NP
Lairdsville:											
[1]LdB:											
Lairdsville part	0-8	Silty clay loam	ML, CL	A-6, A-7	0	80-100	75-95	70-95	65-90	30-45	10-15
	8-32	Silty clay, silty clay loam, shaly clay loam.	CL	A-6	0-5	70-100	60-95	55-95	50-90	25-35	10-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Riga part	0-6	Silty clay loam	ML, CL, MH	A-7	0	85-100	75-100	70-100	65-95	40-55	10-20
	6-26	Silty clay loam, silty clay, clay loam.	CL, ML, MH	A-7, A-6	0-5	90-95	85-95	80-95	60-90	35-55	10-20
	26	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]LdC3:											
Lairdsville part	0-8	Silty clay loam	ML, CL	A-6, A-7	0	80-100	75-95	65-95	55-90	30-45	10-15
	8-32	Silty clay, silty clay loam, shaly clay loam.	CL	A-6	0-5	70-100	60-95	55-95	50-90	25-35	10-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Riga part	0-6	Silty clay loam	ML, CL, MH	A-7	0	85-100	75-100	70-100	65-95	40-55	10-20
	6-26	Silty clay loam, silty clay, clay loam.	CL, ML, MH	A-7, A-6	0-5	90-95	85-95	80-95	60-90	35-55	10-20
	26	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]LEE:											
Lairdsville part	0-8	Silty clay loam	ML, CL	A-6, A-7	0	80-100	75-95	70-95	65-90	30-45	10-15
	8-32	Silty clay, silty clay loam, shaly clay loam.	CL	A-6	0-5	70-100	60-95	55-95	50-90	25-35	10-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Riga part	0-6	Silty clay loam	ML, CL, MH	A-7	0	85-100	75-100	70-100	65-95	40-55	10-20
	6-26	Silty clay loam, silty clay, clay loam.	CL, ML, MH	A-7, A-6	0-5	90-95	85-95	80-95	60-90	35-55	10-20
	26	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lakemont:											
Lk	0-9	Silty clay loam	OL, CL, ML	A-6, A-7	0	100	95-100	90-100	80-95	35-48	12-20
	9-28	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	80-100	30-55	10-25
	28-42	Silty clay, clay	CL, CH, MH	A-6, A-7	0	100	95-100	90-100	80-100	30-55	10-25
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lamson:											
Lm	0-10	Very fine sandy loam.	SM, ML	A-4	0	95-100	90-100	75-95	40-65	<20	NP-4
	10-33	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	65-90	40-55	<20	NP-4
	33-50	Very fine sandy loam, fine sand, very fine sand.	SM, ML	A-2, A-4	0	95-100	90-100	60-95	20-65	<20	NP-4
Lockport:											
[1]LoA:											
Lockport part	0-6	Silty clay loam	CL, CL-ML	A-4, A-5, A-6, A-7	0	80-100	75-95	70-95	65-90	20-43	5-18
	6-30	Clay, silty clay, shaly silty clay loam.	GC, CL, MH, GM	A-6, A-7	0	60-100	50-95	45-95	40-90	35-55	11-20
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Brockport part	0-12	Silty clay loam	CL, CL-ML	A-4, A-5, A-7	0	95-100	90-100	85-100	75-95	20-43	5-18
	12-30	Clay, silty clay loam, shaly silty clay.	CL-ML, MH, GM, GM-GC	A-7, A-6	0	60-95	50-95	45-95	40-90	35-55	11-20
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]LoB:											
Lockport part	0-6	Silty clay loam	CL, CL-ML	A-4, A-5, A-6, A-7	0	80-100	75-95	70-95	65-90	20-43	5-18
	6-30	Clay, silty clay, shaly silty clay loam.	CL, GC, MH, GM	A-6, A-7	0	60-100	50-95	45-95	40-90	35-55	11-20
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Brockport part	0-12	Silty clay loam	CL, CL-ML	A-7, A-5, A-4	0	95-100	90-100	85-100	75-95	20-43	5-18
	12-30	Clay, silty clay loam, shaly silty clay.	CL-ML, MH, GM, GM-GC	A-7, A-6	0	60-95	50-95	45-95	40-90	35-55	11-20
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lyons:											
Ls	0-8	Mucky silt loam	ML, OL	A-5, A-7	0	80-95	75-90	65-85	55-80	40-50	5-15
	8-38	Silt loam, gravelly loam, fine sandy loam.	CL, GC, CL-ML	A-4, A-6, A-2	0-5	60-95	55-90	45-85	25-80	20-35	5-15
	38-54	Gravelly loam, gravelly silt loam, very gravelly fine sandy loam.	CL, GC, SC, GM-GC	A-2, A-4, A-6, A-1	5-10	35-90	30-80	25-80	15-70	20-35	5-15

See footnote at end of table.

TABLE 14.--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	
Lyons:											
Ly	0-8	Very stony silt loam.	ML, OL, SM	A-5, A-7	2-10	65-75	60-75	55-75	45-70	40-50	5-15
	8-38	Silt loam, gravelly loam, fine sandy loam.	CL, GC, CL-ML	A-4, A-6, A-2	0-15	70-95	65-90	45-85	25-80	20-35	5-15
	38-54	Gravelly loam, gravelly silt loam, gravelly fine sandy loam.	CL, GC, SC, GM-GC	A-2, A-4, A-6, A-1	5-10	35-90	30-80	25-80	15-70	20-35	5-15
Madalin:											
Ma	0-6	Silty clay loam	ML, MH	A-6, A-7	0	95-100	95-100	90-100	80-95	35-55	10-20
	6-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	30-42	Silty clay, stratified clay and silt.	CL, CH	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
Madrid:											
MdB, MdC, MdD	0-8	Gravelly fine sandy loam.	SM, GM	A-2, A-4	0-5	60-80	60-75	45-70	25-40	30-40	5-10
	8-51	Fine sandy loam, gravelly loam, gravelly silt loam.	GM-GC, SC, SM-SC, CL-ML	A-2, A-4	0-5	60-95	55-90	40-90	25-80	20-30	5-10
	51-62	Gravelly fine sandy loam, gravelly silt loam.	GM-GC, SC, SM-SC	A-2, A-4, A-1	0-5	60-85	55-80	35-70	20-65	20-30	5-10
Martisco:											
Me	0-12	Sapric material	Pt	---	0	---	---	---	---	---	---
	12-34	Marl	---	---	0	---	---	---	---	---	---
	34-42	Silt loam, silt, silty clay.	ML, CL, MH, CH	A-6, A-7	0	100	95-100	85-100	70-100	25-35	5-15
Massena:											
MfA, MfB	0-7	Gravelly loam	SC, GC, CL	A-6, A-7, A-2	0-5	55-75	50-70	40-65	30-60	35-45	12-20
	7-33	Gravelly fine sandy loam, gravelly sandy loam, loam.	SM-SC, GC, CL, CL-ML	A-4, A-6, A-2, A-1	0-5	55-95	55-90	35-85	15-65	15-25	5-15
	33-48	Gravelly fine sandy loam, gravelly loam, very gravelly sandy loam.	GC, CL, SC, CL-ML	A-4, A-6, A-2, A-1	0-5	50-75	40-70	25-65	10-55	15-25	5-15
Mg	0-7	Very stony loam	CL, GC, SC	A-6, A-7, A-2	5-10	55-85	50-80	40-75	30-60	35-45	12-20
	7-33	Gravelly fine sandy loam, gravelly sandy loam, loam.	SM-SC, GC, CL, CL-ML	A-4, A-6, A-2, A-1	0-5	55-95	55-90	35-85	15-65	15-25	5-15
	33-48	Gravelly fine sandy loam, gravelly loam, very gravelly sandy loam.	GC, CL, SC, CL-ML	A-4, A-6, A-2, A-1	0-5	50-75	40-70	25-65	10-55	15-25	5-15

See footnote at end of table.

