SOIL SURVEY

Monroe County New York

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION
Issued March 1973

Major fieldwork for this soil survey was done in the period 1955-66. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1967. 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 Monroe County Soil and Water Conservation District.

Fieldwork was financed partly by funds provided to the Soil and Water Conservation District by the Monroe County legislature.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

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

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

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

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Nonfarm Uses of the Soils."

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

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

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

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Issued March 1973

SOIL SURVEY OF MONROE COUNTY, NEW YORK

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SOILS SURVEYED BY ROBERT L. HEFFNER, SEYMOUR D. GOODMAN, BRADFORD A. HIGGINS, AND TROY D. YOAKUM, SOIL CONSERVATION SERVICE

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

MONROE COUNTY is in the Erie-Ontario Lake Plain region of western New York (fig. 1). It is approximately 25 miles from north to south and 27 miles from east to west. It has a total area of 430,720 acres, or about 673 square miles. Rochester, the county seat, is in the northern part of the county.

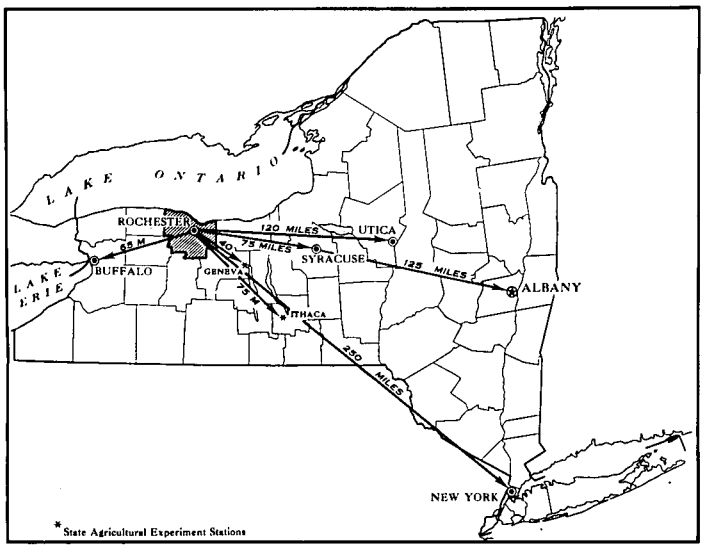

Figure 1.—Location of Monroe County in New York.

Slightly less than half the county is used for farming. Dairying is the predominant farm enterprise. A substantial amount of fluid milk is sold. Also important are cash-grain crops and fruits and vegetables. Grain crops are grown for dairy feed, as well as for cash income. Also, a considerable acreage of dry beans is grown in the county. North of U.S. Route 104 and also in small areas south of this highway, an extensive acreage is used for fruits and vegetables. Apples, cherries, pears, prunes, tomatoes, potatoes, cabbage, and green beans are commonly grown. Approximately 30 percent of the total dollar value of farm products sold comes from the sale of fruits and vegetables.

Only a small percentage of the county is used for woodland. Much of the acreage is scattered throughout the county in small farm woodlots. Much of the woodland is owned by the Government. The State owns land along the Ontario Parkway, the Erie Barge Canal, and Hamlin State Park. The county owns approximately 10,000 acres of parkland, which is distributed throughout the county.

Rochester, the county seat, has many manufacturing facilities that include food processing, clothing, graphic arts, cameras, chemicals, automotive parts, and heavy machine tools. Brockport, Honeoye Falls, Hilton, and other towns also have small manufacturing facilities.

How This Survey Was Made

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

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The soil series (*7*)[1] and the soil phase are the categories of soil classification most used in a local survey.

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

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management.

[1] Italic numbers in parentheses refer to Literature Cited, p. 170.

For example, Alton gravelly loam, 3 to 8 percent slopes, is one of several phases within the Alton series.

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

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

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Monroe County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. An example is Ontario-Palmyra-Arkport complex, rolling.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Ovid and Appleton silt loams, limestone substratum, is an example.

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

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

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

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The 14 soil associations in Monroe County are discussed in the following pages.

Associations Dominated by Soils Formed in Glacial Till

These associations are on the dissected glacial till plain, mainly south of the beach ridge on which U.S. Route 104 is located. The soils formed in deep to shallow deposits of glacial till that range from gravelly fine sandy loam to clay in texture. They are nearly level to moderately sloping in most places, but they are steep on drumlins and escarpments. Near Rochester, many of the associations are used for urban purposes or are idle. Most other areas are used for cash crops or for dairy farms.

1. Madrid-Massena association

Deep, well-drained to poorly drained soils that have a moderately coarse textured to medium-textured subsoil

This association is in nearly level to undulating morainic areas of the till plain. It is generally along or just to the north and south of the Lockport limestone escarpment, but in the eastern part of the county near the Wayne County line it extends as far north of U.S. Route 104 as Schlegel Road. Drumlins are a prominent local feature in nearby areas.

This association makes up about 10 percent of the county. It is about 30 percent Madrid soils and 9 percent Massena soils. Because of the complexity of soil patterns in these morainic areas, other soils make up the remaining 61 percent.

Madrid and Massena soils are similar, but Madrid soils are well drained and Massena soils are somewhat poorly drained to poorly drained. Both are deep, moderately

coarse textured soils that formed in till that has been partly worked by water. The Madrid soils are nearly level to undulating. They occur in morainic areas, in many places on the fringes of drumlins. Massena soils are nearly level. They generally occur in depressions and long drainageways below Madrid soils.

Among the minor soils are soils of the Ontario, Hilton, and Wassaic series, and the moderately shallow variant of Sun series, all of which formed in till. Other minor soils are those of the Collamer, Niagara, Arkport, Galen, and Elnora series, all of which formed in lacustrine sediments, and those of the Alton series, which formed in gravelly beach deposits. Muck soils, which formed in organic deposits, also are a part of this association.

Approximately 29 percent of this association has been developed for some kind of urban use, which is more heavily concentrated in and around Rochester than in other areas. The rest of the association is used dominantly for farming. The main crops are corn, grain, hay, and vegetables. There are a few scattered dairy farms and a few farms where orchards are the main crop. Erosion control is needed in gently sloping to moderately sloping areas.

The Madrid soils in this association have few restrictions for many nonfarm uses. Among the features that affect use of this association are poor drainage in low areas. In areas where bedrock is within 40 inches of the surface, construction of underground facilities is costly.

2. *Ontario-Hilton association*

Deep, well drained to moderately well drained soils that have a medium-textured to moderately fine textured subsoil

This association occupies dissected till plains where drumlins are a prominent feature of the landscape. It is mainly in the southern part of the county, south of the Lockport limestone escarpment. The slope range is nearly level to very steep.

This association makes up about 18 percent of the county. It is about 41 percent Ontario soils and 27 percent Hilton soils. Other soils make up the remaining 32 percent.

Ontario soils are deep, well-drained, medium textured and moderately coarse textured. They formed in very firm glacial till that contains a large amount of lime. They are dominantly gently sloping to moderately sloping, but in places they are very steep. These soils occur at the higher elevations on knolls and ridges and on the tops and sides of some drumlins.

Hilton soils are nearly level to gently sloping, moderately well drained soils that formed in the same kind of material as that in which the Ontario soils formed. They are commonly downslope from Ontario soils, in areas where some runoff accumulates.

The minor soils are mainly soils of the Appleton, Madrid, and Collamer series.

This association is used dominantly for farming, but about 4 percent is urban. Near the urban areas, much of this association is idle. The main enterprise is cash-crop farming, but a few large dairy farms are scattered throughout the association. The common crops are corn, oats, wheat, dry beans, and alfalfa, but tomatoes, green beans, cabbage, and some other specialized vegetable crops are grown. The dominant soils have medium to high natural fertility and are well suited to most crops grown in the county. Erosion is the main hazard in the sloping areas, and lack of drainage is a limitation in the low areas.

The major soils have favorable properties for many nonfarm uses. The slope and the moderately slow or slow permeability of the substratum are limitations in some places and for some uses.

3. *Lima-Honeoye-Ontario association*

Well drained to moderately well drained soils that have a medium-textured to moderately fine textured subsoil and that are mainly 3½ to 6 feet deep over limestone bedrock

This association is on slightly dissected glacial till plains where the underlying limestone bedrock is near the surface. It has nearly level to moderate slopes, except for the areas along the bedrock escarpment. It is mainly west of the Genesee River and close to the Lockport limestone escarpment, which transects the county in an east-west direction. One small area is east of the river and in the southern part of the towns of Rush and Mendon, near the Onondaga escarpment. Areas of this association extend a few hundred feet to several miles south from the limestone escarpments.

This association makes up about 8 percent of the county. Lima soils and the limestone substratum phases of Lima and Cazenovia soils make up about 16 percent of the association, Honeoye soils make up about 14 percent, and Ontario soils make up about 14 percent. Other soils make up the remaining 56 percent.

Lima and Cazenovia soils are deep, nearly level to gently sloping, medium-textured soils that formed in strongly calcareous, firm or very firm glacial till. The subsoil is medium textured in Lima soils and moderately fine textured in Cazenovia soils. The depth to limestone bedrock is more than 6 feet in the deeper Lima soils but 3½ to 6 feet in the limestone substratum phases of Lima and Cazenovia soils. Water runs off somewhat slowly in some places, but it accumulates in other places. In the northern part of this association, the limestone substratum phases of Lima and Cazenovia soils are near the escarpment.

Honeoye soils are deep, well-drained, nearly level to moderately sloping, medium-textured soils. They formed in very firm calcareous till of the same kind as that in which Lima soils formed. The limestone substratum phases of Honeoye soils are similar to those of Lima and Cazenovia soils and also are near the rock escarpments. These soils are commonly upslope from Lima soils, and water runs off them onto the Lima soils.

Ontario soils are deep, well-drained, moderately coarse textured and medium-textured soils that formed in very firm, calcareous glacial till. These soils, which occupy knolls and drumlins where runoff does not accumulate, are dominantly gently sloping to moderately sloping but very steep in places. They contain a little more sand throughout than the other major soils in this association.

The minor soils of the association are mainly in the Benson, Hilton, Cayuga, and Collamer series.

Much of this association is urban. The rest is used mainly for farms, but some shallow areas are idle. The main enterprise is cash-crop farming, but there are a few scattered dairies and orchards. The principal crops are corn, wheat, oats, and alfalfa, but the soils are well suited to most crops grown in the county. Fertility is medium to high. The drainage of wet soils is a problem in the lower areas. Drainage outlets are difficult to establish in many places. Erosion is a hazard in the more sloping areas.

The use of soils in this association for many nonfarm purposes is affected by the moderately slow to slow permeability of the substratum. Where these soils are used for industrial or recreational purposes, depth to bedrock should be thoroughly investigated, because excavating limestone bedrock is difficult. The bedrock escarpment and surrounding areas afford opportunities for scenic and diversified recreational development.

4. Lockport-Cazenovia-Lairdsville association

Deep to moderately deep, somewhat poorly drained to well-drained soils that have a moderately fine textured to fine textured subsoil

This association is in nearly level to gently sloping areas near the perimeter of the lake plain and west of the Genesee River. It is mainly in the town of Clarkson, but it extends eastward into the towns of Parma and Greece, just north of the beach ridge on which U.S. Route 104 is located.

This association makes up about 6 percent of the county. It is about 27 percent Lockport soils, 22 percent Cazenovia soils, and 7 percent Lairdsville soils. Other soils make up the remaining 44 percent.

Lockport soils are moderately deep, level to nearly level, somewhat poorly drained soils that have a moderately fine textured surface layer and a fine-textured subsoil. They formed partly in reddish-colored, clayey lake sediments and partly in material weathered from shale, or in till mixed with lake sediments and material weathered from shale. The depth to soft, red shale bedrock is 20 to 40 inches. These soils occupy the lower bedrock-controlled landscapes.

Cazenovia soils are deep, nearly level to gently sloping, moderately well drained to well drained soils that have a medium-textured surface layer and a moderately fine textured subsoil. They formed in firm glacial till derived mainly from red shale and reworked reddish-colored lake sediments. These soils are on the higher ridges and knolls upslope from Lockport and Lairdsville soils.

Lairdsville soils are moderately deep, gently sloping, moderately well drained to well drained soils that have a medium-textured surface layer and a fine-textured subsoil. They are similar to Lockport soils, and they formed in the same material. The depth to soft, red shale bedrock is 20 to 40 inches. These soils are intermingled with Lockport soils, mainly on breaks between areas of different elevations.

The minor soils are dominantly those of the Ovid, Hilton, Appleton, and Alton series.

The current use of this association is mainly for farming, which is concentrated in areas of Cazenovia soils. Much of the acreage in Lockport and Lairdsville soils either is idle or is reverting to a secondary growth of native vegetation, which consists of trees and shrubs. The main enterprises are cash-crop farming on Cazenovia soils and dairying on Lairdsville and Lockport soils. Because of its proximity to Lake Ontario, this association has a more favorable climate for fruit and vegetable crops than other associations, and these crops are commonly grown on Cazenovia soils. The main management problems are maintaining tilth and developing and maintaining an adequate system of drainage. Erosion is a hazard in some of the more sloping areas. The depth of rooting is restricted in areas where the dominant soils are moderately deep to shale.

A seasonal high water table, moderately slow or slow permeability, shallowness to shale bedrock, and other adverse features are limitations for nonfarm uses. Many areas of Lairdsville and Lockport soils in this association offer opportunities for development of wildlife habitat or recreational facilities.

5. Riga-Brockport Association

Moderately deep, well-drained to somewhat poorly drained soils that have a moderately fine textured to fine textured subsoil

This association is on till plains where it is characterized by areas that have a relatively flat, bedrock-controlled topography. It has been dissected by streams. One of the two small areas is just north of the Lockport limestone escarpment near Rochester, and the other is in the town of Riga where the landscape is more rolling.

This association makes up 1 percent of the county. It is about 41 percent Riga soils and 24 percent Brockport soils. Other soils make up the remaining 35 percent.

Riga soils are moderately deep, gently sloping, moderately well drained to well drained soils that have a medium-textured surface layer and a fine-textured subsoil. They formed in glacial till derived mainly from underlying shale, but in places they formed partly in shale residuum. The depth to soft, gray shale bedrock is 20 to 40 inches. These soils commonly occupy breaks where the depth to the underlying shale varies, but they are also along drainageways.

Brockport soils are nearly level, somewhat poorly drained soils that formed in the same kind of shaly till or residuum as that in which the Riga soils formed. The depth to soft, gray shale bedrock is 20 to 40 inches. These soils occur with Riga soils in broad flat areas where water either runs off slowly or accumulates.

The minor soils are mainly soils of the Canandaigua, Churchville, and Hilton series, and Muck.

About 33 percent of this association is urban, and heavy industrial complexes occupy much of the area near the northwestern limits of the city of Rochester. On the edges of the urban developments, a considerable part of this association is idle and being held for future development. In outlying areas this association is used mainly for general cash-crop farming. The principal crops are corn, wheat, oats, dry beans, and some alfalfa. The soils are fairly well suited to many of the crops grown. Natural fertility is high to medium, but maintaining good tilth and providing drainage in the flat and depressional areas are problems. Erosion is a hazard in the more sloping areas.

The features that affect the use of the dominant soils for nonfarm purposes are a seasonal high water table, slow permeability, a moderately fine textured or fine textured subsoil, and soft shale bedrock at a depth of 20 to 40 inches.

6. Benson-Honeoye association

Shallow to deep, excessively drained to well-drained soils that have a medium-textured subsoil

This association occupies nearly level to gently sloping, bedrock-controlled landscapes on the till plains adjacent

to the Onondaga limestone escarpment. The larger of the two areas is in the town of Wheatland in the southwestern corner of the county, and the smaller area is in the town of Rush near Five Points.

This association makes up less than 1 percent of the county. It is about 50 percent Benson soils and about 25 percent Honeoye soils. Rock land makes up about 15 percent, and other soils make up the remaining 10 percent.

Benson soils are shallow, nearly level to gently sloping, excessively drained or somewhat excessively drained soils that are medium textured. They formed in thin deposits of till derived mainly from limestone. The depth to limestone bedrock is 10 to 20 inches.

The Honeoye soils in this association are those of the limestone substratum phase. They are nearly level to gently sloping, well-drained soils that are medium textured. They formed in firm, calcareous glacial till. The depth to limestone bedrock is about 4 to 6 feet. These soils are intermingled with the shallow Benson soils.

Rock land consists of limestone bedrock outcrops along the escarpment and in other extremely shallow areas.

The minor soils are mainly soils of the Lima, Wassaic, and Genesee series.

Much of this association is woodland. Very little farming is done.

The shallowness to bedrock affects many nonfarm uses. Because blocks of land are owned by game and gun clubs, use of this association for wildlife habitat development and recreation is common.

7. *Sodus-Ira-Niagara association*

Deep, well drained to moderately well drained soils that have a moderately coarse textured to medium-textured subsoil and deep, somewhat poorly drained soils that have a medium-textured to moderately fine textured subsoil

This association occupies one small, nearly level to gently sloping area of the dissected till plain, in the northeastern corner of the county along the Wayne County line.

This association makes up less than 1 percent of the county. It is about 42 percent Sodus soils, 15 percent Ira soils, and 15 percent Niagara soils. Other soils make up the remaining 28 percent.

Sodus soils are deep, gently sloping, well-drained soils that are moderately coarse textured and that have a dense, slowly permeable fragipan at a depth of about 18 to 24 inches. These soils formed in glacial till that is rich in red Medina sandstone. They occupy ridges and knolls where water does not accumulate.

Ira and Sodus soils have similar profile characteristics and formed in the same till material. Ira soils are nearly level to gently sloping and moderately well drained. They occupy areas where water runs off somewhat slowly or accumulates to a slight degree.

Niagara soils are deep, nearly level, somewhat poorly drained soils that are medium textured. They formed in lake-laid deposits of silt, very fine sand, and some clay. They are interspersed with Sodus and Ira soils in drainageways and depressions.

The minor soils are mainly soils of the Wayland, Canandaigua, Lamson, and Collamer series.

This association is used mainly for cash-crop farming, but there are also some orchards and vegetable farms. The influence of nearby Lake Ontario on the climate is favorable for these uses. Erosion is a hazard in sloping areas, and drainage is generally necessary in the lower areas.

A seasonal high water table and, in some areas, a slowly permeable fragipan are limitations for many nonfarm uses.

Associations Dominated by Soils Formed in Gravelly or Sandy Glacial Water Deposits

These associations are mainly along a preglacial outlet of the Genesee River that extends from the Rush-Victor area in the southern part of the county northward through Irondequoit Bay. They also occur in an area east and west of the bay and north of the beach ridge on which U.S. Route 104 is located. The soils formed in glacial material that was deposited by water and that ranges from stratified gravel and sand to fine sand in texture. They are nearly level to sloping in most places, but they are very steep in some places. Around Rochester, most of the associations either are in urban use or are idle. The outlying areas are used mainly for farming.

8. *Palmyra-Wampsville-Eel association*

Deep, excessively drained to well-drained soils that have a moderately coarse textured to moderately fine textured subsoil over sand and gravel and deep, moderately well drained soils that have a medium-textured subsoil

This association is mainly on nearly level to moderately sloping and undulating glacial outwash terraces, kames, and eskers, as well as on flood plains, which are a conspicuous part of many areas. Steep terrace fronts are common along the level flood plains. This association is in the southern part of the county and is oriented in a generally east-west direction. It is generally in areas of the old Rush-Victor glacial outlet for glacial Lake Warren and is in the towns of Wheatland, Rush, and Mendon. One area is in the town of Perinton.

This association makes up about 6 percent of the county. It is about 19 percent Palmyra soils, 14 percent Wampsville soils, and 6 percent Eel soils. Because of the complexity of soil patterns in these glacial outwash areas, a large number of other soils make up the remaining 61 percent.

Palmyra soils are deep, well-drained to excessively drained soils that are moderately coarse textured or medium textured. They are dominantly gently sloping to moderately sloping, but they range from nearly level to very steep. These soils formed in gravelly and sandy glacial outwash derived mainly from limestone, sandstone, and shale. They occupy glacial outwash terraces, kames, kettles, and eskers. The kames and eskers are common in the area of Mendon Ponds.

Wampsville soils are deep, nearly level to moderately sloping, well-drained soils that are medium textured. They formed in calcareous gravelly outwash, but the outwash in which they formed is richer in red shale than that in which Palmyra soils formed and their subsoil is generally finer textured. These Wampsville soils occur on the higher terraces and ridges along the valley edges of the Rush-Victor outlet.

Eel soils are deep, nearly level, moderately well drained soils that are medium textured. They formed in silty allu-

vium. These are the main soils on the flood plains of streams that cross this association.

Among the minor soils are soils of the Phelps, Halsey, Colonie, Arkport, Galen, Minoa, Lamson, Odessa, Genesee, Wayland, Ontario, and Hilton series and Muck.

This association is used mainly for farming. Cash-crop farming is the main enterprise. The principal crops are corn, wheat, oats, and dry beans, but there are also some small vegetable farms and, in the town of Wheatland, some large dairy farms. The soils are well suited to most of the crops grown.

Except for slope, the better drained Palmyra and Wampsville soils have few limitations for many nonfarm uses. These soils provide the most extensive deposits of sand and gravel in the county. There are several gravel pits scattered throughout the association. Flooding is a limitation for many nonfarm uses in Eel soils and their associated soils. A seasonal or prolonged high water table in most of the other soils is a limitation for nonfarm uses.

9. Colonie-Elnora-Minoa association

Deep, excessively drained to somewhat poorly drained soils that have a coarse-textured to medium-textured subsoil over sand

This association is on sandy beaches, bars, and deltas of the lake plain. Some of the areas adjacent to streams and to old drainageways are steeply dissected, but the slopes are dominantly nearly level to gently undulating. Five areas of this association are scattered across the county in an east-west direction in a zone that roughly parallels the beach ridge on which U.S. Route 104 is located. One large area extends south of Irondequoit Bay into the town of Perinton.

This association makes up about 14 percent of the county. It is about 18 percent Colonie soils, 10 percent Elnora soils, and 8 percent Minoa soils. Because of the complexity of soil patterns in this association, a large number of soils make up the remaining 64 percent.

Colonie soils are deep, mainly nearly level to gently undulating, well-drained to excessively drained soils that are coarse textured. They formed in deep deposits of fine sand. They are mainly nearly level to gently undulating on the beaches, bars, and deltas, but they are hilly on the dunes, and very steep along drainageways.

Elnora soils are nearly level to gently sloping, moderately well drained soils. The water table is seasonally high. Elnora and Colonie soils formed in the same sandy deposits. Elnora soils are generally downslope from Colonie soils.

Minoa soils are deep, somewhat poorly drained soils that are medium textured. They formed in deposits of sand that are finer textured than those in which Colonie and Elnora soils formed. Commonly, these Minoa soils are adjacent to Colonie and Elnora soils in broad, flat basinlike depressions, but they also occur along drainageways.

The minor soils in this association are mainly soils of the Alton, Galen, Arkport, Lamson, Claverack, and Massena series, but there are also spots of alluvial soils along the streams that cross the association and Muck soils in the larger depressions.

Much of this association around Rochester and south along the Irondequoit drainageway is urban, but most areas that are not urban are idle. The outlying areas are used mainly for cash-crop farms. The common crops are vegetables, orchard fruits, and other specialized crops. Large areas are droughty, and smaller areas are seasonally wet; both irrigation and drainage are a part of good management in many places. Soil blowing is a hazard where these sandy soils are bare and do not have a protective cover.

The soil features that affect many nonfarm uses are extremely variable. Some areas are dry, but others are wet. Soil blowing and water erosion are critical hazards in disturbed areas. The sands in which these soils formed are unstable, and suitability for many engineering uses is affected.

Associations Dominated by Soils Formed in Lake-Laid Deposits of Silt and Very Fine Sand

These associations are on the lake plain west of the Genesee River and north of the beach ridge on which U.S. Route 104 is located, in the Irondequoit-Mendon area in the eastern part of the county, and along the Genesee River and Black Creek in the southwestern part of the county. The soils formed mainly in glacial water-deposited material that ranges from silt to loamy fine sand in texture. They are nearly level to gently sloping in most places but are very steep in some dissected areas. Near Rochester, these associations are in urban use or are idle. Much of the remainder is farmed.

10. Arkport-Collamer association

Deep, well drained to moderately well drained soils that have a coarse-textured to moderately fine textured subsoil

This association is on level to steep lake plains that are deeply dissected by streams. Most of this association is along Irondequoit Bay and extends east and west from its outlet along the shore of Lake Ontario. Smaller areas are near Powder Mill Park and at the eastern edge of the town of Mendon.

This association makes up about 5 percent of the county. It is about 32 percent Arkport soils and 10 percent Collamer soils. Because of the complexity of soil patterns on the lake plain, a large number of other soils make up the remaining 58 percent.

Arkport soils are deep, nearly level to very steep, well-drained soils that have a medium-textured surface layer and a subsoil that is mainly coarse textured but has bands of medium-textured material. They formed in lacustrine sediments that are rich in very fine sand. These soils occupy the steep sides of valleys in the Irondequoit Bay area and some of the undulating areas that border the upper fringes of the valley walls.

Collamer soils are deep, nearly level to moderately sloping, moderately well drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in lacustrine deposits that are rich in silt and very fine sand. They are commonly in higher areas of the lake plain upslope from Arkport soils.

The minor soils are mainly soils of the Wayland, Colonie, Galen, Dunkirk, and Canandaigua series.

Prominent land types are Fresh water marsh and Alluvial land.

About 40 percent of the association is wooded, and 30 percent is urban. The rest either is idle or is used for farming. Near Rochester, this association is largely urban, and the areas that have not been developed for urban use are mainly idle. Only small areas are farmed. Near Lake Ontario, there are some orchards and, in gently sloping areas, vegetable farms. Control of surface runoff and erosion are the dominant management problems. The less sloping areas are suited to most of the common cultivated field crops. In open or idle areas, these soils have a high potential for intensive use for fruits, vegetables, and other specialized crops.

The soils in this association are extremely variable in features that affect many nonfarm uses. Unstable sand and silt affect many engineering uses. Some soils are dry; some are seasonally wet; and locally, some are very steep. Erosion is a serious hazard if the plant cover is removed.

11. Canandaigua-Niagara-Eel association

Deep, poorly drained to moderately well drained soils that have a medium-textured to moderately fine textured subsoil

This association is on the level to nearly level lake plain and on old stream terraces dissected by the streams that formed the present flood plains. The larger of the two areas is in the south-central part of the county, mainly along the Genesee River and along Black Creek. The smaller area is west of Churchville.

This association makes up about 2 percent of the county. It is about 23 percent Canandaigua soils, 22 percent Niagara soils, and 10 percent Eel soils. Other soils make up the remaining 45 percent.

Canandaigua soils are deep, level or nearly level, poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in lacustrine sediments that are rich in silt. They occupy depressional areas of the lake plain where outlets are restricted.

Niagara soils are deep, nearly level, somewhat poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in the same silty lacustrine deposits as those in which the Canandaigua soils formed. They generally occupy areas upslope from Canandaigua soils on the lake plain.

Eel soils are deep, moderately well drained soils that are medium textured. They formed in silty alluvium. These are the main soils on the flood plains along the streams that dissect this association.

The minor soils are mainly soils of the Palmyra, Colonie, Ontario, Genesee, and Wayland series.

Much of this association is farmed, but about 7 percent is urban. Cash-crop farms and vegetable farms are the main enterprises, but there are a few large livestock farms. The main limitations to farming are wetness and local flooding. In places drainage is difficult to establish because of the flat topography, but if adequately drained, the major soils of this association are well suited to most of the crops grown.

Wetness and flooding are the main limitations for many nonfarm uses.

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12. Collamer-Hilton-Niagara association

Deep, moderately well drained to somewhat poorly drained soils that have a medium-textured to moderately fine textured subsoil

This association is on the level to undulating lake plain that extends from the Genesee River west along Lake Ontario to the Orleans County line. The ridges and knolls of glacial till that cross this association in a generally east-west direction are a conspicuous part of the landscape.

This association makes up about 13 percent of the county. It is about 35 percent Collamer soils, 17 percent Hilton soils, and 14 percent Niagara soils. Other soils make up the remaining 34 percent.

Collamer soils are deep, nearly level to moderately sloping, moderately well drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in lake-laid deposits rich in silt and very fine sand. They are generally at an elevation intermediate between the low areas of the lake plain and the higher areas of the till ridges.

Hilton soils are deep, nearly level to gently sloping, moderately well drained soils that have a medium-textured or moderately coarse textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in firm calcareous glacial till. These soils are on the higher ridges and knolls that rise above the general elevation of the lake plain.

Niagara soils are deep, level to nearly level, somewhat poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. They formed in the same kind of silty lacustrine deposits as those in which the better drained Collamer soils formed. These soils are commonly on the lake plain downslope from Collamer soils where runoff accumulates.

The minor soils are mainly soils of the Canandaigua, Lakemont, Cazenovia, and Appleton series.

Much of this association is farmed. The main enterprise is cash-crop farming, but there are also a few dairy farms. The most common cultivated crops are corn, small grain, and vegetables, but orchard crops are also common. The influence of Lake Ontario on the climate is favorable for fruit and vegetable crops. The soils are well suited to the crops grown if erosion control, drainage, and other good management practices are used. Erosion is a serious hazard, even on the gently sloping soils. The drainage of seasonally wet soils is a problem in flat areas, because adequate drainage outlets are difficult to establish in many places.

About 11 percent of this association is urban. The largest concentration is near Rochester in the town of Greece, but there is also some development along the shores of Lake Ontario and around Hilton and some of the other small villages. The seasonal wetness and the moderately slow or slow permeability are limitations for many nonfarm uses. The silty materials of Collamer and Niagara soils are unstable, and suitability for many engineering uses is affected.

The areas along the shore of Lake Ontario where bays and inlets extend into the lake plain are well suited to development as habitat for wetland wildlife. Areas along the lake shore that have not been developed but are accessible have potential for recreational development.

Associations Dominated by Soils Formed in Clayey Lake-Laid Deposits

These associations occur throughout the county, mainly in areas of glacial lakebeds that are interspersed in areas of the dissected till plains south of the beach ridge on which U.S. Route 104 is located. The soils formed in water-deposited material that consists mainly of clay but has thin layers of silt. They are nearly level to gently sloping in most places, but they are very steep along some drainageways. The associations are used mainly for farming, but there is some urban development and some idle land near Rochester.

13. Hudson-Rhinebeck-Madalin association

Deep, moderately well drained to very poorly drained soils that have a fine textured to moderately fine textured subsoil

This association is on the level to gently sloping lake plain. Of the three areas in the county, one is in the northeastern corner of the town of Webster along the shore of Lake Ontario; another is south of the village of West Webster and mainly east of Empire Boulevard; the other is in the northeastern part of the town of Mendon.

This association makes up less than 1 percent of the county. It is about 34 percent Hudson soils, 34 percent Rhinebeck soils, and 9 percent Madalin soils. Other soils make up the remaining 23 percent.

Hudson soils are deep, gently sloping or undulating, moderately well drained soils that have a medium-textured surface layer. They formed in clayey lacustrine deposits. They occur in the higher areas of the lake plain.

Rhinebeck soils are deep, level or nearly level, somewhat poorly drained soils that have a medium-textured surface layer. They formed in clayey lacustrine deposits. In many places they are in areas intermediate between Hudson soils, which occur at the higher elevations of the lake plain, and Madalin soils, which are in the lower depressional areas.

Madalin soils are deep, poorly drained and very poorly drained soils that have a finer textured surface layer than Hudson and Rhinebeck soils. They formed in clayey lacustrine deposits. In places they are subject to ponding.

The minor soils are mainly soils of the Ontario, Galen, and Collamer series.

Much of this association is farmed, but some is idle. Cash-crop farming is a common enterprise, but there are also some orchards, mainly in the area of Empire Boulevard. The main limitation to farming is seasonal wetness. Timely tillage is essential because these soils puddle and clod easily unless tilled within a limited range of moisture content. The soils are naturally fertile. The response is good to management practices that include adequate drainage and maintenance of tilth.

Seasonal wetness and slow permeability are limitations for many nonfarm uses. The soils are clayey and have many adverse properties that affect engineering uses.

14. Schoharie-Odessa-Cayuga association

Deep, well-drained to somewhat poorly drained soils that have a fine textured to moderately fine textured subsoil

This association is mainly in level to gently sloping areas of old glacial lakebeds, but there are some steep areas along the drainageways. The main area of this association is just south of and parallel to the Pinnacle Hill moraine, which crosses the county in an east-west direction. The other area is east and northeast of the village of Honeoye Falls.

This association makes up about 14 percent of the county. It is about 13 percent Schoharie soils, 12 percent Odessa soils, and 11 percent Cayuga soils. Because of the complexity of soil patterns on the lake plain, a large number of other soils make up the remaining 64 percent.

Schoharie soils are deep, moderately well drained to well drained soils that have a medium-textured or moderately fine textured surface layer and a fine to moderately fine textured subsoil. They formed in deposits of reddish-colored lacustrine clay and silt. They are dominantly nearly level to gently sloping on knolls of the lake plain, but along the major drainage channels, the soils are steep to very steep.

Odessa soils are deep, nearly level to gently sloping, somewhat poorly drained soils that have a medium-textured surface layer and a fine-textured subsoil. They formed in glacial lake deposits of the same kind of reddish-colored clay and silt as that in which the Schoharie soils formed. They occur with Schoharie soils on the lake plain in areas where water runs off more slowly or accumulates to a greater degree than on Schoharie soils.

Cayuga soils are deep, nearly level to gently sloping, moderately well drained to well drained soils that have a medium-textured surface layer and a fine textured to moderately fine textured subsoil. They resemble Schoharie soils in the upper part of the profile. They formed in lake-laid deposits of clay and silt. These deposits are 20 to 40 inches thick over firm glacial till. These soils occupy islandlike knolls and fringe areas of the lake plain.

The minor soils are mainly soils of the Lakemont, Churchville, Ontario, Collamer, Claverack, and Eel series.

Much of this association is farmed, but about 13 percent is urban. The main enterprise is cash-crop farming, but there are a few large dairy farms scattered throughout the association. Corn, wheat, oats, and alfalfa are the principal crops. Seasonal wetness is the main limitation to farming. Timely tillage is essential because these soils puddle and clod easily, unless they are tilled within a narrow range of moisture content. Erosion is a serious hazard in the more sloping areas. These soils are naturally fertile and respond well to drainage, maintenance of good tilth, and erosion control.