TABLE 14.--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	
Minoa:											
Mn	0-12	Very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	80-95	45-65	<20	NP-4
	12-32	Loamy very fine sand, silt loam, fine sandy loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-85	<20	NP-4
	32-72	Loamy very fine sand, loamy fine sand, silt loam.	SM, ML	A-2, A-4	0	95-100	90-100	65-95	25-80	---	NP
Newstead:											
Ne	0-10	Gravelly fine sandy loam.	GM, SM	A-2, A-4, A-1	0-5	55-75	50-70	30-65	20-40	25-40	2-10
	10-20	Very fine sandy loam, gravelly loam, gravelly sandy loam.	ML, GM, SM, CL	A-1, A-2, A-4	0-5	55-90	50-85	30-80	15-75	15-25	2-10
	20-27	Very gravelly loam, gravelly silt loam, gravelly sandy loam.	GM, ML, SM, CL-ML	A-1, A-2, A-4	5-10	50-90	45-80	25-80	15-70	15-25	2-6
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Niagara:											
Ng	0-17	Silt loam	ML	A-4, A-6	0	95-100	90-100	80-95	65-90	35-45	5-15
	17-38	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	65-95	15-25	2-10
	38-60	Silt loam, fine sand, silty clay loam.	ML, SM	A-4, A-2	0	95-100	95-100	70-100	30-95	<15	NP-4
Oakville:											
OaB	0-10	Loamy fine sand	SM	A-2	0	100	100	70-95	20-35	---	NP
	10-56	Fine sand	SM, SP-SM	A-2, A-3	0	100	95-100	70-95	5-30	---	NP
Ontario:											
OnB, OnC, OnD, [1]OSE	0-15	Gravelly loam	ML, SM, CL-ML	A-4, A-2	0-15	70-80	65-75	55-75	40-60	20-30	1-6
	15-37	Gravelly loam, loam, sandy clay loam.	ML, GM, SC, CL	A-4, A-2	0-15	70-95	65-85	55-80	20-65	15-25	3-10
	37-56	Gravelly loam, gravelly fine sandy loam, very gravelly loam.	ML, SM, GC, GM	A-4, A-2, A-1	5-15	45-90	40-80	30-75	15-60	15-25	3-10
Ovid:											
OvA, OvB	0-12	Silt loam	ML, CL-ML	A-4, A-6, A-7	0	85-100	75-100	70-95	55-90	25-45	5-15
	12-30	Silty clay loam, clay loam, gravelly clay loam.	CL, SC, CL-ML, GM-GC	A-4, A-6	0-5	65-100	65-95	60-95	45-90	20-35	5-15
	30-40	Silty clay loam, clay loam, gravelly clay loam.	CL, GC, SC, CL-ML	A-4, A-6	0-5	60-90	60-90	55-85	40-80	20-35	5-15

See footnote at end of table.

TABLE 14.--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	
Palms:											
Pa	0-22	Sapric material	Pt	A-8	---	---	---	---	---	---	---
	22-50	Clay loam, loam, silt loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-80	<30	5-15
Palmyra:											
PcA, PcB, PcC, PgA, PgB, [1]PhD	0-9	Gravelly loam, cobbly loam.	ML, SM, GM, CL-ML	A-4	0-15	60-80	55-75	50-70	35-55	25-35	5-10
	9-24	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-75	40-65	25-50	25-35	5-10
	24-40	Very gravelly sand.	GP, GW, SW, GP, GM	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
[1]PLE:											
Palmyra part	0-9	Gravelly loam, cobbly loam.	ML, SM, GM, CL-ML	A-4	0-15	60-80	55-75	50-70	35-55	25-35	5-10
	9-24	Gravelly loam, gravelly sandy clay loam, gravelly fine sandy loam.	SM, SC, GM, GC	A-2, A-4	0-5	60-90	55-75	40-65	25-50	25-35	5-10
	24-40	Very gravelly sand.	GP, GW, GP-GM, SW	A-1	5-10	35-60	30-55	15-40	0-10	<5	NP
Alton part	0-8	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	65-75	60-70	30-50	15-30	<10	NP-5
	8-42	Gravelly fine sandy loam, very gravelly sandy loam.	GM, SM	A-1, A-2, A-4	0-15	40-75	30-70	20-60	10-40	<10	NP-5
	42-60	Very gravelly sand, very gravelly loamy sand.	GP, GM, SM, SP	A-1	10-25	45-60	40-50	20-40	2-15	---	NP
Phelps:											
PoA, PoB	0-9	Gravelly loam	ML, SM, GM	A-2, A-4	0-5	60-80	55-75	50-70	30-55	20-35	2-10
	9-34	Gravelly loam, gravelly clay loam, silt loam.	ML, SM, GM-GC, CL-ML	A-2, A-4	0-5	60-95	55-90	40-90	25-80	20-35	5-10
	34-50	Stratified sand and gravel.	GP, SP, GW-GM, SW	A-1	5-10	35-60	30-55	15-40	0-10	<20	NP-2
PpA	0-9	Cobbly loam.	ML, SM, GM	A-4	5-15	70-80	65-80	55-70	40-60	20-35	2-10
	9-34	Gravelly loam, gravelly clay loam, silt loam.	ML, SM, GM-GC, CL-ML	A-2, A-4	0-5	60-95	55-90	40-90	25-80	20-35	5-10
	34-50	Stratified sand and gravel.	GP, SP, GW-GM, SW	A-1	5-10	35-60	30-55	15-40	0-10	<20	NP-2

See footnote at end of table.