Seasonal wetness, slow permeability, and erosion are limitations for many nonfarm uses. The more extensive clayey soils have many properties that adversely affect engineering work.

Use and Management of the Soils

This section explains the system of capability grouping used by the Soil Conservation Service and discusses the management of the soils in Monroe County by capability units. Estimated yields of the principal field, vegetable, and fruit crops are given. Also discussed are the general management of soils for farming, for woodland, and for wildlife habitat. The properties and features that affect engineering practices and the limitations that affect nonfarm uses of the soils are enumerated, mainly in tables.

General Farm Management [2]

This section is designed to help farmers, and those who advise farmers, to choose soil, water, and crop management practices suitable for the wise and economic use of the soils on a farm and appropriate for conditions prevailing at the time the choices are made. The user of this survey should modify his choices to take advantage of rapid advances in knowledge of soil, water, and crop management.

Unless otherwise noted, the information in this section is based on the results of research studies at the Aurora and Mount Pleasant Research Farms by staff members and associates of the New York State College of Agriculture at Cornell University. New research findings are reported currently in annually revised editions of "Cornell Recommends for Field Crops," "Cornell Recommends for Vegetable Crops," and "Tree Fruit Recommendations." Cornell Miscellaneous Bulletins and current editions of other applicable publications on soil and crop management should also be consulted. Much published and unpublished information is available upon request from the Cooperative Extension Service, the Soil Conservation Service, and other agencies. Currently applicable information concerning soil and crop management is also available to the user of this survey from industry representatives who serve the farmers of Monroe County.

In their natural state, the soils have a supply of plant nutrients derived either from parent material or through the effect of soil-farming processes. Their ability to supply these plant nutrients is directly related to their texture and their content of organic matter. In general, the finer the texture the greater the ability to supply plant nutrients. All the soils in Monroe County require applications of lime and fertilizer to maintain crop yields. The amounts should be governed by the results of complete soil tests and the needs of the specific crop to be grown.

Among the soil properties upon which the choice of a suitable crop variety largely depends are the depth of and the characteristics of the root zone and the natural drainage or the extent of artificial drainage. The choice also depends on climate.

In the following paragraphs the relationships of subsoil characteristics to rooting depths and acidity relationships and nutrient relationships of the soils are briefly discussed.

SUBSOIL CHARACTERISTICS THAT AFFECT ROOTING DEPTH.—Subsoil characteristics of the various soils have to be considered when a crop or cropping system is chosen. In Honeoye, Ontario, Palmyra, and some other soils, the subsoil permits easy penetration of water and roots. In other soils there are impeding layers, such as a dense heavy clay subsoil or a slowly permeable fragipan, or there may be a seasonal high water table (fig. 2) or shallowness to bedrock that restricts the penetration of roots. Examples of soils that have these characteristics are Cayuga, Ira, Lamson, and Benson soils. In many high-lime and medium-lime soils, the subsoil has blocky structure. In these soils, crop roots penetrate readily if drainage is good.

Tile provides effective drainage in moderately well drained to very poorly drained, medium-textured to moderately fine textured soils that have a subsoil of blocky structure. Open ditches (fig. 3) provide more effective drainage in soils that have a fine-textured subsoil.

[2] Prepared with the assistance of ERNEST L. MCPHERRON, conservation agronomist, Soil Conservation Service.

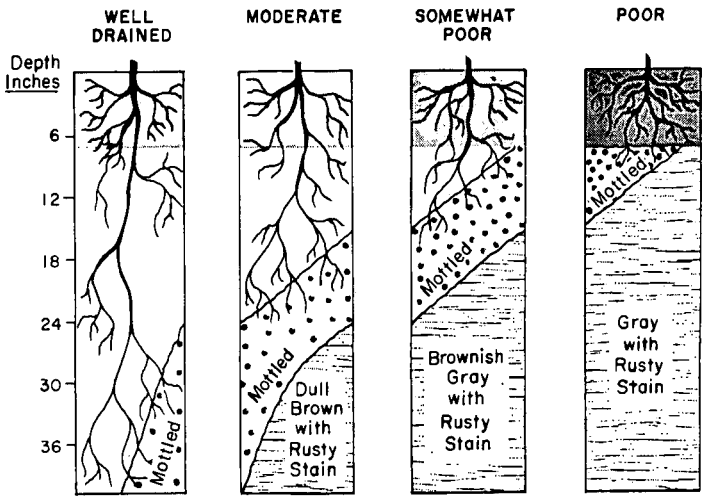

Figure 2.—**Effect of soil drainage on root development.**

ACIDITY RELATIONSHIPS OF THE SOILS.—The natural lime content (pH profile) of Monroe County soils is mainly in the medium to high range, but overall it is low to high. Figure 4 illustrates the relationship of the different lime levels, to a depth of 60 inches, in four profiles.

Honeoye, Lima, Schoharie, and other high-lime soils are neutral or slightly acid in the upper part and are less acid with increasing depth. Generally, the depth to free lime in these soils is 16 to 36 inches.

Hilton, Ontario, and other medium-lime soils are medium acid to slightly acid to a depth of more than 12 inches, but they are less acid with increasing depth. Generally, the depth to free lime is more than 30 to 40 inches.

Sodus, Ira, and other low-lime soils are strongly acid to medium acid to a depth of about 30 inches but slightly acid or neutral below this depth. Free lime occurs deep in

Figure 3.—**Open ditch for draining excess surface and subsurface water from Niagara and Canandaigua soils. The mud flowing out of the tile outlet, in ditchbank at right, is causing siltation of the channel.**

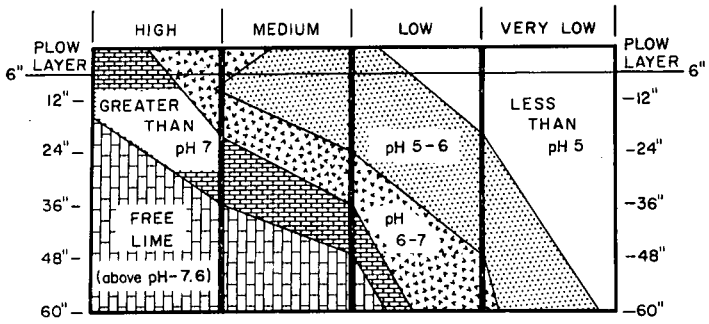

Figure 4.—**Lime level of soil profiles in Monroe County.**

the substratum. For all practical purposes, there are no very low lime soils in this county.

The average rate of downward movement of lime in silt loam is about one-half inch per year. Silt loam is a common texture of the surface layer in soils of this county. The amount of lime removed by crops is small compared with that removed by erosion and by leaching. Consequently, it is necessary to keep the plow layer in low-lime and medium-lime soils at the desired pH value by applying lime every 4 to 5 years.

NITROGEN RELATIONSHIPS OF THE SOILS.—In most soils of Monroe County, the plow layer is 3 to 6 percent organic matter. The amount of nitrogen released from this organic matter ranges from 40 to 60 pounds per acre in a year. On well-managed soils, the need for additional nitrogen fertilizer to supplement the nitrogen available from the soil, the crop residue, and the manure, is greater during the cool months of early spring than at other seasons.

PHOSPHORUS RELATIONSHIPS OF THE SOILS.—The soils in this county are inherently low to medium in supply of phosphorus. Consequently, the addition of phosphate in the form of commercial fertilizer is essential for maximum crop yields. About 20 pounds of phosphate can be supplied each year by moderately fine textured and fine textured soils and 10 pounds or less by the medium-textured to coarser textured soils.

POTASSIUM RELATIONSHIPS OF THE SOILS.—Clayey soils, such as Odessa soils, or other soils that can supply about 70 to 120 pounds of potash a year are rated high as potassium-supplying soils. Extensive research at the Aurora Research Farm in Cayuga County has confirmed that medium-textured soils that have an accumulation of clay in the subsoil, such as Honeoye and Lima soils, are also rated high. Soils that can supply about 25 to 70 pounds are rated moderate, and those that can supply less than 25 pounds are rated low.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, the soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife habitat. (None in this county)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife habitat or water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements

about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1 or IIIw–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages each of the capability units in Monroe County is described, and suggestions for the use and management of the soils in each unit are given. The names of the soil series represented are mentioned in the description of each capability unit, but the listing of the series name does not necessarily indicate that all the soils of a series are in the capability unit. The capability classification of each soil is given in the "Guide to Mapping Units." Alluvial land, Cut and fill land, Fresh water marsh, Lake beaches, Made land, Pits and Quarries, and Urban land, all of which are land types, and Muck, shallow are not given a capability classification.

CAPABILITY UNIT I–1

This unit consists of deep, well-drained, medium-textured and moderately coarse textured soils of the Honeoye, Madrid, and Wampsville series. These soils are nearly level. They have a medium to high content of lime. The Wampsville soil has enough cobblestones in the surface layer to interfere slightly with cultivation.

The available water capacity is moderate to high. The ability to supply phosphorus is medium. The ability to supply potassium is medium to high in the Honeoye and Wampsville soils and low in the Madrid soil.

These soils are suited to all the commonly grown crops. In places stones on the surface interfere with planting and cultivation of fine-seeded crops on the Wampsville soil.

Row crops can be grown year after year, but if sod crops are not included, careful management is required to maintain soil structure. Such management includes growing cover crops, using crop residue, and keeping tillage to a minimum whenever possible. Except in areas where the surface texture is silt loam, irrigation water can be applied at a rapid rate to these soils without risk of damage. Early in spring, when the surface soil is dry, irrigation may be needed to establish stands. During dry periods, plants may wilt in some areas of Wampsville soil earlier than in other soils of this unit. Applications of lime are needed in places to maintain a neutral soil surface.

CAPABILITY UNIT IIe–1

This unit consists of deep, well-drained, medium-textured and moderately coarse textured soils of the Honeoye, Madrid, Ontario, and Sodus series. These soils are gently sloping. All except the Sodus soil have a medium to high content of lime. The Sodus soil has a low content of lime and has a fragipan at a depth below 18 to 24 inches. The fragipan restricts rooting and the movement of air and water. Erosion is a moderate hazard if the soils are cultivated and not protected. Moderate stoniness may interfere with the operation of precision machinery.

The available water capacity is moderate to high in the Honeoye, Madrid, and Ontario soils and low to moderate in the Sodus soil. The supply of available phosphorus is low to medium. The supply of available potassium is medium to high in the Honeoye and Ontario soils and low in the Madrid and Sodus soils.

These soils are suited to all the commonly grown crops. They are some of the more productive soils in the county. The soils require some management, but they respond well.

The more gently sloping soils and those on the shorter slopes can be used almost continuously for row crops if management includes minimum tillage, contouring, return of crop residue, and winter cover. Response to management is excellent if it includes keeping tillage to a minimum, using a clod crusher, and disking before plowing.

On the longer or steeper slopes, contour stripcropping, grassed waterways, and other erosion control measures are needed if the soils are used moderately for row crops. Tile drainage of wet spots is generally necessary where row crops are grown. Diversions can be used to shorten the effective slope length, but they may cause seep spots below, which necessitate tile drains.

These soils take in irrigation water readily. The soils that have a silt loam surface texture need careful management to maintain good tilth if they are irrigated. Additional water may be needed on these soils. Additional lime is required in the Sodus soil.

CAPABILITY UNIT IIe–2

This unit consists of deep, well-drained, gravelly or cobbly, medium-textured soils of the Alton, Palmyra, and Wampsville series. These soils are gently sloping. The Palmyra and Wampsville soils have a medium to high content of lime. The Alton soil has a low to medium content of lime. The Wampsville soil contains enough cobblestones in the surface layer to interfere slightly with cultivation. In some places gravel interferes with the use of precision cultivation equipment. Erosion is a moderate hazard if these soils are cultivated and not protected. Complex slopes are common, and they restrict the suitability of the soils for contouring.

The available water capacity ranges from low to high. The ability to supply phosphorus is medium in the Palmyra and Wampsville soils and low in the Alton soil. The ability to supply potassium is medium to high in the Palmyra and Wampsville soils and low in the Alton soil.

These soils are productive and are suited to all the commonly grown crops. They are well suited to fruit crops and are especially well suited to alfalfa and crops that need good drainage and deep rooting. They are also suited to field crops and vegetables that are planted early in the season.

Minimum tillage and the return of crop residue are needed on all slopes to maintain the organic-matter content and good tilth. Row crops can be grown almost continuously on the more gently sloping soils and on the shorter slopes if management includes minimum tillage, contouring, return of crop residue, and use of winter cover. Contour tillage is needed on the longer slopes. A no-plow system of management that includes corn planted directly into sod, cover crops, or crop residue will control erosion and permit more intensive cropping of the soils in undulating areas.

Irrigation is needed to maintain production in summer. The soils of this unit are well suited to irrigated crops because infiltration is rapid and there is little or no crusting or sealing. Also, the soils can be cultivated soon after

irrigation with little or no risk of compaction. Repeated applications of lime and fertilizer are needed.

CAPABILITY UNIT IIe-3

Arkport very fine sandy loam, 0 to 6 percent slopes, is the only soil in this unit. This soil is deep, well drained, nearly level to gently sloping, and medium textured. It has a medium to high content of lime. Thin, slightly finer textured, firm bands in the subsoil somewhat impede the percolation of water.

The available water capacity is moderate. The ability to supply phosphorus and potassium is low to medium. Tilth is easy to maintain, but the soil is highly susceptible to both water erosion and soil blowing. Complex slopes are common, and they restrict the use of contour farming.

All the commonly grown crops are suited, but stands and yields may be adversely affected by erosion, droughtiness, and low to medium natural fertility. Deep-rooted crops should be favored. The soil is easy to work and is suited to vegetables and fruits and other specialized crops. It is well suited to row crops if they are planted directly in sod, in cover crops, or in crop residue in a no-plow system of management. Response is good to lime and an annual topdressing of phosphate and potash, which are needed to maintain stands.

On slopes that are not protected by erosion control measures, the soil should be cultivated no more than 3 consecutive years before a sod crop is established. When the soil is used for vegetable crops or year-round cropping, the return of crop residue and careful attention to winter cover are essential. Land smoothing to fill low, wet depressions will make possible more efficient operation of machinery. Keeping tillage to a minimum and using light tillage to break crusts, in combination with maintaining cover crops and crop residue on the surface, are important supporting practices for the control of soil blowing and water erosion and maintenance of good tilth.

Irrigation is a suitable practice if this soil is used intensively for high-value crops. Fertilizer should be applied at the time the plants are ready to use it, because plant nutrients are readily leached.

CAPABILITY UNIT IIe-4

Phelps gravelly fine sandy loam, 3 to 8 percent slopes, is the only soil in this unit. This is a deep, moderately well drained, gently sloping, and moderately coarse textured soil. It has a medium to high content of lime and is underlain by stratified sand and gravel at depths ranging from 20 to 40 inches. The available water capacity is moderate. The ability to supply phosphorus and potassium is medium. Erosion is a moderate hazard if the soil is cultivated and not protected.

This soil is suited to all the commonly grown crops. It is easy to work. Planting may have to be delayed in spring because of slight wetness. Random drainage of wet inclusions is necessary in many places. Stones interfere with the use of machinery for tillage of truck crops and sugar beets in some areas.

A cropping system that includes a sod crop every 2 or 3 years is needed unless supporting conservation measures are used. The soil can be cultivated more intensively if a combination of practices to control erosion is used. Such management includes minimum tillage, contour tillage, sod waterways, terraces, and winter cover crops. Irrigation may be needed on high-value crops that require a continuous supply of water in summer.

CAPABILITY UNIT IIe-5

This unit consists of deep, moderately well drained to well drained, moderately coarse textured and medium-textured soils of the Cazenovia, Hilton, Ira, and Lima series. These soils are nearly level and gently sloping. The Cazenovia, Hilton, and Lima soils have a medium to high content of lime. The Ira soil has a low content of lime; and, at a depth of approximately 18 inches, it has a fragipan that restricts rooting and the movement of air and water. Some areas of Hilton and Cazenovia soils have enough stones on the surface to interfere slightly with cultivation. In the limestone substratum phases of the Lima and Cazenovia soils, bedrock occurs at depths of 3½ to 6 feet and, in some places, at slightly less depths. Erosion is a moderate hazard if the soils are cultivated and not protected.

The available water capacity is low to moderate in the Ira soil and is moderate to high in all the other soils. In all except the Ira soil, the ability to supply phosphorus is medium and to supply potassium is medium to high. In the Ira soil, the ability to supply these nutrients is low.

These soils are suited to all the commonly grown crops. Planting may have to be delayed early in spring because of wetness, and in the wetter spots, drainage is needed to make management of fields more uniform. In places surface stones interfere with the use of precision machinery.

Keeping cultivation to a minimum, not plowing when wet, disking before plowing, and using crop residue are essential management practices if the cropping system includes more than 2 years of row crops. Long slopes are common, and the soils are erodible where water concentrates. On these slopes the maximum intensity of rotation should not exceed 2 years of row crops followed by a sod crop if practices to control erosion are not applied. In most places contour stripcropping and grassed waterways will control erosion. Where these are used in combination with diversions or terraces, the soils can be used more intensively. Planting corn directly in the sod, crop residue, or cover crops in a no-plow system of management will also effectively control erosion. The amount of lime needed on these soils varies, but addition of lime is essential on the Ira soil. Fertilizer is needed in places, but the ability of the soils to retain and supply applied plant nutrients is very good.

These soils are easily eroded if irrigation water is applied too rapidly. Cultivation before irrigation is needed to break up any crust that has formed.

CAPABILITY UNIT IIe-6

This unit consists of deep, well drained and moderately well drained, medium-textured soils of the Collamer and Durkirk series. These soils are gently sloping. They have a medium to high content of lime. The loamy subsoil variant of the Collamer soils has compact, calcareous glacial till at a depth below 20 to 40 inches.

The available water capacity is high. The ability to supply phosphorus and potassium is medium to high. Erosion is a severe hazard on all the soils, even on those that are nearly level.

The soils of this unit are free of stones and are suited to all the commonly grown crops. Careful management is needed to reduce crusting and control erosion and to re-

duce compaction below the surface. Maintenance of good structure is difficult, and plowing and fitting should not be done when the soils are wet.

In some years the Collamer soils are slightly wet in spring, and planting must be delayed. Drainage of wet spots by land shaping and the installation of random tile systems help make these soils more useful for all crops.

Good management practices that include maintaining cover crops, using crop residue, and keeping tillage to a minimum will give satisfactory erosion control on the gently sloping soils. On the steeper soils and longer slopes, terracing (fig. 5), contour stripcropping where topography permits, and keeping grass in waterways are also needed.

If these soils are not protected when cultivated, the cropping system should include not more than 1 year of row crops, followed by 1 year of grain and 3 years of sod. Corn can be grown intensively in a no-plow management system if it is planted directly into the sod, in the crop residue, or in cover crops. Irrigation efficiency is reduced by the moderately slow or slow permeability of the subsoil and the crusting of surface soils. Lime and fertilizer are needed.

CAPABILITY UNIT IIe-7

This unit consists of deep to moderately deep, moderately well drained to well drained soils of the Cayuga, Hudson, Lairdsville, Riga, and Schoharie series. These soils have a medium-textured surface layer and a clayey subsoil. They have a high content of lime.

The Hudson and Schoharie soils are deep and have lake-laid silt and clay substrata. The Lairdsville and Riga soils are underlain by soft shale at a depth of 20 to 40 inches, and the Cayuga soil is underlain by firm glacial till at these depths.

The available water capacity is moderate to high. The ability to supply phosphorus is medium and to supply potassium is high. The soils are erodible if cultivated and not protected.

The soils of this unit are suited to many of the commonly grown crops. The heavy subsoil restricts the movement of water and results in slight wetness, which briefly delays planting or grazing in spring. Tilth is hard to maintain, and the use of the soils for intertilled crops is limited. The soils are well suited to alfalfa, however, if properly fertilized and if good harvesting methods are used.

Working the soil when it is too wet can cause puddling and crusting and will also compact the upper part of the subsoil. These conditions can be corrected by establishing a deep-rooted grass-and-legume sod. In most places the soils in depressions are wet, and a safe system for disposal of surface water should be established. Random tile drainage systems or grassed waterways are generally needed.

These soils should not be cultivated many years in succession without the use of close-growing crops, high-residue crops, and occasionally, a year-round cover crop. Erosion control on these soils necessitates a cropping system of no more than 1 year of corn, 1 year of grain, and 2 years of sod. Terracing, which permits more intensive cultivation, is a suitable practice. If a water disposal system has been established, row crops can be grown intensively under a no-plow management system. Irrigating these soils is complicated by crusting, puddling, and increased runoff and erosion. Small amounts of lime are needed.

CAPABILITY UNIT IIw-1

This unit consists of deep, moderately well drained, medium-textured, moderately coarse textured, and coarse

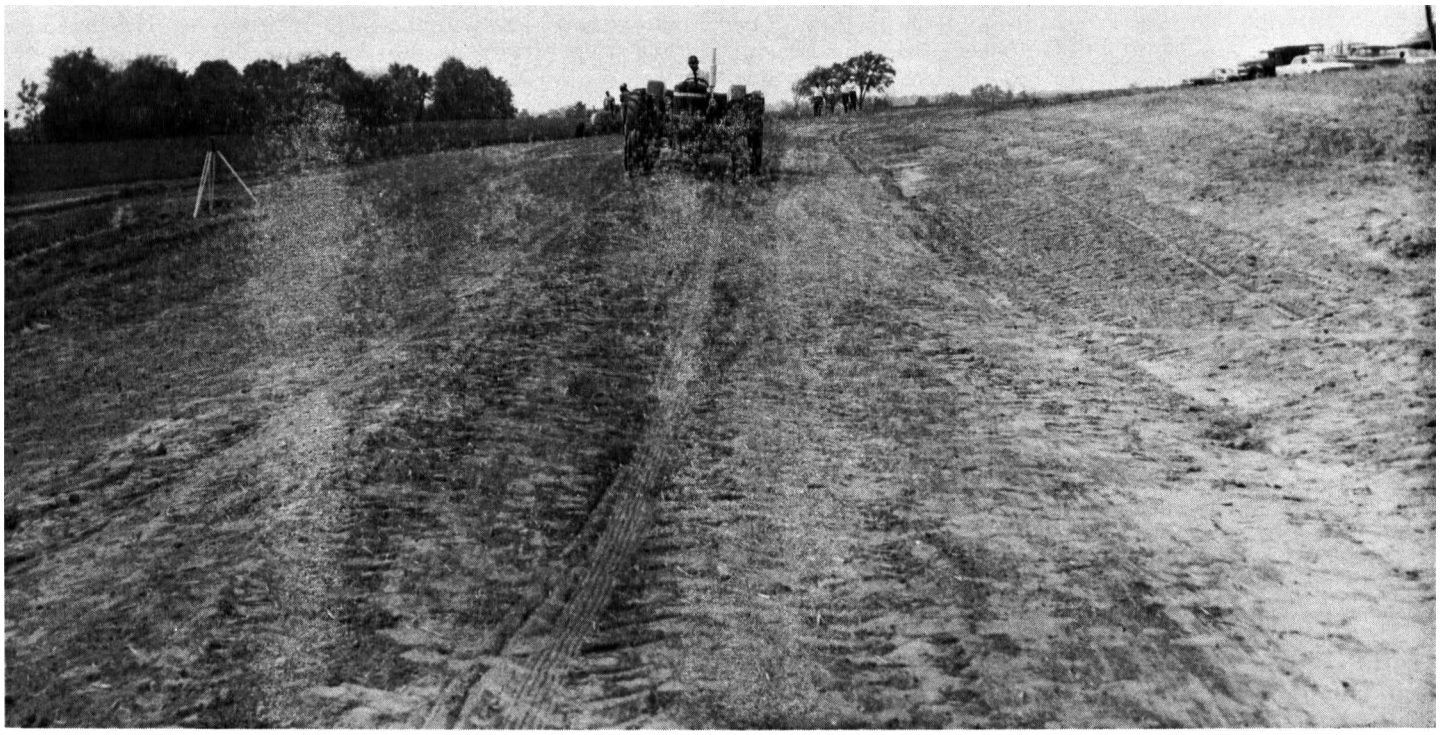

Figure 5.—**Terrace under construction on Dunkirk silt loam, 2 to 6 percent slopes. This soil is in capability unit IIe-6.**

textured soils of the Claverack, Collamer, Elnora, Galen, and Phelps series. These soils are level to nearly level. They have a high to low content of lime. The available water capacity is high in the Collamer soil, moderate in the Phelps soil, and low to moderate in the other soils. The ability to supply phosphorus and potassium is medium to high in Collamer and Phelps soils, but low to medium in the other soils. Except on the Phelps soil, soil blowing is a hazard if the soils are bare and unprotected.

These soils are suited to vegetables and other specialized crops, as well as to most other crops. They are well suited to row crops that can be grown under a no-plow system of management that maintains year-round protection of the soil surface.

These soils can be cultivated intensively if a high level of management is used. Planting may have to be delayed in spring because of wetness. The use of these soils can be increased by the use of drain tile placed at random in low, wet spots, but the tile must be wrapped to keep out sand and silt.

Keeping cultivation to a minimum, using crop residue, and maintaining cover crops are good management practices. The crop residue should be mixed into the surface layer to control soil blowing. Under intensive farming, the organic-matter content is difficult to maintain. In places frequent irrigation of high-value vegetable crops is needed. Less lime is required on Phelps and Collamer soils than on the other soils. On the sandy Claverack and Elnora soils, from which plant nutrients are readily leached, side-dressing with fertilizer during the growing season is a suitable way to maintain fertility.

CAPABILITY UNIT IIw–2

This unit consists of deep, moderately well drained and well drained, nearly level soils of the Cayuga and Schoharie series. These soils have a silty surface layer and a clayey subsoil. They have a high content of lime. The Cayuga soil is underlain by compact, calcareous glacial till at a depth of 20 to 40 inches. The available water capacity is high to moderate. The ability to supply phosphorus is medium and to supply potassium is high. The soils crust as they dry and puddle easily if tilled when too wet. Erosion is not a hazard.

The soils of this unit are fairly well suited to many commonly grown crops, but unless they are properly managed, their usefulness for row crops is greatly reduced. Plowing, cultivating, or traveling over these soils when they are too wet can cause cloddiness, crusting, and compaction that necessitates a grass-legume sod to correct.

Fertilizer is needed for maximum production. Fall plowing and minimum tillage can be used to maintain tilth. Land shaping to insure rapid removal of surface water and random tile drainage to remove water from depressions are beneficial on some fields. Using cover crops and returning crop residue help to keep the soil surface open. The soils are not suitable for irrigation, because they seal over and puddle easily.

CAPABILITY UNIT IIw–3

This unit consists of deep, well drained and moderately well drained, medium-textured soils of the Eel, Genesee, and Hamlin series. These are level or nearly level soils on flood plains. They have a high or medium content of lime. The available water capacity is high. The ability to supply phosphorus and potassium is medium. In some places flooding is a hazard during the growing season if the soils are not protected, but periods of flooding are of short to moderate duration. Erosion is not a hazard. Maintenance of tilth and organic-matter content is not a problem.

The soils of this unit are well suited to all the commonly grown crops. Where flooding has been corrected, generally along the Genesee River, the soils are productive and can be used for row crops year after year if they are properly managed. In areas where flooding cannot be corrected, water-tolerant sod crops, fertilized annually with nitrogen and used to produce forage, are suitable.

Although planting may have to be delayed briefly in spring because of wetness, these soils are easy to work. In some places land shaping is needed for surface drainage.

Winter cover is needed on these soils. The improvement and maintenance of existing stream channels, along with use of levees, helps to control flooding. These soils are well suited to irrigation because of their depth and permeability and because sources of irrigation water are nearby. Sod crops need annual applications of nitrogen. The response of crops to applications of lime and fertilizer, where needed, is excellent.

CAPABILITY UNIT IIw–4

This unit consists of deep, moderately well drained to well drained, medium-textured and moderately coarse textured soils of the Cazenovia, Hilton, and Lima series. These soils are nearly level. They have a medium to high content of lime. The Hilton and Lima soils have a medium-textured subsoil. The Cazenovia soil has a moderately fine textured subsoil.

The available water capacity is moderate to high. The ability to supply phosphorus is medium and to supply potassium is medium to high. Erosion is not a hazard. Frost heaving is a problem in places, and some perennial deep-rooted crops are winterkilled. In areas of Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes, enough stones are on the surface to interfere slightly with cultivation.

These soils are suited to all the commonly grown crops. Row crops can be grown year after year under good management. In places stones interfere with the use of precision machinery for tillage where truck crops are grown. Although slight wetness briefly delays spring planting in some years, these soils are easy to work. A cropping system that includes a sod crop every 4 or 5 years helps to maintain soil structure. Minimum tillage is important. Random drainage of wet spots is necessary in many places; wetness is commonly caused by old drains that no longer function properly. Crops need additional nitrogen in spring because the soils tend to be cold and wet.

CAPABILITY UNIT IIw–5

This unit consists of deep, moderately well drained, medium-textured or coarse-textured soils of the Claverack, Elnora, and Galen series. These soils are gently sloping. They have a low to medium content of lime. The Claverack soil is underlain by a clay substratum at a depth of 20 to 40 inches. The Galen soil has thin, slightly finer textured, firm bands in the subsoil. These bands impede the percolation of water.

The available water capacity is low to moderate. The ability to supply phosphorus and potassium is low to medium. These soils are subject to water erosion and soil

blowing if not protected. Complex slopes are common. The Claverack and Elnora soils leach easily, and the Galen soil leaches to a lesser degree.

The soils of this unit are suited to vegetables and other special crops, as well as to all the commonly grown crops, under careful management. They are well suited to successive planting of row crops that can be grown under a no-plow system of management and planted directly into killed sod, crop residue, or cover crops.

Drain tile placed at random in low, wet spots increases the usefulness of these soils, but the tile must be wrapped to keep out sand and silt. On crops that require a high level of fertility, the sandy Claverack and Elnora soils need a sidedressing of fertilizer during the growing season. In some years planting must be briefly delayed in spring because of slight wetness. Frequent irrigation is needed on high-value vegetable crops.

Unless these soils are protected, they should not be farmed more intensively than 1 year of a cultivated crop, 1 year of grain, and 2 years of sod. A high level of management that includes contouring, stripcropping, or terracing permits more intensive use. The organic-matter content is difficult to maintain under intensive farming. All slopes need the protection of cover crops where possible. The crop residue should be mixed into the surface layer to control soil blowing and water erosion.

CAPABILITY UNIT IIs–1

This unit consists of deep, well-drained to excessively drained, gravelly, moderately coarse textured soils of the Alton and Palmyra series. These soils are nearly level to gently sloping. They have a medium to low content of lime. Complex slopes are common and restrict contouring. Gravel interferes with the use of machinery for precision cultivation in some places.

The available water capacity is moderate to low. The ability to supply phosphorus and potassium is low to medium. Erosion is a slight hazard on the more sloping areas if the soils are cultivated.

The soils of this unit can be worked early in spring. They are suited to most of the commonly grown crops, and their good internal drainage makes them well suited to early vegetable and orchard crops grown under irrigation. Deep-rooted crops are preferred for general cropping.

Lime and a good program of fertilization are necessary. Potash is especially needed. Fertilizer should be applied during the growing season to supply nutrients needed by the crop being grown. Nutrient losses through leaching may be excessive, especially in the Alton soils, if applications of large amounts of fertilizer and irrigation water are improperly timed.

Measures to control erosion are needed on sloping areas, and rotations should not exceed 3 years of cultivated and close-growing crops before a year of a sod crop is grown. These soils can be used more intensively if the surface is protected by minimum tillage and the use of crop residue or winter cover crops to reduce both soil and water loss. They are well suited to intensive row cropping if used for crops that are suited to a no-plow system of management, which consists of direct planting into killed sod, crop residue, or cover crops. The no-plow system is well suited to soils on complex slopes. These soils readily absorb irrigation water. Shallow-rooted crops, such as vegetables, need frequent irrigation and fertilization.

CAPABILITY UNIT IIs–2

Wassaic fine sandy loam, 0 to 4 percent slopes, is the only soil in this unit. It is moderately deep over hard bedrock, well drained and moderately well drained, and nearly level to gently sloping. This soil has a medium to high content of lime.

The available water capacity is low to high, depending on the depth to bedrock. The variable depth to bedrock causes spotty available water conditions. The ability to supply potassium and phosphorus is low. Erosion is generally not a problem.

This soil is fairly well suited to all the commonly grown crops. Row crops can be grown year after year, but all crop residue should be returned. Minimum tillage and a cropping system that includes a sod crop or green-manure crop helps maintain soil structure.

The use of killed sod and crop residue in a no-plow system of management conserves water received as natural rainfall. This soil can be irrigated.

CAPABILITY UNIT IIIe–1

This unit consists of deep, well-drained, strongly sloping, moderately coarse textured and medium-textured soils of the Honeoye, Madrid, and Ontario series. The soils have a medium to high content of lime. The ability to supply phosphorus is medium. The ability to supply potassium is low in the Madrid soil but medium to high in the other soils. Erosion is a moderate to severe hazard in cultivated areas that are not protected.

These soils are suited to the crops commonly grown, but their use is somewhat limited by their slope. Where the soils are protected, an example of a suitable cropping system is 1 year of cultivated crops, 1 year of grain, and 2 years of sod. The use for row crops can be more intensive in a no-plow system of management where the row crops are planted directly in killed sod, crop residue, or cover crops.

The use of these soils for cultivated crops should be restricted, unless their slopes are protected by such multiple erosion control measures as contouring, contour stripcropping, diversions, and grassed waterways. Keeping tillage to a minimum and using crop residue and cover crops to stabilize the surface are necessary.

The measures used to control erosion also increase infiltration and offset the capacity to store moisture. The lack of available moisture in the subsoil of the Madrid soil may be a limitation in dry years. Tilth is generally not a problem. Because of the slope, the use of precision farm machinery is difficult in places, and the use of irrigation on specialized crops is either reduced or not practical. It is generally important to intercept both seepage and surface runoff on this soil before water reaches the more nearly level, more poorly drained soils downslope. Tile should be used in the wet spots and drainageways.

CAPABILITY UNIT IIIe–2

This unit consists of deep, well-drained to excessively drained, strongly sloping or rolling, medium-textured and moderately coarse textured soils of the Alton, Arkport, Ontario, Palmyra, and Wampsville series. The Ontario soil is underlain by very firm glacial till, but the rest of the soils are underlain by a substratum of stratified sand or sand and gravel. The content of lime is low to medium in the Alton soil but medium to high in the other soils.