TABLE 14.--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	
Rhinebeck:											
RaA, RaB	0-8	Silty clay loam	MH, CL	A-6, A-7	0	95-100	95-100	85-100	80-95	30-55	10-25
	8-24	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	95-100	95-100	85-100	70-95	45-65	25-35
	24-60	Stratified silt and clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	95-100	85-100	70-95	40-60	20-30
Sodus:											
SdB, SdC, SdD, [1]SSE	0-9	Gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-90	60-80	40-70	25-50	<15	NP-2
	9-28	Very fine sandy loam, loam, gravelly fine sandy loam.	SM, ML	A-2, A-4	0-5	70-95	60-90	40-85	25-65	<15	NP-2
	28-56	Gravelly very fine sandy loam, gravelly loam, very gravelly fine sandy loam.	GM, SM	A-2, A-1, A-4	0-5	50-70	40-60	30-55	15-45	<15	NP-2
Teel:											
Te	0-9	Silt loam	ML, CL-ML	A-4	0	100	95-100	90-100	65-90	15-35	2-10
	9-32	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	15-35	2-10
	32-50	Silt loam, fine sandy loam, gravelly very fine sandy loam.	ML, SM	A-4	0-5	75-100	70-100	50-100	30-90	<25	NP-3
Wallington:											
Wa	0-8	Silt loam	ML, CL-ML	A-4	0	95-100	90-100	85-100	65-90	15-20	3-6
	8-15	Very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	15-20	3-6
	15-34	Very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	80-100	50-90	15-20	3-6
	34-58	Stratified silt loam to very fine sand.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<10	NP
Wassaic:											
WcA, WcB	0-10	Silt loam	ML	A-4	0	90-100	85-100	75-95	60-90	25-35	2-10
	10-30	Loam, gravelly fine sandy loam, silty clay loam.	GM, GC, SM, CL	A-2, A-4	0-5	60-100	55-95	45-95	25-85	15-25	2-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wayland:											
Wd	0-8	Silt loam	ML, OL	A-7, A-5	0	100	95-100	90-100	70-90	40-50	5-15
	8-50	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	70-95	25-40	5-15
Williamson:											
WnA, WnB, WnC	0-8	Silt loam	ML	A-4, A-2	0	95-100	90-100	85-100	65-90	<30	NP-6
	8-20	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	55-90	<20	NP-6
	20-48	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	55-90	<20	NP-6
	48-60	Stratified silt to very fine sandy loam.	ML, SM	A-4	0	95-100	90-100	75-95	40-90	<15	NP-3