The available water capacity is low to moderate in the Alton soil but moderate or moderate to high in the other soils. The ability to supply phosphorus and potassium is low to medium in Alton and Arkport soils but medium to high in the other soils. The cobblestones in the surface layer of the Wampsville soil are numerous enough to interfere slightly with cultivation. Erosion is a moderate hazard in cultivated areas that are not protected.

These soils are suited to all the crops commonly grown, but the intensity of their use is limited by the slope and the content of gravel or cobblestones. They are well suited to deep-rooted fruit trees and forage crops that require good drainage. They are not suited to crops that have fine seeds, and they are not suited to crops that require the use of heavy or precision machinery because of the slope or the gravel. Fruits and vegetables can be grown where erosion is controlled. 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.

Measures that conserve soil and moisture are important to the management of these soils. Winter cover is essential in cultivated areas. Unprotected slopes cannot safely be cultivated, but the longer slopes that can be protected by contouring or stripcropping can be used more intensively. Complex slopes are common in many areas, and contour farming is not practical.

These soils warm up early in spring. They are not suitable for irrigation, because of the erosion hazard. Keeping tillage to a minimum and using crop residue are necessary to maintain organic-matter content and good tilth.

CAPABILITY UNIT IIIe-3

This unit consists of deep, well-drained, moderately sloping soils of the Arkport and Dunkirk series. The profile is dominated by very fine sand and fine sand in Arkport soils and by silt and very fine sand and some clay in the Dunkirk soil. All the soils have a high to medium content of lime. The available water capacity is high in the Dunkirk soil and moderate in the Arkport soils. The ability to supply phosphorus and potassium is medium to low in the Arkport soils and medium to high in the Dunkirk soil. Nutrients are readily leached from Arkport soils. The soils in this unit are highly susceptible to erosion. The slopes of the soils in the Arkport-Dunkirk complex are so complex in places that contouring is not practical.

These soils are better suited to cropping systems that include deep-rooted hay and pasture crops than to other cropping systems. All crops can be grown, but no more than 1 year of cultivated crops should be grown in a rotation with 4 to 5 years of sod. If the slopes can be contoured or are less than 100 feet long, 1 year of crops can be grown if followed by 2 years of sod. Vegetables and fruits can be grown where the soils are protected from erosion. The soils are well suited to row crops grown in a no-plow system of management, but the row crops must be suitable for direct planting into killed sod, crop residue, or cover crops that protect the soil.

The use of crop residue and careful attention to winter cover are essential in areas used for cultivated crops. Where the slopes are short and complex, keeping tillage to a minimum, in combination with the use of cover crops, and keeping crop residue on the surface are important in the control of soil blowing and water erosion and in the maintenance of good tilth. Irrigation is beneficial and should be a part of the management of high-value crops. It is important to apply fertilizer on Arkport soils when the crops are ready to use it, because plant nutrients are so readily leached from this soil.

CAPABILITY UNIT IIIe-4

This unit consists only of Claverack loamy fine sand, 6 to 12 percent slopes, a deep, moderately well drained soil. This soil has a sandy surface layer and subsoil that are low to medium in content of lime and a clayey substratum that is high in content of lime. The available water capacity is low to moderate. The ability to supply phosphorus and potassium is low. The erosion hazard is moderate to severe in cultivated areas that are not protected.

This soil is suited to all the crops grown in the county, but because of its sandy nature and its slope, it is better suited to deep-rooted hay and pasture crops than to other crops. Fruit trees do moderately well. Vegetables can be grown, but the slope, erodibility, and the sandy texture of the soil are limitations in places. No more than 1 year of row crops should be grown in rotation with 5 years of sod, unless the soil is protected both from soil blowing and from water erosion. More years of row crops can be included in the rotation if the crops can be grown in a no-plow system of management where they are planted directly into sod or crop residue.

Complex slopes are common in some areas and contouring is not practical. The intensity of cultivation can be increased if the soil surface is protected by cover crops, tillage is kept to a minimum, crop residue is returned, and other erosion control measures are used. Irrigation is needed, but the slope is a limitation to the use of some kinds of machinery in places. Frequent applications of fertilizer during the growing season are needed for all crops.

CAPABILITY UNIT IIIe-5

This unit consists only of Collamer silt loam, 6 to 12 percent slopes, a deep, moderately well drained soil that is rich in silt. This soil has a medium to high content of lime. The available water capacity is high. The ability to supply phosphorus is medium, and the ability to supply potassium is medium to high. This soil is highly susceptible to erosion in cultivated areas that are not protected.

This soil is suited to all crops, including fruits and vegetables. No more than 1 year of row crops should be grown in a rotation with 5 years of sod, unless erosion is controlled. This soil is also suited to row crops grown in a no-plow system of management where the residue kept on the surface protects the soil.

Careful management is needed to reduce surface crusting, control erosion, and prevent compaction below the surface. Diversions, terraces, and contour stripcropping allow more intensive use of the soils in areas where the slope permits. It is necessary to combine these measures with the use of cover crops, the keeping of tillage to a minimum, and the use of crop residue, which keeps the soil stable and permeable.

Irrigation is difficult because of the slope and the moderately slow permeability of the subsoil. In some places the slope is a limitation to use of some kinds of machinery. Tile drainage of wet spots is needed for efficient field operations. Applications of lime and fertilizer are needed.

CAPABILITY UNIT IIIw-1

This unit consists only of Muck, deep, which is a level, very poorly drained soil dominated by decomposed and partly decomposed plant material. This soil has a medium to high content of lime. Permeability is rapid, and the available water capacity is high. Inherently, the supplies of phosphorus and potassium are low, but the ability to supply applied plant nutrients is high. If drained and cultivated but not protected, this soil is highly susceptible to soil blowing. Drained areas are also subject to subsidence.

If adequately drained and fertilized, this soil can be used continuously for many kinds of row crops. It is not well suited to grain, because grain is susceptible to lodging. It is generally not suitable for use as improved pasture. Hay, small grain, and field crops are seldom profitable enough to pay for the drainage and the special equipment needed.

A carefully planned drainage system is needed that includes open and closed drains, a pumping system, and structures that regulate the water level. If drained, muck gradually subsides as a result of oxidation, but the subsidence can be retarded by saturating the surface layer with water during periods of nonuse. Excessive tillage should be avoided because it encourages the oxidation of organic matter.

Soil blowing can be controlled by manmade or vegetative windbreaks and by cover crops. All crop residue should be returned to the soil. Late spring and early fall frosts are common.

CAPABILITY UNIT IIIw-2

This unit consists of deep, level to nearly level, somewhat poorly drained to poorly drained soils of the Appleton, Cosad, Massena, Minoa and Niagara series. The Cosad soil has a sandy surface layer and subsoil and a clayey substratum, but the other soils are medium textured to moderately coarse textured. The content of lime is low to medium in the surface layer and subsoil and high in the substratum of the Cosad soil; it is medium to high in the other soils.

The available water capacity is very low to moderate in the Cosad soil, low to moderate in Massena and Minoa soils, and moderate to high in Appleton and Niagara soils. Unless the soils are overdrained, there is ordinarily more than enough water available for plant growth. The ability to supply phosphorus and potassium is low in the Cosad soil, low to medium in the Massena and Minoa soil, and medium to high in the Appleton and Niagara soils. The Cosad and Minoa soils in this unit are subject to soil blowing when left without cover. In places stones on the surface of the Appleton and Massena soils are numerous enough to influence the choice of crops.

If effectively drained and adequately limed and fertilized, the soils of this unit are suited to the common field crops and most vegetables. Row crops can be grown continuously. If not drained, these soils are generally better suited to birdsfoot trefoil, timothy, and other somewhat water-tolerant hay and forage crops than to other crops.

These soils can be successfully managed for intensive cultivation if excess water is removed. Careful design and installation are needed if both tile and open ditches are used. This care is especially needed when these soils are saturated, because the silt and sand grains flow readily and plug both open and closed drains. In most areas land smoothing helps to remove excess water.

If row crops are grown, the use of all crop residue is important. Keeping tillage to a minimum and including a sod crop or green-manure crop in the rotation help to maintain soil structure. If the soils are irrigated, irrigation water should be carefully controlled to avoid damage and sealing of the soil surface. Liming is necessary for some crops.

CAPABILITY UNIT IIIw-3

This unit consists of deep and moderately deep, level to nearly level, somewhat poorly drained to moderately well drained soils of the Appleton, Brockport, Churchville-Lockport, Odessa, Ovid, and Rhinebeck series. Brockport and Lockport soils have a moderately fine textured surface layer, but the other soils have a medium-textured surface layer. The Appleton soil has a medium-textured subsoil, but the other soils have a fine textured or moderately fine textured subsoil. The depth to hard rock is more than 3½ to 6 feet in Ovid and Appleton silt loams, limestone substratum, and the depth to soft shale is between 20 and 40 inches in Brockport and Lockport soils. All the soils in this unit have a high content of lime.

The available water capacity is low to moderate in Brockport, Churchville, Lockport, and Odessa soils, but moderate to high in the other soils. The ability to supply phosphorus is medium. The ability to supply potassium is medium to high in the Appleton soil but high in the other soils.

If adequately drained, these soils are suited to the crops commonly grown. These soils should not be plowed more than 3 years in succession before they are planted to sod for at least 1 year, unless a cover crop is grown each year. Where drainage is not practical, these soils can be used for water-tolerant varieties of forage plants if a complete fertilizer that is high in content of nitrogen is applied each year.

Drainage is necessary and generally justified if crops are to be grown. Tile set in a closely spaced pattern for internal drainage, or adequate surface drainage, is needed. The tile system should be supplemented by land smoothing, which effectively removes surface depressions. Surface runoff from higher areas should be intercepted and diverted to safe outlets.

Most of the soils clod and puddle easily if tilled when too wet, and the soils that have a surface texture of silt loam crust when dry. Careful management of tilth is essential for moderately intensive use of these soils. Plowing should be done only within a moderate to low range of moisture content. Fall plowing is desirable in some of the more nearly level areas. Keeping tillage to a minimum, disking stubble before plowing, and pulling a pulverizer behind the plow are desirable practices. All crop residue should be returned to the soil. Irrigation water should be applied at a moderate rate because, where irrigated, these soils tend to crust over rapidly. Restriction of traffic is also necessary when these soils are wet. Lime is generally not needed.

CAPABILITY UNIT IIIw-4

This unit consists of deep, gently sloping, somewhat poorly drained soils of the Churchville and Odessa series. These soils have a fine textured to moderately fine textured subsoil. The Churchville soil has a substratum of compact, calcareous glacial till. The soils in this unit have a high content of lime. The available water capacity is low to moderate. The ability to supply phosphorus is medium,

and the ability to supply potassium is high. Erosion is a moderate hazard in cultivated areas.

If drainage, erosion control, and management of tilth are adequate, these soils are suited to all commonly grown crops. At maximum intensity, the cropping system should include no more than 1 year of row crops, 1 year of grain, and 2 years of sod, unless erosion control practices are used. If these soils are not drained, their use is limited to water-tolerant sod crops, small grain, or short-season row crops.

The response to tile drainage is variable. In some places the random draining of wet spots is desirable.

These soils clod and puddle easily if tilled when too wet; they crust when dry. Each year that the soils are cultivated, it is necessary to plow within a narrow range of moisture content, disk stubble before plowing the field, keep tillage to a minimum, return all crop residue to the soil, and use other careful management. Terraces or graded strips, sodded waterways, and winter cover are needed to control erosion on a few of the long slopes. Careful control of irrigation is needed to avoid erosion damage and puddling. The response to lime, where needed, and fertilizer is good. Lime and fertilizer should be applied according to the results of soil tests and the needs of the crop to be grown:

CAPABILITY UNIT IIIw–5

This unit consists of deep, level to nearly level, poorly drained to very poorly drained soils of the Canandaigua, Halsey, and Lamson series. These soils have a high content of lime. The Canandaigua soil has a silty, medium-textured surface layer and a medium-textured to moderately fine textured subsoil. The other soils are medium textured, except that the Halsey soil has a substratum of sand and gravel.

The available water capacity is moderate to high in the Canandaigua soil, very low to moderate in the Lamson soil, and moderate in the Halsey soil. The ability to supply phosphorus and potassium is medium in the Canandaigua soil and low to medium in the Halsey soils. In the Lamson soil the ability to supply phosphorus is medium and the ability to supply potassium is low. If drained and cultivated, the Canandaigua and Lamson soils are subject to soil blowing.

If adequately drained, the soils in this unit are suited to all crops commonly grown in the county. In undrained areas, water-tolerant forage plants can be grown.

These soils are naturally too wet for cultivation, but they can be drained. The response to tile drainage is generally excellent where outlets are available. Special care is needed when the tile is installed to prevent plugging with silt and fine sand. The use of cover crops, keeping tillage to a minimum, returning all possible crop residue to the soil, and other practices help to maintain the organic-matter content and to keep the surface layer friable. The use of crop residue and cover crops as much of each year as possible also helps to control soil blowing.

CAPABILITY UNIT IIIs–1

This unit consists only of Colonie loamy fine sand, 0 to 6 percent slopes, which is a deep, well-drained to excessively drained soil. In places the slopes are complex. This soil has a low to medium content of lime. The available water capacity is moderate to low. The ability to supply available phosphorus and potassium is low. This soil is highly susceptible to soil blowing.

This soil is suited to truck crops, but suitability is improved if the soil is irrigated and adequately fertilized. It can be used for some field crops, but without irrigation its suitability is greatly reduced. Deep-rooted crops are preferred because they can withstand dry spells for a longer time. This soil is well suited to all row crops that can be used in a no-plow system of management that permits planting into killed sod, crop residue, or cover crops.

This soil can be planted early in the season, is easy to work, and responds well to a high level of management. It can be irrigated frequently without difficulty. There are few problems with maintenance of tilth if crop residue is used to protect the soil. Nutrients are leached rapidly by normal rainfall or by irrigation water, and consequently, fertilizer should be applied during the growing season if there is to be an adequate supply of nutrients.

Erosion of the frozen soil is a hazard if the soil is left bare in winter and cover crops or crop residue are not kept on the surface. A combination of measures is needed to control soil blowing, to protect the crops, and to reduce loss of soil, moisture, and fertility. Establishing living windbreaks, use of cover crops, and careful use of crop residue, are important supporting practices.

CAPABILITY UNIT IIIs–2

This unit consists only of Benson channery silt loam, 0 to 8 percent slopes, a shallow, somewhat excessively drained to excessively drained soil. The surface layer contains enough rock fragments to interfere slightly with cultivation, and rock outcrops are common. The underlying bedrock is hard limestone. The content of lime throughout the profile is high. The available water capacity is very low to moderate because the soil is shallow. The ability to supply phosphorus and potassium is medium. Erosion is a slight hazard in the more sloping areas if the soil is cultivated and not protected.

This soil is better suited to early, short-season crops than to other crops because shallowness limits the moisture reserve during dry periods. It is suited to row crops that can be planted in crop residue in a no-plow system of management. The suitability to high-value crops is improved if the soil is irrigated frequently during the dry season.

For intensive use of this soil, careful management is necessary to maintain the supply of available water. Contour cultivation and the use of crop residue and cover crops reduce the loss of soil and water and are among the conservation practices important in keeping this loss to a minimum. The surface mulches used in a no-plow system of management also conserve both soil and water for crop use. Lime is generally not needed for most crops. Fertilizer should be applied each year so that the crops can make the best use of available moisture. Application of nitrogen early in spring is desirable on grass sod.

CAPABILITY UNIT IVe–1

This unit consists of deep, well drained and moderately well drained, medium-textured to moderately fine textured soils of the Dunkirk, Ontario, and Schoharie series. These soils are moderately sloping and eroded. They have a medium to high content of lime. They are subject to continuous erosion if cultivated and not protected. Much of

the original surface layer has been lost through erosion, and the subsoil is exposed in places.

The organic-matter content has been depleted. Surface runoff is rapid, but the available water capacity is moderate to high. The ability to supply phosphorus is medium. The ability to supply potassium is high in the Schoharie soil but medium to high in the other soils.

These soils are suited to cultivated crops, but only if these are combined with sod crops and if the crop residue is returned to the surface. Row crops can be grown more frequently if they are planted directly in the crop residue in a no-plow system of management. If tilled when too wet, the Schoharie soil is cloddy and easily puddled. The Dunkirk soil crusts as it dries. The soils of this capability unit are also suited to permanent hay and pasture.

These soils need protective cover all year. If they are cultivated, a complete system of erosion control is needed, including the management of crop residue and growing winter grains to protect the soil surface. The soils should not be plowed repeatedly, because they crust severely when overworked and plant growth is restricted. They produce good forage, which includes deep-rooted legumes, if management includes proper use of a complete fertilizer. Irrigation is not a suitable practice on these soils. Extreme care must be taken to maintain tilth.

CAPABILITY UNIT IVe-2

This unit consists of deep, moderately steep and hilly, well-drained to excessively drained, medium-textured to moderately coarse textured soils of the Arkport, Dunkirk, Ontario, and Palmyra series. The slopes are commonly complex. These soils have a medium to high content of lime throughout the profile. Surface runoff is rapid or very rapid, and the hazard of erosion is very severe in cultivated areas that are not protected. The available water capacity is moderate in Arkport and Palmyra soils, moderate to high in the Ontario soil, and high in the Dunkirk soil. The ability to supply phosphorus and potassium is medium to low in Arkport soils and medium to high in the other soils.

These soils are suited to deep-rooted legumes and other hay crops. They are too steep or hilly to use frequently for row crops, but row crops can be safely grown in a no-plow system of management where they are planted directly in killed vegetation. Where the soils have shorter, gentler slopes, they can be used occasionally for cultivated crops or grain crops that produce a large amount of winter cover or crop residue. They can be used for orchards where the soil has a sod cover.

Because the slopes are commonly complex, the use of contour farming to control runoff and erosion is seldom practical. Reseeding, when necessary, should be done in narrow strips and, as much as practical, across the slope. Orchards can be irrigated where sod protects the soils. The use of machinery is restricted in some places where the soils are moderately steep.

CAPABILITY UNIT IVw-1

This unit consists only of Wayland silt loam, a deep, level, poorly drained to very poorly drained, medium-textured soil. This soil is subject to frequent, prolonged flooding, unless flood control measures and drainage have been established. It has a high content of lime throughout the profile. At a depth below 30 inches, the substratum layers may be gravel, sand, silt, or clay. The available water capacity is low to high. The ability to supply phosphorus is medium, and the ability to supply potassium is medium to high.

If drained and protected from flooding, this soil can be intensively cultivated and used for the crops commonly grown in the county. In its natural condition, it is suited only to permanent cover and to water-tolerant forage and pasture plants, because of the poor drainage and the frequent flooding.

There are few limitations, except for the flooding and the wetness. Surface grading and tiling make the use of machinery much more efficient. The need for irrigation water is limited, but if needed, the water should not be applied at too rapid a rate, because the subsoil has restricted permeability.

CAPABILITY UNIT IVw-2

This unit consists of deep, level, poorly drained and very poorly drained soils of the Lakemont and Madalin series and the loamy subsoil variant of the Lakemont soils. These soils are subject to ponding for extended periods, and, in winter, to a damaging ice cover. They have a fine-textured subsoil. The content of lime is high. The depth to compact calcareous glacial till is between 20 and 40 inches in the loamy subsoil variant of the Lakemont soil. The available water capacity is low to moderate, but this is not usually a limitation during periods of normal rainfall. The ability to supply phosphorus is medium, and the ability to supply potassium is high.

If adequately drained, these soils are suited to corn, beans, and other annual crops, but their use depends on the effectiveness of the measures used to overcome the wetness. If only partly drained, the soils can be used for a permanent grass sod that tolerates the wetness caused by ponding. If not drained, they are too wet for cultivated crops.

The response to tile drainage is slow, and a pattern of closely spaced tile is required. Surface drains are effective. Intensive management is needed to maintain tilth. These soils clod and puddle easily if tilled when too wet. Plowing in fall, within a narrow range of moisture content, and not more than three times between sod crops, as well as land smoothing and using crop residue, are helpful practices. Restricting traffic on these soils is necessary when the soils are wet.

CAPABILITY UNIT IVw-3

This unit consists of deep and moderately shallow, level, poorly drained and very poorly drained soils of the Lyons and Sun series and the moderately shallow variant of the Sun series. In places, all of the soils are subject to ponding for extended periods and, in winter, to damage from ice. These soils have a high content of lime. The Lyons and Sun soils are deep, but the depth to hard bedroock is between 20 and 40 inches in the moderately shallow variant of the Sun soil. The Lyons soil has a medium-textured surface layer and subsoil, and Sun soils are moderately coarse textured to medium-textured throughout the profile. The available water capacity is low to moderate in the Lyons soil and very low to moderate in the Sun soils. The ability to supply phosphorus is medium in all the soils. The ability to supply potassium is medium to high in the Lyons soil and low in the Sun soils.

Unless drained, these soils are not suitable for cultivation, but the soils can be drained and, if properly managed, used for cultivated crops.

Open ditches, tile drains, land shaping or combinations of these measures are needed to remove the water held in surface pockets. The moderate shallowness to bedrock is a limitation for the installation of drainage systems in the moderately shallow variant of the Sun soils. Plowing, fitting seedbeds, and seeding should be done during a dry period in summer when prolonged wetness is less likely to occur. For high-value crops, supplemental irrigation is needed in places. Where water-tolerant grass sod is grown in undrained areas, application of a complete fertilizer each year results in good forage production. The harvesting of forage crops can be better managed where the water from higher areas can be diverted.

CAPABILITY UNIT IVw–4

This unit consists of Edwards muck, a level, shallow to moderately deep, very poorly drained organic soil that is underlain by marl at a depth of 16 to 40 inches. This soil has a medium to high content of lime. The available water capacity is variable. Inherently, the supplies of available phosphorus and potassium are low or very low, but the ability to supply applied plant nutrients is high. Where drained, the soil is subject to subsidence. Soil blowing is a serious hazard in cultivated areas.

If not drained, this soil is not suited to cultivation, but if drained and adequately fertilized, it is suited to many crops.

The kind of crop and the use of the soil depend upon the thickness of the muck that remains after the soil has been drained. The lifespan of muck that is less than 3½ feet deep may be too short to warrant development. The management of crop residue, the control of soil blowing, and the control of the water level are needed to reduce subsidence and the effect of oxidation. Careful planning and coordination of drainage systems, water level control measures, and windbreaks are necessary.

CAPABILITY UNIT IVs–1

This unit consists only of Colonie loamy fine sand, 6 to 12 percent slopes, which is a deep, well-drained to excessively drained soil. The slopes are complex in many places. This soil has a low to medium content of lime. The available water capacity is moderate to low. The ability to supply phosphorus and potassium is low. This soil is highly susceptible to soil blowing and to water erosion.

Unless intensively managed, this soil is better suited to drought-resistant sod crops than to other crops. It is poorly suited to most crops unless the content of organic matter, the fertility, and the supply of water are maintained. This soil is well suited to row crops that can be grown in a no-plow system of management and planted directly in the crop residue.

This soil can be planted early and is easy to work, and maintaining tilth is not a problem. The use of contour farming for moisture retention and erosion control is not practical, because of the complex slopes. Frequent applications of fertilizer and irrigation water are needed during the growing season. Applied fertilizer is readily available to plants if soil moisture is adequate.

CAPABILITY UNIT VIe–1

This unit consists of deep, moderately steep, well drained to moderately well drained soils of the Dunkirk, Ontario, and Schoharie series. If not protected, all of these soils are subject to very rapid runoff and a continuous, very severe hazard of erosion. Much of the original surface layer has been lost through erosion. The Dunkirk and Ontario soils have a medium-textured surface layer, and the Schoharie soil has a moderately fine textured surface layer. These soils have a medium to high content of lime. The content of organic matter has been depleted. The available water capacity is moderate to high. The ability to supply phosphorus is medium, and the ability to supply potassium is medium to high. If tilled when too wet, the Schoharie soil clods and puddles easily. The Dunkirk soil is subject to surface crusting.

These soils are well suited to deep-rooted legumes and are better suited to permanent sod crops than to other crops. They are poorly suited to cultivation because of the slope, the excessive erosion, and the difficulty in managing soils that have an eroded surface layer.

Lime is needed in places to establish the stands, and fertilizer is needed to maintain them. Where these soils have slopes on which machinery can be safely operated, the growing of long-lived pasture grasses and legumes is generally worthwhile. In general, pasture on these soils can be grazed early.

CAPABILITY UNIT VIs–1

This unit consists only of Madrid very stony fine sandy loam, 3 to 8 percent slopes, which is a deep, well-drained soil. The stones and boulders on the surface are numerous enough to seriously interfere with farming. This soil has a medium to high content of lime. The available water capacity is moderate to high. The ability to supply phosphorus and potassium is low.

The soil is suited only to a cover of native grasses and legumes or to crops that can be planted and harvested by hand or can be grazed. The soil is too stony for cultivated crops. Topdressing with a complete fertilizer is beneficial to early sod pasture.

CAPABILITY UNIT VIIe–1

This unit consists of deep, steep and very steep soils of the Arkport, Colonie, Dunkirk, Ontario, Palmyra, and Schoharie series. The slope has more influence on use and management of these soils than other soil features have. Permeability, the available water capacity, and the supply of available nutrients are highly variable. Runoff is very rapid, and if a protective cover is not maintained, erosion is a very severe hazard.

The soils in this unit are too steep for the use of machinery to be safe or practical when liming, fertilizing, or mowing. Only small selected areas can be managed. The rapid runoff is damaging to forage crops and pasture. Grazing animals should be excluded until the plants have grown enough to provide a cover that gives maximum protection.

CAPABILITY UNIT VIIs–1

This unit consists of Colonie loamy fine sand, 12 to 20 percent slopes, eroded, a deep, well-drained to excessively drained soil. This soil is highly susceptible to continuous water erosion and soil blowing. Most of the surface layer

has been lost in some places, and all of it has been lost in other places. The content of organic matter has been lowered in some places and completely lost in others. The content of lime is low to medium. The available water capacity is moderate to low. The ability to supply phosphorus and potassium is low.

This soil should be kept in a permanent stabilizing cover; it is not suitable for cultivation or pasture.

The moderate slope and the coarse texture of the surface layer are limitations to the use of equipment. Grazing animals should be excluded. All the natural vegetation that makes up the ground cover should be kept in place to control erosion and increase the intake of water.

CAPABILITY UNIT VIIIs-1

This unit consists only of Rock land, a nearly level to very steep land type. This land type is made up of areas of very shallow soil material where rocks crop out on 70 to 80 percent of the surface. It has little potential for the producton of vegetation. Its usefulness is restricted to natural vegetation and to limited use for recreation, wildlife habitat, and esthetic purposes. This land type is too rocky for the use of machinery. Traffic, both by wheel and foot, must be controlled if vegetation is to grow. In selected areas the application of a complete fertilizer each year is needed to maintain the vigor of the stabilizing plant cover.

Estimated Yields [3]

Estimated yields are shown in tables 1, 2, and 3. The yield figures are for crops grown under two levels of management. Table 1 gives estimates for specified field crops; table 2, for specified vegetable crops; and table 3, for specified fruit crops. All yields are subject to variation because they are a result of the interaction of management factors.

The estimates show the relative productivity of the soils at the same level of management. Comparison of yield figures in columns B with those in columns A will show the response to be expected to the two levels of management.

[3] E. L. McPherron, conservation agronomist, Soil Conservation Service, assisted in the preparation of the tables in this section. Members of the Cooperative Extension Service also assisted. These were Herbert E. Johnson and Paul E. Turner, who helped prepare the table on field crops; Edwin E. Motsenbocker, who helped prepare the table on vegetables; and Richard L. Norton, who helped prepare the table on fruit.

TABLE 1.—*Estimated average yields per acre of specified field crops under two levels of management*

[Yields in columns A can be expected under ordinary management; those in columns B can be expected under improved management. Absence of a yield figure indicates that the crop is not suited to the soil or is not commonly grown]

Soil	Corn				Oats		Wheat		Alfalfa		Alfalfa-trefoil-grass		Trefoil-grass	
	For silage		For grain											
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Alluvial land														
Alton gravelly sandy loam, 0 to 3 percent slopes	6	14	30	70	25	40	20	30	1.5	3.0	2.0	2.5	1.0	2.0
Alton gravelly sandy loam, 3 to 8 percent slopes	6	14	30	70	25	40	20	30	1.5	3.0	2.0	2.5	1.0	2.0
Alton gravelly loam, 3 to 8 percent slopes	7	14	35	70	35	60	25	35	1.5	3.0	2.0	3.0	1.0	2.0
Alton gravelly loam, 8 to 15 percent slopes	6	10	30	50	25	40	20	30	1.5	3.0	2.0	3.0	1.0	2.0
Appleton loam, 0 to 3 percent slopes	15	22	75	110	35	80	25	50		4.0	2.0	3.5	1.0	3.5
Arkport very fine sandy loam, 0 to 6 percent slopes	14	19	70	95	45	70	25	40	2.0	4.0	1.5	3.0	1.0	2.0
Arkport very fine sandy loam, 6 to 12 percent slopes	11	15	55	75	40	65	25	35	1.5	3.5	1.5	3.0	1.0	2.0
Arkport very fine sandy loam, 12 to 20 percent slopes	8	12	40	60	30	55	20	35	1.0	3.0	1.0	2.0	1.0	2.0
Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes	11	15	55	75	40	65	25	35	1.5	3.5	1.5	3.0	1.0	2.0
Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes	8	12	40	60	30	55	20	35	1.0	3.0	1.0	2.0	1.0	2.0
Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded														
Benson channery loam, 0 to 8 percent slopes	5	10	25	50	25	40	20	30	2.5	3.5	2.0	3.0	1.5	2.5
Brockport silty clay loam, 0 to 2 percent slopes	7	20	35	100	30	65	25	55		5.0	1.0	4.0	1.0	3.5
Canandaigua silt loam	6	22	30	110	25	75	15	50		5.0	1.0	3.5	1.0	3.5
Cayuga silt loam, 0 to 2 percent slopes	15	20	75	100	45	90	35	60	3.0	5.0	2.5	4.0	1.0	3.5
Cayuga silt loam, 2 to 6 percent slopes	15	20	75	100	45	90	35	60	3.0	5.0	2.5	4.0	2.0	3.5
Cazenovia gravelly loam, 0 to 3 percent slopes	15	22	75	110	55	85	30	55	2.0	4.5	1.0	3.0	1.0	3.5
Cazenovia gravelly loam, 3 to 8 percent slopes	15	22	75	110	60	90	30	55	2.0	4.5	1.0	3.0	1.0	3.5
Churchville silt loam, 0 to 2 percent slopes	8	20	40	100	45	90	30	60	2.0	4.5	2.0	3.5	1.5	3.5
Churchville silt loam, 2 to 6 percent slopes	8	20	40	100	45	90	30	60	2.5	4.5	2.5	3.5	2.0	3.5
Claverack loamy fine sand, 0 to 2 percent slopes	8	14	40	70	40	60	20	35	2.0	3.5	1.0	3.0	1.0	3.0
Claverack loamy fine sand, 2 to 6 percent slopes	8	14	40	70	40	60	20	35	2.0	3.5	1.0	3.0	1.0	3.0
Claverack loamy fine sand, 6 to 12 percent slopes	7	12	35	60	40	60	20	30	2.0	3.5	1.0	3.0	1.0	3.0
Collamer silt loam, 0 to 2 percent slopes	15	22	75	110	50	90	35	55	2.0	4.0	1.0	3.5	1.0	3.5

TABLE 1.—*Estimated average yields per acre of specified field crops under two levels of management*—Continued