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than; > means more than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Adrian:									
Aa	0-21	2.0-6.0	0.35-0.45	5.6-7.3	----------	High------	Moderate--	---	---
	21-56	6.0-20	0.03-0.08	7.4-8.4	Low-------	High------	Moderate--	---	
Alluvial land:									
AD	0-60								
Alton:									
AgA, AgB, AgC, AgD, AlA, AlB	0-8	2.0-6.0	0.06-0.14	4.5-5.5	Low-------	Low-------	High------	0.20	3
	8-42	2.0-6.0	0.07-0.09	5.6-7.3	Low-------	Low-------	Moderate--	0.20	
	42-60	>6.0	0.02-0.04	6.6-7.8	Low-------	Low-------	Low-------	0.17	
Appleton:									
Ap	0-9	0.6-2.0	0.12-0.20	5.6-7.3	Low-------	High------	Low-------	0.32	3
	9-32	0.2-0.6	0.07-0.18	5.6-7.8	Low-------	High------	Low-------	0.37	
	32-50	0.06-0.2	0.07-0.17	7.4-8.4	Low-------	High------	Low-------	0.28	
Beaches:									
Be.									
Bombay:									
BoA, BoB, BoC	0-10	0.6-2.0	0.08-0.15	5.1-6.5	Low-------	Moderate--	Moderate--	0.24	3
	10-45	0.2-2.0	0.09-0.19	5.1-7.3	Low-------	Moderate--	Low-------	0.28	
	45-60	0.2-0.6	0.08-0.14	6.6-8.4	Low-------	Moderate--	Low-------	0.24	
Canandaigua:									
Ca	0-8	0.6-2.0	0.20-0.35	6.1-7.8	Low-------	High------	Low-------	---	---
	8-36	0.2-0.6	0.19-0.20	6.1-7.8	Low-------	High------	Low-------	---	
	36-40	0.2-0.6	0.19-0.20	6.6-8.4	Low-------	High------	Low-------	---	
Carlisle:									
Cd	0-66	6.0-20	0.35-0.45	5.6-7.3	----------	High------	Moderate--	---	---
Cazenovia:									
CeB, CeC	0-15	0.6-2.0	0.13-0.21	5.6-7.3	Low-------	Moderate--	Low-------	0.37	3
	15-36	0.2-0.6	0.09-0.16	5.6-7.8	Moderate--	Moderate--	Low-------	0.37	
	36-50	0.06-0.2	0.11-0.17	7.4-8.4	Low-------	Moderate--	Low-------	0.28	
CoA, CoB	0-15	0.6-2.0	0.10-0.16	5.6-7.3	Low-------	Moderate--	Low-------	0.28	3
	15-36	0.2-0.6	0.09-0.16	5.6-7.8	Moderate--	Moderate--	Low-------	0.37	
	36-50	0.06-0.2	0.11-0.17	7.4-8.4	Low-------	Moderate--	Low-------	0.28	
	50	---	---	---	----------	----------	----------	---	
Chippeny:									
Cp	0-20	0.2-0.6	0.35-0.45	5.6-7.8	----------	High------	Moderate--	---	---
	20-22	0.2-2.0	0.12-0.19	6.6-8.4	Low-------	High------	Low-------	---	
	22	---	---	---	----------	----------	----------	---	
Collamer:									
CrB	0-9	0.6-2.0	0.14-0.21	5.1-7.3	Low-------	Moderate--	Low-------	0.49	3
	9-14	0.6-2.0	0.14-0.20	5.1-7.3	Low-------	Moderate--	Low-------	0.43	
	14-37	0.2-0.6	0.16-0.20	5.6-7.3	Low-------	Moderate--	Low-------	0.43	
	37-52	0.2-0.6	0.12-0.20	6.1-8.4	Low-------	Moderate--	Low-------	0.64	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Colonie:									
CsA, CsB, CsC, CsD	0-7	6.0-20	0.15-0.18	4.5-6.5	Low	Low	Moderate	0.24	4
	7-42	6.0-20	0.06-0.08	4.5-6.5	Low	Low	Moderate	0.24	
	42-60	6.0-20	0.02-0.06	5.6-7.3	Low	Low	Moderate	0.24	
[1]CTE:									
Colonie part	0-7	6.0-20	0.15-0.18	4.5-6.5	Low	Low	Moderate	0.24	4
	7-42	6.0-20	0.06-0.08	4.5-6.5	Low	Low	Moderate	0.24	
	42-60	6.0-20	0.02-0.06	5.6-7.3	Low	Low	Moderate	0.24	
Dunkirk part	0-7	0.6-2.0	0.16-0.21	5.1-7.3	Low	Low	Low	0.49	3
	7-14	0.6-2.0	0.16-0.20	5.1-7.3	Low	Low	Low	0.43	
	14-40	0.2-0.6	0.16-0.20	5.6-7.8	Low	Low	Low	0.43	
	40-80	0.2-0.6	0.12-0.20	6.1-7.8	Low	Low	Low	0.64	
Dunkirk:									
DkB, DkC3, DkD	0-7	0.6-2.0	0.16-0.21	5.1-7.3	Low	Low	Low	0.49	3
	7-14	0.6-2.0	0.16-0.20	5.1-7.3	Low	Low	Low	0.43	
	14-40	0.2-0.6	0.16-0.20	5.6-7.8	Low	Low	Low	0.43	
	40-80	0.2-0.6	0.12-0.20	6.1-7.8	Low	Low	Low	0.64	
Edwards:									
Ed	0-30	6.0-20	0.35-0.45	5.6-7.8	---	High	Low	---	---
	30-54	---	---	7.4-8.4	Low	High	Low	---	
Elnora:									
ElA, ElB	0-10	2.0-6.0	0.08-0.16	4.5-6.5	Low	Low	Moderate	0.24	4
	10-21	2.0-20.0	0.06-0.08	4.5-6.5	Low	Low	Moderate	0.24	
	21-60	6.0-20.0	0.03-0.06	5.1-7.3	Low	Low	Moderate	0.24	
Farmington:									
FaB	0-9	0.6-2.0	0.11-0.19	5.1-6.5	Low	Low	Moderate	0.32	2
	9-15	0.6-2.0	0.07-0.18	5.6-7.3	Low	Low	Low	0.28	
	15	---	---	---	---	---	---	---	
Fredon:									
Fr	0-8	0.6-2.0	0.12-0.20	5.6-6.5	Low	High	Moderate	0.24	3
	8-24	0.2-2.0	0.12-0.20	5.6-7.3	Low	High	Low	0.24	
	24-50	2.0-20	0.02-0.06	6.6-7.8	Low	High	Low	0.17	
Fresh water marsh:									
FW	0-60								
Halsey:									
Ha	0-9	0.6-6.0	0.14-0.24	5.6-6.5	Low	High	Moderate	---	---
	9-28	0.6-6.0	0.12-0.18	5.6-6.5	Low	High	Moderate	---	
	28-50	6.0-20	0.02-0.07	6.6-7.8	Low	High	Low	---	
Hamlin:									
Hm	0-9	0.6-2.0	0.18-0.21	6.1-7.3	Low	Low	Low	---	---
	9-40	0.6-2.0	0.17-0.19	6.1-7.3	Low	Low	Low	---	
	40-64	0.6-2.0	0.17-0.19	5.6-7.8	Low	Low	Low	---	
Hilton:									
HnA, HnB, HnC	0-11	0.6-2.0	0.10-0.18	5.1-6.5	Low	Moderate	Moderate	0.24	3
	11-31	0.6-2.0	0.08-0.14	6.1-7.3	Low	Moderate	Low	0.28	
	31-50	0.06-0.2	0.08-0.14	7.4-8.4	Low	Moderate	Low	0.24	
HoA, HoB	0-11	0.6-2.0	0.10-0.18	5.1-6.5	Low	Moderate	Moderate	0.24	3
	11-31	0.6-2.0	0.08-0.14	6.1-7.3	Low	Moderate	Low	0.28	
	31-40	0.06-0.2	0.08-0.14	7.4-8.4	Low	Moderate	Low	0.24	
	40	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
Ira:									
IrA, IrB, IrC-----	0-5	0.6-2.0	0.09-0.14	4.5-5.5	Low-------	Moderate--	High------	0.24	3
	5-21	0.6-2.0	0.08-0.14	5.1-6.0	Low-------	Moderate--	Moderate--	0.24	
	21-44	0.06-0.2	0.02-0.04	5.6-7.3	Low-------	Moderate--	Moderate--	0.24	
	44-50	0.06-0.2	0.02-0.04	6.1-7.8	Low-------	Moderate--	Low-------	0.24	
Joliet:									
Jo----------	0-11	0.6-2.0	0.17-0.24	6.1-8.4	Moderate--	High------	Low-------	---	---
	11	---	---	---	----------	----------	----------	---	
Junius:									
Ju----------	0-10	2.0-6.0	0.06-0.16	5.6-7.3	Low-------	High------	Moderate--	0.17	5
	10-50	6.0-20	0.04-0.08	6.1-8.4	Low-------	High------	Low-------	0.17	
Lairdsville:									
[1]LdB:									
Lairdsville part	0-8	0.6-2.0	0.15-0.20	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	8-32	<0.06	0.12-0.17	5.6-8.4	Moderate--	High------	Low-------	0.28	
	32	---	---	---	----------	----------	----------	---	
Riga part-------	0-6	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	6-26	<0.06	0.10-0.16	5.6-8.4	Moderate--	High------	Low-------	0.28	
	26	---	---	---	----------	----------	----------	---	
[1]LdC3:									
Lairdsville part	0-8	0.6-2.0	0.15-0.20	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	8-32	<0.06	0.12-0.17	5.6-8.4	Moderate--	High------	Low-------	0.28	
	32	---	---	---	----------	----------	----------	---	
Riga part-------	0-6	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	6-26	<0.06	0.10-0.16	5.6-8.4	Moderate--	High------	Low-------	0.28	
	26	---	---	---	----------	----------	----------	---	
[1]LEE:									
Lairdsville part	0-8	0.6-2.0	0.15-0.20	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	8-32	<0.06	0.12-0.17	5.6-8.4	Moderate--	High------	Low-------	0.28	
	32	---	---	---	----------	----------	----------	---	
Riga part-------	0-6	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	6-26	<0.06	0.10-0.16	5.6-8.4	Moderate--	High------	Low-------	0.28	
	26	---	---	---	----------	----------	----------	---	
Lakemont:									
Lk----------	0-9	0.2-0.6	0.17-0.21	6.1-7.3	Moderate--	High------	Low-------	---	---
	9-28	<0.06	0.12-0.17	6.1-7.8	Moderate--	High------	Low-------	---	
	28-42	<0.06	0.12-0.14	7.4-8.4	Moderate--	High------	Low-------	---	
	42	---	---	---	----------	----------	----------	---	
Lamson:									
Lm----------	0-10	2.0-6.0	0.12-0.16	6.1-7.3	Low-------	High------	Low-------	---	
	10-33	2.0-6.0	0.11-0.13	6.5-7.8	Low-------	High------	Low-------	---	
	33-50	2.0-6.0	0.02-0.04	7.4-8.4	Low-------	High------	Low-------	---	
Lockport:									
[1]LoA:									
Lockport part---	0-6	0.6-2.0	0.15-0.20	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	6-30	<0.06	0.12-0.17	5.6-7.8	Moderate--	High------	Low-------	0.28	
	30	---	---	---	----------	----------	----------	---	
Brockport part--	0-12	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	12-30	0.06-0.2	0.11-0.14	5.6-7.8	Moderate--	High------	Low-------	0.28	
	30	---	---	---	----------	----------	----------	---	
[1]LoB:									
Lockport part---	0-6	0.6-2.0	0.15-0.20	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	6-30	<0.06	0.12-0.17	5.6-7.8	Moderate--	High------	Low-------	0.28	
	30	---	---	---	----------	----------	----------	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Lockport:									
Brockport part--	0-12	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.43	3
	12-30	0.06-0.2	0.11-0.14	5.6-7.8	Moderate--	High------	Low-------	0.28	
	30	---	---	---	----------	----------	----------	---	
Lyons:									
Ls----------	0-8	0.6-2.0	0.15-0.20	5.6-7.3	Low-------	High------	Low-------	---	---
	8-38	0.2-2.0	0.08-0.18	6.1-7.3	Low-------	High------	Low-------	---	
	38-54	<0.2	0.06-0.15	7.4-8.4	Low-------	High------	Low-------	---	
Ly----------	0-8	0.6-2.0	0.11-0.16	5.6-7.3	Low-------	High------	Low-------	---	---
	8-38	0.2-2.0	0.08-0.18	6.1-7.3	Low-------	High------	Low-------	---	
	38-54	<0.06	0.06-0.15	7.4-8.4	Low-------	High------	Low-------	---	
Madalin:									
Ma----------	0-6	0.2-0.6	0.16-0.21	5.6-7.8	Moderate--	High------	Low-------	---	---
	6-30	0.06-0.2	0.12-0.13	5.6-7.8	Moderate--	High------	Low-------	---	
	30-42	0.06-0.2	0.12-0.13	7.4-7.8	Moderate--	High------	Low-------	---	
Madrid:									
MdB, MdC, MdD-----	0-8	0.6-2.0	0.08-0.15	5.1-6.5	Low-------	Low-------	Moderate--	0.24	3
	8-51	0.2-2.0	0.09-0.19	5.1-7.3	Low-------	Low-------	Low-------	0.28	
	51-62	0.2-0.6	0.08-0.14	6.1-8.4	Low-------	Low-------	Low-------	0.24	
Martisco:									
Me----------	0-12	0.6-6.0	0.25-0.35	6.1-8.4	----------	High------	Low-------	---	---
	12-34	0.06-0.2	---	7.9-8.4	Low-------	High------	Low-------	---	
	34-42	0.06-0.6	0.16-0.21	7.9-8.4	Moderate--	High------	Low-------	---	
Massena:									
MfA, MfB----------	0-7	0.6-2.0	0.09-0.16	5.6-7.3	Low-------	Moderate--	Low-------	0.24	3
	7-33	0.06-0.6	0.08-0.15	5.6-7.3	Low-------	Moderate--	Low-------	0.28	
	33-48	0.06-0.6	0.06-0.14	6.6-8.4	Low-------	Moderate--	Low-------	0.24	
Mg----------	0-7	0.6-2.0	0.13-0.19	5.6-7.3	Low-------	Moderate--	Low-------	0.20	3
	7-33	0.06-0.6	0.08-0.15	5.6-7.3	Low-------	Moderate--	Low-------	0.28	
	33-48	0.06-0.6	0.06-0.14	6.6-8.4	Low-------	Moderate--	Low-------	0.24	
Minoa:									
Mn----------	0-12	0.6-2.0	0.13-0.21	5.1-7.3	Low-------	Moderate--	Moderate--	0.32	4
	12-32	0.6-2.0	0.13-0.20	5.1-7.3	Low-------	Moderate--	Moderate--	0.37	
	32-72	0.6-6.0	0.08-0.13	5.6-7.8	Low-------	Moderate--	Low-------	0.28	
Newstead:									
Ne----------	0-10	0.6-2.0	0.08-0.15	6.1-7.8	Low-------	High------	Low-------	0.28	3
	10-20	0.6-2.0	0.07-0.17	6.6-8.4	Low-------	High------	Low-------	0.28	
	20-27	0.6-2.0	0.07-0.17	6.6-8.4	Low-------	High------	Low-------	0.24	
	27	---	---	---	----------	----------	----------	---	
Niagara:									
Ng----------	0-17	0.6-2.0	0.17-0.22	5.6-7.3	Low-------	High------	Low-------	0.49	3
	17-38	0.2-0.6	0.16-0.20	5.6-7.8	Low-------	High------	Low-------	0.43	
	38-60	0.2-0.6	0.12-0.20	6.6-8.4	Low-------	High------	Low-------	0.64	
Oakville:									
OaB----------	0-10	>20.0	0.07-0.09	5.6-7.3	Low-------	Low-------	Moderate--	0.17	5
	10-56	>20.0	0.06-0.08	5.6-7.3	Low-------	Low-------	Moderate--	0.17	
Ontario:									
OnB, OnC, OnD, [1]OSE----------	0-15	0.6-2.0	0.10-0.18	5.1-7.3	Low-------	Low-------	Low-------	0.24	3
	15-37	0.6-2.0	0.08-0.14	5.1-7.3	Low-------	Low-------	Low-------	0.28	
	37-56	0.06-0.2	0.08-0.14	7.4-8.4	Low-------	Low-------	Low-------	0.24	
Ovid:									
OvA, OvB----------	0-12	0.6-2.0	0.13-0.21	5.6-7.3	Low-------	High------	Low-------	0.37	3
	12-30	0.2-0.6	0.09-0.16	5.6-7.8	Moderate--	High------	Low-------	0.37	
	30-40	0.06-0.2	0.11-0.17	7.4-8.4	Low-------	High------	Low-------	0.28	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Palms:									
Pa	0-22	0.6-6.0	0.35-0.45	5.1-7.3	----------	High------	Moderate--	---	---
	22-50	0.2-2.0	0.05-0.19	6.1-8.4	Low-------	High------	Low-------	---	
Palmyra:									
PcA, PcB, PcC, PgA, PgB, [1]PhD	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low-------	Low-------	Low-------	0.24	3
	9-24	0.6-2.0	0.07-0.15	6.1-7.8	Low-------	Low-------	Low-------	0.28	
	24-40	>20	0.01-0.02	7.4-8.4	Low-------	Low-------	Low-------	0.17	
[1]PLE:									
Palmyra part	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low-------	Low-------	Low-------	0.24	3
	9-24	0.6-2.0	0.07-0.15	6.1-7.8	Low-------	Low-------	Low-------	0.28	
	24-40	>20	0.01-0.02	7.4-7.8	Low-------	Low-------	Low-------	0.17	
Alton part	0-8	2.0-6.0	0.06-0.14	4.5-5.5	Low-------	Low-------	High------	0.20	3
	8-42	2.0-6.0	0.07-0.09	5.6-7.3	Low-------	Low-------	Moderate--	0.20	
	42-60	>6.0	0.02-0.04	6.6-7.8	Low-------	Low-------	Low-------	0.17	
Phelps:									
PoA, PoB, PpA	0-9	0.6-2.0	0.10-0.16	5.6-7.3	Low-------	Moderate--	Low-------	0.24	3
	9-34	0.6-2.0	0.09-0.18	5.6-7.3	Low-------	Moderate--	Low-------	0.28	
	34-50	2.0-20	0.01-0.02	7.4-8.4	Low-------	Moderate--	Low-------	0.17	
Rhinebeck:									
RaA, RaB	0-8	0.2-0.6	0.16-0.21	5.6-7.3	Moderate--	High------	Low-------	0.49	3
	8-24	0.06-0.2	0.12-0.14	5.6-7.3	Moderate--	High------	Low-------	0.28	
	24-60	0.06-0.2	0.12-0.15	7.4-7.8	Moderate--	High------	Low-------	0.28	
Sodus:									
SdB, SdC, SdD, [1]SSE	0-9	0.6-2.0	0.10-0.18	5.1-6.0	Low-------	Low-------	Moderate--	0.24	3
	9-28	0.6-2.0	0.10-0.15	5.1-6.0	Low-------	Low-------	Moderate--	0.24	
	28-56	0.06-0.2	0.02-0.04	5.6-7.8	Low-------	Low-------	Moderate--	0.24	
Teel:									
Te	0-9	0.6-2.0	0.18-0.21	6.1-7.3	Low-------	Moderate--	Low-------	---	---
	9-32	0.6-2.0	0.17-0.19	6.1-7.3	Low-------	Moderate--	Low-------	---	
	32-50	0.6-2.0	0.12-0.19	6.6-7.8	Low-------	Moderate--	Low-------	---	
Wallington:									
Wa	0-8	0.6-2.0	0.19-0.21	4.5-6.0	Low-------	High------	Moderate--	0.49	3
	8-15	0.6-2.0	0.18-0.20	4.5-6.0	Low-------	High------	Moderate--	0.64	
	15-34	0.06-0.2	0.10-0.14	5.1-6.5	Low-------	High------	Moderate--	0.64	
	34-58	0.06-0.2	0.10-0.14	5.6-7.3	Low-------	High------	Low-------	0.43	
Wassaic:									
WcA, WcB	0-10	0.6-2.0	0.13-0.21	5.6-7.3	Low-------	Moderate--	Low-------	0.32	3
	10-30	0.6-2.0	0.09-0.19	5.6-7.3	Low-------	Moderate--	Low-------	0.37	
	30	---	---	---	----------	----------	----------	---	
Wayland:									
Wd	0-8	0.2-2.0	0.17-0.22	6.6-7.8	Low-------	High------	Low-------	---	---
	8-35	0.06-0.2	0.16-0.20	6.6-7.8	Low-------	High------	Low-------	---	
	35-50	0.06-0.2	0.11-0.19	7.4-8.4	Low-------	High------	Low-------	---	
Williamson:									
WnA, WnB, WnC	0-8	0.6-2.0	0.18-0.20	4.5-6.0	Low-------	Moderate--	Moderate--	0.49	3
	8-20	0.6-2.0	0.18-0.20	4.5-6.0	Low-------	Moderate--	Moderate--	0.64	
	20-48	0.06-0.2	0.10-0.14	5.1-6.0	Low-------	Moderate--	Moderate--	0.64	
	48-60	0.06-0.2	0.10-0.14	5.1-7.3	Low-------	Moderate--	Moderate--	0.64	

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[Dashes indicate the feature is not a concern. Absence of an entry indicates the soil was not rated. The definitions of "flooding" and "water table" in the Glossary explain the terms "brief," "apparent," and perched." The symbol < means less than; > means more than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Adrian: Aa	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High.
Alluvial land: AD	A/B	Frequent	Very brief	Jan-Dec	0-6.0	Apparent	Apr-May	>60	---	---
Alton: AgA, AgB, AgC, AgD, AlA, AlB	A	None	---	---	>6.0	---	---	>60	---	Low.
Appleton: Ap	C	None	---	---	0.5-1.5	Perched	Dec-May	>60	---	High.
Beaches: Be.										
Bombay: BoA, BoB, BoC	B	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate.
Canandaigua: Ca	D	None	---	---	0-1.0	Apparent	Nov-May	>60	---	High.
Carlisle: Cd	A/D	Frequent	Long	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High.
Cazenovia: CeB, CeC	B	None	---	---	2.0-4.0	Perched	Mar-May	>60	---	Moderate.
CoA, CoB	B	None	---	---	2.0-4.0	Perched	Mar-May	49-60	Rippable	Moderate.
Chippeny: Cp	D	Frequent	Long	Nov-May	0-1.0	Apparent	Sep-May	20-40	Hard	High.
Collamer: CrB	C	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	High.
Colonie: CsA, CsB, CsC, CsD	A	None	---	---	>6.0	---	---	>60	---	Low.
[1]CTE:										
Colonie part	A	None	---	---	>6.0	---	---	>60	---	Low.
Dunkirk part	B	None	---	---	>6.0	---	---	>60	---	High.
Dunkirk: DkB, DkC3, DkD	B	None	---	---	>6.0	---	---	>60	---	High.
Edwards: Ed	B/D	Frequent	Long	Sep-May	0-0.5	Apparent	Sep-Jun	>60	---	High.
Elnora: ElA, ElB	B	None	---	---	1.5-2.0	Apparent	Feb-May	>60	---	Moderate.
Farmington: FaB	C	None	---	---	>6.0	---	---	10-20	Hard	Moderate.
Fredon: Fr	C	None	---	---	0-1.5	Apparent	Nov-Jun	>60	---	High.
Fresh water marsh: FW	D	None	---	---	0-0.5	Apparent	Jan-Dec	>60	---	---