Soil	Corn				Oats		Wheat		Alfalfa		Alfalfa-trefoil-grass		Trefoil-grass	
	For silage		For grain											
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Collamer silt loam, 2 to 6 percent slopes	15	22	75	110	50	90	35	55	2.0	4.0	1.0	3.5	1.0	3.5
Collamer silt loam, 6 to 12 percent slopes	13	20	65	100	40	75	30	50	2.0	4.0	1.0	3.5	1.0	3.5
Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes	15	22	75	110	50	90	35	55	2.0	4.0	1.0	3.5	1.0	3.5
Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes	15	22	75	110	50	90	35	55	2.0	4.0	1.0	3.5	1.0	3.5
Colonie loamy fine sand, 0 to 6 percent slopes	6	14	30	70	20	35	15	25	-----	-----	1.0	2.0	-----	-----
Colonie loamy fine sand, 6 to 12 percent slopes	5	10	25	50	20	30	15	25	-----	-----	1.0	2.0	-----	-----
Colonie loamy fine sand, 12 to 20 percent slopes, eroded											1.0	1.5		
Cosad loamy fine sand	7	15	35	75	30	60	20	40	-----	3.5	1.0	3.0	1.5	3.0
Cut and fill land														
Dunkirk silt loam, 2 to 6 percent slopes	15	22	75	110	55	95	35	60	2.0	4.5	1.5	3.5	1.0	2.5
Dunkirk silt loam, 6 to 12 percent slopes, eroded	11	18	50	80	50	90	25	55	2.0	4.5	1.5	3.5	1.0	2.5
Dunkirk silt loam, 12 to 20 percent slopes, eroded	11	18	50	80	30	60	25	45	1.0	4.0	1.0	3.5	1.0	2.0
Edwards muck	10	22	50	110										
Eel silt loam	15	24	75	120	40	80	20	60	3.0	4.5	2.0	4.0	1.0	4.0
Elnora loamy fine sand, 0 to 2 percent slopes	8	18	40	90	40	60	20	40	1.0	3.0	1.0	3.0	1.0	3.0
Elnora loamy fine sand, 2 to 6 percent slopes	8	18	40	90	40	60	20	40	1.0	3.0	1.0	3.0	1.0	3.0
Fresh water marsh														
Galen very fine sandy loam, 0 to 2 percent slopes	14	20	70	100	50	85	30	55	1.0	3.5	1.0	3.0	1.0	3.0
Galen very fine sandy loam, 2 to 6 percent slopes	14	20	70	100	50	85	30	55	1.0	3.5	1.0	3.0	1.0	3.0
Genesee silt loam	18	25	90	125	50	90	30	65	3.5	5.5	2.0	4.5	1.0	4.0
Halsey gravelly loam	6	19	30	95	20	75	25	50	1.0	3.5	1.0	3.0	1.0	3.5
Hamlin silt loam	15	24	75	120	40	80	30	60	2.0	5.0	1.5	4.0	1.0	4.0
Hilton fine sandy loam, 0 to 3 percent slopes	14	21	70	105	40	80	30	60	3.0	4.5	2.5	4.0	1.0	3.0
Hilton fine sandy loam, 3 to 8 percent slopes	14	21	70	105	40	80	30	60	3.0	4.5	2.5	4.0	1.0	3.0
Hilton loam, 0 to 3 percent slopes	15	21	75	105	35	80	35	60	3.0	5.0	2.5	4.0	1.0	3.0
Hilton loam, 3 to 8 percent slopes	15	21	75	105	40	80	35	60	3.0	5.0	2.5	4.0	1.0	3.0
Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes	12	20	60	100	40	80	35	60	3.0	5.0	2.5	4.0	1.0	3.0
Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes	12	20	60	100	40	80	35	60	3.5	5.0	2.5	4.0	1.0	3.0
Honeoye silt loam, 3 to 8 percent slopes	15	21	75	105	55	90	35	65	3.5	5.0	2.5	4.0	1.0	3.0
Honeoye silt loam, 8 to 15 percent slopes	10	16	50	80	50	85	30	60	3.5	5.0	2.5	4.0	1.0	3.0
Honeoye silt loam, limestone substratum, 0 to 3 percent slopes	15	21	75	105	55	90	35	65	3.5	5.0	2.5	4.0	1.0	3.0
Honeoye silt loam, limestone substratum, 3 to 8 percent slopes	15	21	75	105	55	90	35	65	3.5	5.0	2.5	4.0	1.0	3.0
Hudson silt loam, 2 to 6 percent slopes	14	20	70	100	45	90	35	65	3.0	5.0	2.5	4.0	1.0	3.0
Ira gravelly fine sandy loam, 0 to 6 percent slopes	8	15	40	75	35	85	30	55	2.0	3.5	1.0	3.0	1.0	2.0
Lairdsville silt loam, 2 to 6 percent slopes	8	16	40	80	30	65	25	50	3.0	5.0	1.0	3.0	2.0	3.0
Lake beaches														
Lakemont silt loam	7	20	35	100	20	30	20	35	-----	4.0	-----	2.5	1.0	3.0
Lakemont silt loam, loamy subsoil variant	7	20	35	100	20	30	20	35	-----	4.0	-----	2.5	1.0	3.0
Lamson very fine sandy loam	9	21	45	105	25	75	20	45	-----	3.0	-----	2.0	1.0	3.0
Lima silt loam, 0 to 3 percent slopes	15	21	75	105	40	80	30	60	3.0	5.0	2.5	4.0	1.0	3.0
Lima silt loam, 3 to 8 percent slopes	15	21	75	105	40	80	30	60	3.0	5.0	2.5	4.0	1.0	3.0
Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes	15	21	75	105	40	80	30	60	3.0	5.0	2.5	4.0	1.0	3.0
Lockport silty clay loam	8	20	40	100	30	65	25	55	-----	5.0	1.0	3.0	1.0	3.0
Lyons silt loam	5	22	25	110	25	70	25	50	-----	4.0	1.0	3.0	1.0	3.0
Madalin silty clay loam	7	16	35	80	20	30	20	35	-----	4.0	-----	2.5	1.0	3.5
Made land														
Madrid fine sandy loam, 0 to 3 percent slopes	14	19	70	95	50	90	30	60	4.0	5.0	3.5	4.0	2.5	3.0
Madrid fine sandy loam, 3 to 8 percent slopes	14	19	70	95	50	90	30	60	4.0	5.0	3.5	4.0	2.5	3.0
Madrid fine sandy loam, 8 to 15 percent slopes	11	15	55	75	45	85	25	55	4.0	5.0	3.5	4.0	2.5	3.0
Madrid very stony fine sandy loam, 3 to 8 percent slopes														

TABLE 1.—*Estimated average yields per acre of specified field crops under two levels of management*—Continued

Soil	Corn				Oats		Wheat		Alfalfa		Alfalfa-trefoil-grass		Trefoil-grass	
	For silage		For grain											
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
Massena fine sandy loam	10	19	50	95	35	75	20	45	-----	4.0	2.0	3.5	2.0	3.0
Minoa very fine sandy loam	12	21	60	105	50	85	30	55	-----	4.0	2.0	3.5	2.0	3.0
Muck, deep	15	24	75	120	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Muck, shallow	12	22	60	110	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Niagara silt loam	16	23	80	115	35	90	30	60	-----	4.0	1.5	4.0	2.0	3.0
Niagara silt loam, loamy subsoil variant	16	23	80	115	35	90	30	60	-----	4.0	1.5	4.0	2.0	3.0
Odessa silt loam, 0 to 2 percent slopes	8	16	40	80	45	90	30	60	-----	5.0	1.5	4.0	2.0	4.0
Odessa silt loam, 2 to 6 percent slopes	7	15	35	75	45	90	30	60	-----	5.0	1.5	4.0	2.0	4.0
Ontario fine sandy loam, 3 to 8 percent slopes	14	21	70	105	55	90	35	65	3.0	5.0	2.0	4.0	1.0	3.0
Ontario fine sandy loam, 8 to 15 percent slopes	11	17	55	85	50	80	30	55	3.0	5.0	2.5	4.0	1.0	3.0
Ontario loam, 3 to 8 percent slopes	15	21	75	105	55	90	35	65	3.5	5.0	2.5	4.0	1.0	3.0
Ontario loam, 8 to 15 percent slopes	12	18	60	90	50	80	30	55	3.5	5.0	2.5	4.0	1.0	3.0
Ontario loam, 8 to 15 percent slopes, eroded	10	16	50	80	45	75	25	50	3.0	4.5	2.0	4.0	1.0	3.0
Ontario loam, 15 to 25 percent slopes, eroded	10	16	50	80	-----	-----	-----	-----	3.0	4.0	2.0	4.0	1.0	3.0
Ontario loam, 25 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ontario-Palmyra-Arkport complex, rolling	10	16	50	80	50	80	30	55	3.0	4.5	2.0	4.0	1.0	3.0
Ontario-Palmyra-Arkport complex, hilly	-----	-----	-----	-----	-----	-----	-----	-----	3.0	4.0	2.0	4.0	1.0	3.0
Ontario-Palmyra-Arkport complex, steep	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Ovid silt loam	14	22	70	110	40	85	20	50	-----	4.0	2.0	3.5	1.0	3.0
Ovid and Appleton silt loams, limestone substratum	14	22	70	110	40	85	20	55	-----	4.0	2.0	3.5	1.0	3.0
Palmyra gravelly fine sandy loam, 0 to 3 percent slopes	12	19	60	95	55	80	35	65	3.0	4.5	2.0	4.0	1.0	3.0
Palmyra gravelly fine sandy loam, 3 to 8 percent slopes	12	19	60	95	55	80	35	65	3.0	4.5	2.0	4.0	1.0	3.0
Palmyra gravelly fine sandy loam, 8 to 15 percent slopes	12	18	60	90	50	80	30	60	3.0	4.5	2.0	4.0	1.0	3.0
Palmyra gravelly fine sandy loam, 15 to 25 percent slopes	10	16	50	80	-----	-----	-----	-----	2.0	4.0	1.5	3.5	1.0	2.5
Palmyra gravelly fine sandy loam, 25 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Palmyra gravelly loam, 3 to 8 percent slopes	14	19	70	95	60	85	35	65	3.5	5.0	2.0	4.0	1.0	3.0
Phelps gravelly fine sandy loam, 0 to 3 percent slopes	13	20	65	100	55	80	30	60	2.0	4.5	1.5	4.0	1.0	3.0
Phelps gravelly fine sandy loam, 3 to 8 percent slopes	13	20	65	100	55	80	30	60	2.0	4.5	1.5	4.0	1.0	3.0
Pits and Quarries	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Rhinebeck silt loam	8	20	40	100	45	90	30	60	2.0	5.0	1.5	4.0	2.0	3.0
Riga silt loam, 2 to 8 percent slopes	15	20	75	100	45	90	35	65	3.0	5.0	1.0	3.0	2.0	3.0
Rock land	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Schoharie silt loam, 0 to 2 percent slopes	14	17	70	85	45	90	35	65	3.0	5.0	1.5	4.0	2.0	3.0
Schoharie silt loam, 2 to 6 percent slopes	14	17	70	85	45	90	35	65	3.0	5.0	1.5	4.0	2.0	4.0
Schoharie silty clay loam, 6 to 12 percent slopes, eroded	10	15	50	75	40	80	30	60	3.0	5.0	1.5	4.0	2.0	4.0
Schoharie silty clay loam, 12 to 20 percent slopes, eroded	-----	-----	-----	-----	-----	-----	-----	-----	2.0	4.0	1.5	3.5	1.5	3.0
Schoharie silty clay loam, 20 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sodus gravelly fine sandy loam, 2 to 8 percent slopes	8	15	40	75	35	85	30	55	2.0	3.5	1.0	3.0	1.0	2.0
Sun fine sandy loam	5	20	25	100	20	65	20	45	-----	4.0	1.0	3.0	1.0	3.0
Sun loam, moderately shallow variant	5	20	25	100	20	65	20	45	-----	3.0	-----	3.0	1.0	3.0
Urban land	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Wampsville cobbly loam, 0 to 3 percent slopes	14	19	70	95	60	85	35	65	3.5	5.0	2.0	4.0	1.0	3.0
Wampsville cobbly loam, 3 to 8 percent slopes	14	19	70	95	60	85	35	65	3.5	5.0	2.0	4.0	1.0	3.0
Wampsville cobbly loam, 8 to 15 percent slopes	12	18	60	90	50	80	30	60	3.5	5.0	2.0	4.0	1.0	3.0
Wassaic fine sandy loam, 0 to 4 percent slopes	7	18	35	90	40	75	25	55	3.0	4.0	3.0	4.0	2.0	3.0
Wayland silt loam	6	20	30	100	20	75	15	50	-----	-----	1.0	3.5	1.0	3.5

TABLE 2.—*Estimated average yields per acre of specified vegetable crops under two levels of management*

Yields in columns A can be expected under ordinary management; those in columns B can be expected under improved management. Absence of a yield figure indicates that the crop is not suited to the soil or is not commonly grown]

Soil	Beans				Sweet corn		Tomatoes		Broccoli		Cauliflower		Potatoes		Cabbage			
	Dry		Snap												For market		For kraut	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Alluvial land																		
Alton gravelly sandy loam, 0 to 3 percent slopes					1	3							150	400	8	20		
Alton gravelly sandy loam, 3 to 8 percent slopes					1	3							150	400	8	20		
Alton gravelly loam, 3 to 8 percent slopes					1. 5	3							150	400	8	20		
Alton gravelly loam, 8 to 15 percent slopes					1	3							150	400	8	20		
Appleton loam, 0 to 3 percent slopes	15	35	1. 5	4	2. 5	7	10	25	1	3. 5	2	4	150	500	15	30	20	40
Arkport very fine sandy loam, 0 to 6 percent slopes	23	30	1. 8	3. 5	3	5	11	18	1. 5	3. 5	2. 5	4. 5	250	500	8	20		
Arkport very fine sandy loam, 6 to 12 percent slopes	21	26	1. 8	3. 5	2. 5	4	10. 5	16					225	450				
Arkport very fine sandy loam, 12 to 20 percent slopes	16	25											225	450				
Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes	21	26	1. 8	3. 5	2. 5	4	10. 5	16					225	450				
Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes	16	25											225	450				
Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded																		
Benson channery loam, 0 to 8 percent slopes																		
Brockport silty clay loam, 0 to 2 percent slopes																		
Canandaigua silt loam			. 5	2	1	3. 5	10	22	1	3	1. 5	4					10	25
Cayuga silt loam, 0 to 2 percent slopes	23	30	1. 5	3	2. 5	4	10	22	2	3	2. 5	4	200	400			10	25
Cayuga silt loam, 2 to 6 percent slopes	23	30	1. 5	3	2. 5	4	10	22	2	3	2. 5	4	200	400			10	25
Cazenovia gravelly loam, 0 to 3 percent slopes	20	26	1. 8	3. 5	2. 5	4	13	30	2	4	2. 5	5	250	550	15	25	15	40
Cazenovia gravelly loam, 3 to 8 percent slopes	20	26	1. 8	3. 5	2. 5	4	13	30	2	4	2. 5	5	350	550	10	20	10	30
Churchville silt loam, 0 to 2 percent slopes	18	24			1	3	10	20	1. 5	3	1. 5	3. 5			10	20	15	25
Churchville silt loam, 2 to 6 percent slopes	18	24			1	3	10	20	1. 5	3	1. 5	3. 5			10	20	15	25
Claverack loamy fine sand, 0 to 2 percent slopes	22	28	1. 8	3. 0	2. 5	4	10. 5	20	1. 5	3. 5	2	4. 5	200	400	15	25	15	40
Claverack loamy fine sand, 2 to 6 percent slopes	22	28	1. 8	3. 0	2. 5	4	10. 5	20	1. 5	3. 5	2	4. 5	200	400	10	20	10	30
Claverack loamy fine sand, 6 to 12 percent slopes	20	28	1. 5	3. 0	2. 0	4	10	20	1. 0	3. 5	1. 5	4. 5	150	400	10	20	10	30
Collamer silt loam, 0 to 2 percent slopes	23	35	1. 8	3. 5	2. 5	5. 0	11	25	2. 0	4. 0	2. 5	5. 0	250	500	15	25	15	40
Collamer silt loam, 2 to 6 percent slopes	23	35	1. 8	3. 5	2. 5	5. 0	11	25	2. 0	4. 0	2. 5	5. 0	250	500	10	20	15	35
Collamer silt loam, 6 to 12 percent slopes	22	30			2. 0	4. 5							200	400				
Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes	23	25	1. 8	3. 5	2. 5	5. 0	11	25	2. 0	4. 0	2. 5	5. 0	250	500	15	25	15	40
Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes	23	35	1. 8	3. 5	2. 5	5. 0	11	25	2. 0	4. 0	2. 5	5. 0	250	500	10	20	15	35
Colonie loamy fine sand, 0 to 6 percent slopes						2. 0							100	350	6	15		

TABLE 2.—*Estimated average yields per acre of specified vegetable crops under two levels of management*—Continued

Soil	Beans				Sweet corn		Tomatoes		Broccoli		Cauli-flower		Potatoes		Cabbage			
	Dry		Snap												For market		For kraut	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Colonie loamy fine sand, 6 to 12 percent slopes	----	----	----	----	----	2. 0	----	----	----	----	----	----	100	350	6	15	----	----
Colonie loamy fine sand, 12 to 20 percent slopes, eroded	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cosad loamy fine sand	10	28	1. 0	3. 0	1. 0	4. 0	8. 0	20	1. 0	3. 5	1. 0	4. 5	100	400	----	25	----	40
Cut and fill land	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Dunkirk silt loam, 2 to 6 percent slopes	24	32	1. 8	3. 5	2. 5	5. 0	10. 5	23	2. 0	3. 5	2. 5	4. 5	250	500	15	25	15	40
Dunkirk silt loam, 6 to 12 percent slopes, eroded	21	30	1. 0	3. 5	----	----	----	----	----	----	----	----	200	400	----	----	----	----
Dunkirk silt loam, 12 to 20 percent slopes, eroded	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Edwards muck	----	----	----	----	----	----	----	----	----	----	----	----	200	550	----	----	----	----
Eel silt loam	27	35	1. 8	3. 5	3. 0	5. 0	11. 5	25	1. 5	3. 5	2. 0	4. 5	200	550	15	25	15	40
Elnora loamy fine sand, 0 to 2 percent slopes	18	25	1. 5	3. 0	2. 0	4. 0	8. 0	18	1. 5	3. 5	2. 0	4. 5	200	350	10	20	15	35
Elnora loamy fine sand, 2 to 6 percent slopes	18	25	1. 5	3. 0	2. 0	4. 0	8. 0	18	1. 5	3. 5	2. 0	4. 5	200	350	10	20	15	35
Fresh water marsh	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Galen very fine sandy loam, 0 to 2 percent slopes	21	35	1. 8	3. 5	2. 0	4. 0	11. 0	25	2. 0	4. 0	2. 5	5. 0	250	500	15	25	15	40
Galen very fine sandy loam, 2 to 6 percent slopes	21	35	1. 8	3. 5	2. 0	4. 0	11. 0	25	2. 0	4. 0	2. 5	5. 0	250	500	15	25	15	40
Genesee silt loam	30	50	1. 8	3. 5	6. 0	8. 0	15. 0	28	2. 5	4. 0	2. 5	5. 0	300	600	15	25	25	40
Halsey gravelly loam	----	----	----	2. 0	----	2. 0	----	15	----	2. 0	----	3. 0	----	300	----	----	----	20
Hamlin silt loam	25	35	1. 8	3. 5	2. 5	5. 0	14. 0	25	2. 5	4. 0	2. 0	4. 5	250	550	15	25	20	40
Hilton fine sandy loam, 0 to 3 percent slopes	25	35	1. 8	3. 5	2. 0	4. 5	11. 0	25	2. 0	4. 0	2. 0	4. 5	250	550	15	25	25	40
Hilton fine sandy loam, 3 to 8 percent slopes	25	35	1. 8	3. 5	2. 0	4. 5	11. 0	25	2. 0	4. 0	2. 0	4. 5	250	550	15	25	25	40
Hilton loam, 0 to 3 percent slopes	25	35	1. 8	3. 5	2. 0	4. 5	11. 0	25	2. 0	4. 0	2. 0	4. 5	250	550	15	25	25	40
Hilton loam, 3 to 8 percent slopes	25	35	1. 8	3. 5	2. 0	7. 5	11. 0	25	2. 0	4. 0	2. 0	4. 5	250	550	15	25	25	40
Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes	25	35	1. 0	3. 0	3. 0	5. 0	11. 0	25	2. 5	4. 0	2. 5	5. 0	----	----	15	25	25	40
Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes	25	35	1. 0	3. 0	3. 0	5	11	25	2. 5	4	2. 5	5. 0	----	----	15	25	25	40
Honeoye silt loam, 3 to 8 percent slopes	25	35	1. 0	3. 0	4. 0	6. 5	11	28	2. 5	4	2. 5	5. 0	----	----	15	25	25	40
Honeoye silt loam, 8 to 15 percent slopes	23	32	----	----	2. 5	4. 0	----	----	----	----	----	----	----	----	----	----	----	----
Honeoye silt loam, limestone substratum, 0 to 3 percent slopes	20	25	1. 0	3. 0	1. 5	4. 0	10	20	1. 5	3. 5	2. 0	4. 0	----	----	10	20	20	35
Honeoye silt loam, limestone substratum, 3 to 8 percent slopes	15	20	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hudson silt loam, 2 to 6 percent slopes	10	20	1. 0	2. 0	2. 0	4. 0	----	----	1. 5	3. 0	2. 0	4. 0	150	300	----	----	----	----
Ira gravelly fine sandy loam, 0 to 6 percent slopes	10	25	1. 8	3. 5	2. 0	4. 0	----	----	1. 5	3. 5	2. 0	4. 5	250	550	----	----	----	----
Lairdsville silt loam, 2 to 6 percent slopes	10	20	1. 0	2. 0	2. 0	4. 0	----	----	1. 5	3. 0	2. 0	4. 0	150	300	----	----	----	----
Lake beaches	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lakemont silt loam	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lakemont silt loam, loamy subsoil variant	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lamson very fine sandy loam	----	----	----	2. 0	----	2. 0	----	15	----	2. 0	----	3. 0	----	300	----	----	----	20
Lima silt loam, 0 to 3 percent slopes	24	32	1. 8	3. 5	2. 5	4. 5	12	25	1. 5	4. 0	2. 5	5. 0	----	----	15	25	20	40
Lima silt loam, 3 to 8 percent slopes	24	32	1. 8	3. 5	2. 5	4. 5	12	25	1. 5	4. 0	2. 5	5. 0	----	----	15	25	20	40