See footnote at end of table.

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

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Halsey: Ha	D	None	---	---	0-0.5	Apparent	Sep-Jun	>60	---	High.
Hamlin: Hm	B	Common	Brief	Nov-May	3.0-6.0	Apparent	Nov-May	>60	---	High.
Hilton: HnA, HnB, HnC	B	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate.
HoA, HoB	B	None	---	---	1.5-2.0	Perched	Mar-May	40-60	Hard	Moderate.
Ira: IrA, IrB, IrC	C	None	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	Moderate.
Joliet: Jo	D	Frequent	Brief	Apr-Jun	0-2.0	Perched	Mar-Jun	10-20	Hard	High.
Junius: Ju	C	None	---	---	0.5-1.5	Apparent	Dec-May	>60	---	Moderate.
Lairdsville:										
[1]LdB:										
Lairdsville part	D	None	---	---	1.5-3.0	Perched	Mar-May	20-40	Rippable	Moderate.
Riga part	D	None	---	---	1.5-3.0	Perched	Mar-Apr	20-40	Rippable	Moderate.
[1]LdC3:										
Lairdsville part	D	None	---	---	1.5-3.0	Perched	Mar-May	20-40	Rippable	Moderate.
Riga part	D	None	---	---	1.5-3.0	Perched	Mar-Apr	20-40	Rippable	Moderate.
[1]LEE:										
Lairdsville part	D	None	---	---	1.5-3.0	Perched	Mar-May	20-40	Rippable	Moderate.
Riga part	D	None	---	---	1.5-3.0	Perched	Mar-Apr	20-40	Rippable	Moderate.
Lakemont: Lk	D	None	---	---	0-0.5	Apparent	Nov-Jun	40-60	Rippable	Moderate.
Lamson: Lm	D	None	---	---	0-0.5	Apparent	Dec-May	>60	---	High.
Lockport:										
[1]LoA:										
Lockport part	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
Brockport part	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
[1]LoB:										
Lockport part	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
Brockport part	D	None	---	---	0.5-1.5	Perched	Dec-May	20-40	Rippable	Moderate.
Lyons: Ls, Ly	D	None	---	---	0-0.5	Perched	Nov-Jun	>60	---	High.
Madalin: Ma	D	None	---	---	0-0.5	Apparent	Dec-May	>60	---	Moderate.
Madrid: MdB, MdC, MdD	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Martisco: Me	D	Frequent	Long to very long.	Mar-Jun	0-0.5	Apparent	Oct-Jun	>60	---	High.

See footnote at end of table.

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

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Massena: MfA, MfB, Mg-----	C	None--------	---	---	0.5-1.5	Perched	Feb-May	>60	---	High.
Minoa: Mn----------	C	None--------	---	---	0.5-1.5	Apparent	Feb-May	>60	---	High.
Newstead: Ne----------	C	None--------	---	---	0.5-1.0	Perched	Dec-May	20-40	Hard	High.
Niagara: Ng----------	C	None--------	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High.
Oakville: OaB----------	A	None--------	---	---	>6.0	---	---	>60	---	Low.
Ontario: OnB, OnC, OnD, [1]OSE----------	B	None--------	---	---	3.0-6.0	Apparent	Mar-Apr	>60	---	Moderate.
Ovid: OvA, OvB---------	C	None--------	---	---	0.5-2.0	Perched	Jan-May	>60	---	High.
Palms: Pa----------	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Nov-May	>60	---	High.
Palmyra: PcA, PcB, PcC, PgA, PgB, [1]PhD---	B	None--------	---	---	>6.0	---	---	>60	---	Low.
[1]PLE:										
Palmyra part---	B	None--------	---	---	>6.0	---	---	>60	---	Low.
Alton part-----	A	None--------	---	---	>6.0	---	---	>60	---	Low.
Phelps: PoA, PoB, PpA----	B	None--------	---	---	1.5-2.0	Apparent	Mar-May	>60	---	Moderate.
Rhinebeck: RaA, RaB---------	D	None--------	---	---	0.5-1.5	Perched	Jan-May	>60	---	Moderate.
Sodus: SdB, SdC, SdD, [1]SSE----------	C	None--------	---	---	2.0-3.0	Perched	Feb-Apr	>60	---	Moderate.
Teel: Te----------	B	Common------	Brief-----	Nov-May	0.5-2.0	Apparent	Jan-May	>60	---	High.
Wallington: Wa----------	C	None--------	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High.
Wassaic: WcA, WcB---------	B	None--------	---	---	2.0-3.0	Perched	Feb-Apr	20-40	Hard	Moderate.
Wayland: Wd----------	D	Frequent----	Long------	---	0.0-0.5	Apparent	Nov-Jun	>60	---	High.
Williamson: WnA, WnB, WnC----	C	None--------	---	---	1.5-2.0	Perched	Feb-Apr	>60	---	High.

[1]This map unit is made up of two or more dominant kinds of soil. See description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution										Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			Larger than 3 inches	Percentage passing sieve						Percentage smaller than--					Max. dry density	Optimum moisture	
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm					
			Pct											Pct		Lb/ft^3	Pct	Pct
Hamlin sil:[1] (S71NY-059-002)																		
Ap------ 0 to 18	A-4 (08)	ML	0	100	100	100	100	100	99	80	47	29	15	34	10	102	20	9.0
B2------ 18 to 40	A-4 (06)	ML	0	100	100	100	100	100	100	86	48	29	17	31	8	106	18	6.0
C1------ 40 to 48	A-4 (02)	CL-ML	0	100	100	100	100	100	100	74	36	21	12	24	5	112	16	4.0
C2------ 48 to 64	A-4 (00)	ML	0	100	100	100	100	100	99	54	28	15	10	21	3	119	13	0.0
Oakville lfs:[2] (S71NY-059-007)																		
Ap------ 0 to 10	A-2-4(00)	SM	0	100	100	100	100	99	98	21	9	5	3	--	NP	103	16	0.0
B2------ 10 to 19	A-3 (01)	SW-SM	0	100	100	100	100	100	98	8	--	--	--	--	NP	104	15	0.0
B3------ 19 to 37	A-3 (01)	SW-SM	0	100	100	100	100	100	97	7	--	--	--	--	NP	103	16	0.0
C------- 37 to 56	A-3 (01)	SW-SM	0	100	100	100	100	100	98	9	--	--	--	--	NP	100	17	0.0
Sodus gr-fsl:[3] (S71NY-059-010)																		
Ap------ 0 to 8	A-4 (00)	SM	5	100	94	88	83	79	74	48	17	7	4	--	NP	109	15	2.4
B2------ 8 to 14	A-4 (00)	SM	5	100	94	89	84	79	73	43	16	6	3	--	NP	116	12	1.6
B'x----- 17 to 32	A-4 (00)	SM	5	98	94	92	88	85	80	45	22	15	12	17	3	122	11	2.4
C------- 32 to 60	A-4 (00)	SM	10	96	90	84	78	73	67	39	17	10	7	15	2	130	9	1.6
Teel sil:[4] (S71NY-059-001)																		
Ap------ 0 to 9	A-4 (03)	ML	0	100	100	100	100	100	99	82	43	29	15	29	5	105	18	5.6
B21----- 9 to 23	A-4 (06)	ML	0	100	100	100	100	100	100	87	44	21	13	33	7	104	19	5.6
B22----- 23 to 32	A-4 (02)	CL-ML	0	100	100	100	100	100	100	75	57	31	18	26	5	110	16	4.4
C1------ 32 to 41	A-4 (02)	CL-ML	0	100	100	100	100	100	99	72	33	18	12	25	5	112	15	4.2
C2------ 41 to 50	A-4 (00)	ML	0	100	100	100	100	100	100	55	25	13	8	26	2	107	16	3.0

See footnotes at end of table.

TABLE 17.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution											Liquid limit	Plasticity index	Moisture density		Linear shrinkage
			Larger than 3 inches	Percentage passing sieve							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	
			Pct											Pct		Lb/ft3	Pct	Pct
Williamson sil:[5] (S71NY-059-005)																		
Ap------ 0 to 9	A-4 (00)	ML	0	100	100	100	100	100	99	92	29	11	5	--	NP	95	21	3.8
B2------ 9 to 18	A-4 (00)	ML	0	100	100	100	100	100	99	92	29	8	4	--	NP	104	17	1.8
A'2----- 18 to 24	A-4 (00)	ML	0	100	100	100	100	100	99	93	32	11	6	--	NP	108	15	1.4
B'x----- 24 to 48	A-4 (00)	ML	0	100	100	100	100	100	99	92	32	12	8	--	NP	117	15	2.0
C------- 48 to 60	A-4 (00)	ML	0	100	100	100	100	100	99	95	33	10	7	--	NP	110	15	2.0

[1]Hamlin silt loam:
Town of Lyons, 150 feet south of New York-31, 25 feet east of Canandaigua Outlet.
[2]Oakville loamy fine sand:
Town of Wolcott, 600 feet south of junction New York-104 and New York-104a.
[3]Sodus gravelly fine sandy loam:
Town of Wolcott, 100 feet east of Caywood Road, 0.8 mile southwest of junction of Caywood Road and New York-104a.
[4]Teel silt loam:
Town of Lyons, 150 feet south of New York-31, 50 feet east of Canandaigua Outlet.
[5]Williamson silt loam:
Town of Huron, 100 feet north of Ridge Road, 600 feet east of Preemption Road.

TABLE 18.--RELATIONSHIP BETWEEN POSITION, PARENT MATERIAL, AND DRAINAGE OF SOIL SERIES

Parent Material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
SOILS ON TILL PLAINS						
Deep, moderately fine textured, reddish glacial till with 27 to 35 percent clay in the subsoil.	----------	Cazenovia--	Cazenovia---	Ovid------	----------	----------
Deep, medium and moderately coarse textured, reddish glacial till with 18 to 27 percent clay in the subsoil.	----------	Ontario----	Hilton------	Appleton--	Lyons------	Lyons-----
Deep, moderately coarse and medium textured, reddish glacial till with less than 18 percent clay in the subsoil.	----------	Madrid-----	Bombay------	Massena---	Massena----	----------
Deep, moderately coarse or medium textured, reddish glacial till with a compact fragipan.	----------	Sodus------	Ira---------	----------	----------	----------
Moderately deep, medium textured, reddish or brownish glacial till over limestone.	----------	Wassaic----	Wassaic-----	Newstead--	Newstead---	----------
Shallow, medium textured, reddish or brownish glacial till over limestone.	----------	Farmington-	----------	----------	Joliet-----	----------
Moderately deep, fine textured, reddish glacial till over soft shale.	----------	Lairdsville	Lairdsville-	Lockport--	----------	----------
Moderately deep, fine textured, olive or grayish glacial till over soft shale.	----------	Riga-------	Riga--------	Brockport-	----------	----------
SOILS ON LACUSTRINE PLAINS AND DELTAS						
Clayey, reddish glacio-lacustrine deposits.	----------	----------	----------	----------	Lakemont---	Lakemont--
Clayey, grayish glacio-lacustrine deposits.	----------	----------	----------	Rhinebeck-	Madalin----	Madalin---
Silty, brownish glacio-lacustrine deposits.	----------	Dunkirk----	Collamer----	Niagara---	Canandaigua	Canandaigua
Coarse-silty, brownish glacio-lacustrine deposits, with a compact fragipan.	----------	----------	Williamson--	Wallington	----------	----------
Sandy, brownish glacio-lacustrine deposits.	----------	----------	----------	Minoa-----	Lamson-----	Lamson----
Sandy, brownish or reddish glacio-lacustrine deposits with subsoil bands.	Colonie------	----------	Elnora------	----------	----------	----------
Sandy, brownish or reddish glacio-lacustrine deposits.	----------	Oakville---	----------	Junius----	Junius-----	----------

TABLE 18.--RELATIONSHIP BETWEEN POSITION, PARENT MATERIAL, AND DRAINAGE OF SOIL SERIES

Parent Material	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS ON OUTWASH PLAINS, TERRACES, AND BEACHES					
Stratified sand and gravel, reddish or brownish medium textured glacio-fluvial material.	Palmyra	Palmyra	Phelps	Fredon	Fredon	Halsey
Stratified sand and gravel, brownish or reddish moderately coarse textured glacio-fluvial material.	Alton	Alton	---	---	---	---
	SOILS ON FLOOD PLAINS					
Medium textured, brownish alluvial sediments.	---	Hamlin	Teel	Teel	Wayland	Wayland
	SOILS IN SWAMPS AND BOGS					
Deep organic material more than 51 inches thick.	---	---	---	---	---	Carlisle
Moderately deep organic material, 16 to 50 inches thick, over loamy mineral soil.	---	---	---	---	---	Palms
Moderately deep organic material, 16 to 50 inches thick, over sandy mineral soil.	---	---	---	---	---	Adrian
Moderately deep organic material, 16 to 51 inches thick, over marl.	---	---	---	---	---	Edwards
Moderately deep organic material, 20 to 40 inches thick, over bedrock.	---	---	---	---	---	Chippeny
Shallow organic material, 8 to 16 inches thick, over marl.	---	---	---	---	---	Martisco

TABLE 19.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists
Alluvial land	Fluvaquents
Alton	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
Appleton	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Beaches	Psamments
Bombay	Coarse-loamy, mixed, mesic Glossoboric Hapludalfs
Brockport	Fine, illitic, mesic Aeric Ochraqualfs
Canandaigua	Fine-silty, mixed, nonacid, mesic Mollic Haplaquepts
Carlisle	Euic, mesic Typic Medisaprists
Cazenovia	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
*Chippeny	Euic Lithic Borosaprists
Collamer	Fine-silty, mixed, mesic Glossoboric Hapludalfs
*Colonie	Mixed, mesic Alfic Udipsamments
Dunkirk	Fine-silty, mixed, mesic Glossoboric Hapludalfs
Edwards	Marly, euic, mesic Limnic Medisaprists
Elnora	Mixed, mesic Aquic Udipsamments
Farmington	Loamy, mixed, mesic Lithic Eutrochrepts
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Aeric Haplaquepts
Fresh water marsh	Humaquepts and Saprists
Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Mollic Haplaquepts
Hamlin	Coarse-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Hilton	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Ira	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Joliet	Loamy, mixed, mesic Lithic Haplaquolls
Junius	Mixed, mesic Typic Psammaquents
Lairdsville	Fine, illitic, mesic Typic Hapludalfs
Lakemont	Fine, illitic, mesic Udollic Ochraqualfs
Lamson	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Lockport	Fine, illitic, mesic Aeric Ochraqualfs
Lyons	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Madalin	Fine, illitic, mesic Mollic Ochraqualfs
Madrid	Coarse-loamy, mixed, mesic Glossoboric Hapludalfs
Martisco	Fine-silty, carbonatic, mesic Histic Humaquepts
Massena	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Minoa	Coarse-loamy, mixed, mesic Aquic Dystric Eutrochrepts
Newstead	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Niagara	Fine-silty, mixed, mesic Aeric Ochraqualfs
Oakville	Mixed, mesic Typic Udipsamments
Ontario	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Ovid	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Palmyra	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Glossoboric Hapludalfs
Phelps	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Glossaquic Hapludalfs
Rhinebeck	Fine, illitic, mesic Aeric Ochraqualfs
Riga	Fine, illitic, mesic Glossaquic Hapludalfs
Sodus	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Teel	Coarse-silty, mixed, mesic Fluvaquentic Eutrochrepts
Wallington	Coarse-silty, mixed, mesic Aeric Fragiaquepts
Wassaic	Fine-loamy, mixed, mesic Glossoboric Hapludalfs
Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
Williamson	Coarse-silty, mixed, mesic Typic Fragiochrepts

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