TABLE 2.—*Estimated average yields per acre of specified vegetable crops under two levels of management*—Continued

Soil	Beans				Sweet corn		Tomatoes		Broccoli		Cauliflower		Potatoes		Cabbage			
	Dry		Snap												For market		For kraut	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes	24	32	1.8	3.5	2.5	4.5	12	25	1.5	4.0	2.5	5.0	-----	-----	15	25	20	40
Lockport silty clay loam	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Lyons silt loam	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Madalin silty clay loam	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Made land	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Madrid fine sandy loam, 0 to 3 percent slopes	23	35	1.5	3.0	4.5	7.0	15	32	2.5	4.0	2.5	5.0	250	550	15	25	25	40
Madrid fine sandy loam, 3 to 8 percent slopes	23	35	1.5	3.0	4.5	7.0	15	32	2.5	4.0	2.5	5.0	250	550	15	25	25	40
Madrid fine sandy loam, 8 to 15 percent slopes	22	33	-----	-----	2.0	4.0	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Madrid very stony fine sandy loam, 3 to 8 percent slopes	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Massena fine sandy loam	15	35	1.5	4.0	2.5	7.0	10	25	1.0	3.5	2.0	4.0	150	500	15	30	20	40
Minoa very fine sandy loam	15	35	1.5	4.0	2.5	7.0	10	25	1.0	3.5	2.0	4.0	150	500	15	30	20	40
Muck, deep	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Muck, shallow	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Niagara silt loam	20	35	1.5	3.5	2.0	7.0	8.0	25	1.0	4.0	1.5	5.0	150	500	10	25	10	40
Niagara silt loam, loamy subsoil variant	20	35	1.5	3.5	2.0	7.0	8.0	25	1.0	4.0	1.5	5.0	150	500	10	25	10	40
Odessa silt loam, 0 to 2 percent slopes	18	24	-----	-----	1.0	3.0	10	20	1.5	3.0	1.5	3.5	-----	-----	10	20	15	25
Odessa silt loam, 2 to 6 percent slopes	18	24	-----	-----	1.0	3.0	10	20	1.5	3.0	1.5	3.5	-----	-----	10	20	15	25
Ontario fine sandy loam, 3 to 8 percent slopes	20	35	1.5	3.0	4.0	7.0	10	32	2.0	4.0	2.0	5.0	250	600	10	25	20	40
Ontario fine sandy loam, 8 to 15 percent slopes	20	33	-----	-----	1.5	4.0	------	------	-----	-----	-----	-----	200	500	----	----	----	----
Ontario loam, 3 to 8 percent slopes	23	35	1.5	3.0	4.5	7.0	15	32	2.5	4.0	2.5	5.0	300	600	15	25	25	40
Ontario loam, 8 to 15 percent slopes	22	33	-----	-----	2.0	4.0	------	------	-----	-----	-----	-----	250	500	----	----	----	----
Ontario loam, 8 to 15 percent slopes, eroded	21	33	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ontario loam, 15 to 25 percent slopes, eroded	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ontario loam, 25 to 60 percent slopes	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ontario-Palmyra-Arkport complex, rolling	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ontario-Palmyra-Arkport complex, hilly	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ontario-Palmyra-Arkport complex, steep	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Ovid silt loam	15	25	-----	-----	1.5	3.0	------	------	1.5	3.0	1.5	3.5	-----	-----	10	20	15	25
Ovid and Appleton silt loams, limestone substratum	15	25	-----	-----	1.5	3.0	------	------	1.5	3.0	1.5	3.5	-----	-----	10	20	15	25
Palmyra gravelly fine sandy loam, 0 to 3 percent slopes	22	31	-----	-----	2.0	5.5	8.0	25.0	1.5	3.0	-----	-----	250	550	10	20	15	35
Palmyra gravelly fine sandy loam, 3 to 8 percent slopes	22	31	-----	-----	2.0	5.0	8.0	20.0	1.5	3.0	-----	-----	250	550	10	20	15	35
Palmyra gravelly fine sandy loam, 8 to 15 percent slopes	20	28	-----	-----	2.0	3.5	------	------	-----	-----	-----	-----	200	400	----	----	----	----
Palmyra gravelly fine sandy loam, 15 to 25 percent slopes	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Palmyra gravelly fine sandy loam, 25 to 60 percent slopes	----	----	-----	-----	-----	-----	------	------	-----	-----	-----	-----	-----	-----	----	----	----	----
Palmyra gravelly loam, 3 to 8 percent slopes	24	34	-----	-----	2.0	5.0	8.0	20.0	1.5	3.0	1.5	3.0	250	550	10	20	15	35
Phelps gravelly fine sandy loam, 0 to 3 percent slopes	21	26	1.8	3.5	2.0	4.5	10.0	25.0	1.5	3.5	2.0	4.0	200	550	15	25	20	35

TABLE 2.—*Estimated average yields per acre of specified vegetable crops under two levels of management*—Continued

Soil	Beans				Sweet corn		Tomatoes		Broccoli		Cauliflower		Potatoes		Cabbage			
	Dry		Snap												For market		For kraut	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Phelps gravelly fine sandy loam, 3 to 8 percent slopes	21	26	1.8	3.5	2.0	4.5	10.0	25.0	1.5	3.5	2.0	4.0	200	550	15	25	20	35
Pits and Quarries																		
Rhinebeck silt loam	18	24			1.0	3.0	10	20	1.5	3.0	1.5	3.5			10	20	15	25
Riga silt loam, 2 to 8 percent slopes	15	25			1.5	3.5	8	18	1.5	3.0	2.0	4.0			10	18	10	25
Rock land																		
Schoharie silt loam, 0 to 2 percent slopes	15	25			2.0	4.5			1.5	2.5	2.0	3.5					10	25
Schoharie silt loam, 2 to 6 percent slopes	15	25			2.0	4.5			1.5	2.5	2.0	3.5					10	25
Schoharie silty clay loam, 6 to 12 percent slopes, eroded	17	25			1.5	3.5												
Schoharie silty clay loam, 12 to 20 percent slopes, eroded																		
Schoharie silty clay loam, 20 to 60 percent slopes																		
Sodus gravelly fine sandy loam, 2 to 8 percent slopes	20	30	1.5	2.5	2.0	4.5	10	20	2.0	3.5	2.0	4.0	300	600	10	25	10	30
Sun fine sandy loam																		
Sun loam, moderately shallow variant																		
Urban land																		
Wampsville cobbly loam, 0 to 3 percent slopes	22	31			2.0	5.5	8.0	25	1.5	3.0	1.5	3.0	250	550	10	20	15	35
Wampsville cobbly loam, 3 to 8 percent slopes	22	31			2.0	5.0	8.0	20	1.5	3.0			250	550	10	20	15	35
Wampsville cobbly loam, 8 to 15 percent slopes	20	28			2.0	3.5							200	400				
Wassaic fine sandy loam, 0 to 4 percent slopes	25	35	1.5	3.0	2.0	4.0	10	20	2.5	4.0	2.5	5.0			10	20	15	35
Wayland silt loam																		

TABLE 3.—*Estimated average yields per acre of specified fruit crops under two levels of management*

[Yields in columns A can be expected under ordinary management; those in columns B can be expected under improved management. Absence of a yield figure indicates that the crop is not suited to the soil or is not commonly grown]

Soil	Apples		Sour cherries		Sweet cherries		Strawberries		Peaches		Pears	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Qt.*	*Qt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Alluvial land												
Alton gravelly sandy loam, 0 to 3 percent slopes	400	800	2.8	6.0	4.0	8.0	4,000	8,000	200	300	200	300
Alton gravelly sandy loam, 3 to 8 percent slopes	400	800	2.8	6.0	4.0	8.0	3,000	7,000	200	300	200	300
Alton gravelly loam, 3 to 8 percent slopes	350	700	2.8	6.0	3.5	7.0	3,000	7,000	100	200	150	250
Alton gravelly loam, 8 to 15 percent slopes	350	700	2.8	6.0	3.5	7.0		7,000	100	200	150	250
Appleton loam, 0 to 3 percent slopes	200	400					3,000	7,000				
Arkport very fine sandy loam, 0 to 6 percent slopes	400	800	3.0	7.0	4.0	8.0	4,000	8,000	200	300	200	350
Arkport very fine sandy loam, 6 to 12 percent slopes	350	700	3.0	7.0	3.5	7.0	3,000	7,000	100	200	150	250
Arkport very fine sandy loam, 12 to 20 percent slopes	300	600	2.8	6.0	3.0	6.0			80	180		
Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes	400	800	2.8	6.0	3.5	7.0	3,000	7,000	100	200	200	300

TABLE 3.—*Estimated average yields per acre of specified fruit crops under two levels of management*—Continued

Soil	Apples		Sour cherries		Sweet cherries		Strawberries		Peaches		Pears	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Qt.*	*Qt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes	250	600	2. 5	5. 5	3. 0	6. 0	-------	-------	80	180	------	------
Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded	------	------	------	------	------	------	------	------	------	------	------	------
Benson channery loam, 0 to 8 percent slopes	------	------	------	------	------	------	2, 000	5, 000	------	------	------	------
Brockport silty clay loam, 0 to 2 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Canandaigua silt loam	------	------	------	------	------	------	------	------	------	------	------	------
Cayuga silt loam, 0 to 2 percent slopes	250	500	3. 0	4. 0	------	------	4, 000	8, 000	125	175	200	350
Cayuga silt loam, 2 to 6 percent slopes	250	500	3. 0	4. 0	------	------	4, 000	8, 000	125	175	200	350
Cazenovia gravelly loam, 0 to 3 percent slopes	250	500	3. 0	4. 0	3. 5	7. 0	4, 000	8, 000	------	------	200	350
Cazenovia gravelly loam, 3 to 8 percent slopes	250	500	3. 0	4. 0	4. 0	8. 0	4, 000	8, 000	------	------	------	------
Churchville silt loam, 0 to 2 percent slopes	200	400	------	------	------	------	------	------	------	------	------	------
Churchville silt loam, 2 to 6 percent slopes	200	400	------	------	------	------	------	------	------	------	------	------
Claverack loamy fine sand, 0 to 2 percent slopes	250	500	3. 0	4. 0	------	6. 0	4, 000	8, 000	60	120	200	350
Claverack loamy fine sand, 2 to 6 percent slopes	250	500	3. 0	4. 0	------	6. 0	4, 000	8, 000	60	120	200	350
Claverack loamy fine sand, 6 to 12 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Collamer silt loam, 0 to 2 percent slopes	300	700	3. 0	5. 0	3. 5	7. 0	4, 000	8, 000	------	------	150	250
Collamer silt loam, 2 to 6 percent slopes	300	700	3. 0	5. 0	3. 5	7. 0	4, 000	8, 000	------	------	150	250
Collamer silt loam, 6 to 12 percent slopes	300	700	3. 0	5. 0	3. 0	6. 0	4, 000	8, 000	------	------	150	250
Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes	300	700	3. 0	5. 0	3. 5	7. 0	4, 000	8, 000	------	------	150	250
Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes	300	700	3. 5	5. 0	3. 5	7. 0	4, 000	8, 000	------	------	------	------
Colonie loamy fine sand, 0 to 6 percent slopes	------	------	2. 5	5. 0	2. 5	5. 5	3, 000	7, 000	------	------	------	------
Colonie loamy fine sand, 6 to 12 percent slopes	------	------	2. 5	5. 0	2. 5	5. 5	3, 000	7, 000	------	------	------	------
Colonie loamy fine sand, 12 to 20 percent slopes, eroded	------	------	------	------	------	------	3, 000	7, 000	------	------	------	------
Cosad loamy fine sand	------	------	------	------	------	------	3, 000	7, 000	------	------	------	------
Cut and fill land	------	------	------	------	------	------	------	------	------	------	------	------
Dunkirk silt loam, 2 to 6 percent slopes	300	700	2. 3	5. 0	3. 5	7. 0	4, 000	8, 000	80	160	150	300
Dunkirk silt loam, 6 to 12 percent slopes, eroded	300	600	2. 3	5. 0	3. 0	6. 0	3, 000	7, 000	80	160	150	300
Dunkirk silt loam, 12 to 20 percent slopes, eroded	------	------	------	------	------	------	------	------	------	------	------	------
Edwards muck	------	------	------	------	------	------	------	------	------	------	------	------
Eel silt loam	------	------	------	------	------	------	------	------	------	------	------	------
Elnora loamy fine sand, 0 to 2 percent slopes	300	700	3. 0	5. 0	3. 0	6. 0	3, 000	7, 000	125	200	200	300
Elnora loamy fine sand, 2 to 6 percent slopes	300	700	3. 0	5. 0	3. 0	6. 0	3, 000	7, 000	125	200	200	300
Fresh water marsh	------	------	------	------	------	------	------	------	------	------	------	------
Galen very fine sandy loam, 0 to 2 percent slopes	300	700	3. 0	5. 0	------	------	4, 000	8, 000	125	200	------	------
Galen very fine sandy loam, 2 to 6 percent slopes	300	700	3. 0	5. 0	------	------	4, 000	8, 000	125	200	------	------
Genesee silt loam	------	------	------	------	------	------	4, 000	8, 000	------	------	------	------
Halsey gravelly loam	250	600	2. 8	6. 0	------	------	3, 000	7, 000	------	------	125	200
Hamlin silt loam	------	------	------	------	------	------	------	------	------	------	------	------
Hilton fine sandy loam, 0 to 3 percent slopes	300	700	2. 0	5. 0	3. 0	7. 0	4, 000	8, 000	125	175	200	300
Hilton fine sandy loam, 3 to 8 percent slopes	300	700	2. 0	5. 0	3. 0	7. 0	4, 000	8, 000	125	175	200	300
Hilton loam, 0 to 3 percent slopes	300	700	2. 5	5. 0	3. 0	7. 0	3, 000	7, 000	125	175	200	300
Hilton loam, 3 to 8 percent slopes	300	700	2. 5	5. 0	3. 0	7. 0	3, 000	7, 000	125	175	200	300
Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes	300	700	2. 5	5. 0	3. 0	7. 0	3, 000	7, 000	125	175	200	300
Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes	300	700	2. 5	5. 0	3. 0	7. 0	3, 000	7, 000	125	175	200	300
Honeoye silt loam, 3 to 8 percent slopes	400	800	3. 0	6. 0	3. 0	7. 0	4, 000	8, 000	150	200	200	300
Honeoye silt loam, 8 to 15 percent slopes	400	800	3. 0	6. 0	3. 0	7. 0	4, 000	8, 000	150	200	200	300
Honeoye silt loam, limestone substratum, 0 to 3 percent slopes	400	800	3. 0	6. 0	3. 0	7. 0	4, 000	8, 000	150	200	200	300
Honeoye silt loam, limestone substratum, 3 to 8 percent slopes	400	800	3. 0	6. 0	3. 0	7. 0	4, 000	8, 000	150	200	200	300
Hudson silt loam, 2 to 6 percent slopes	300	700	2. 5	5. 0	------	------	4, 000	8, 000	125	175	150	250
Ira gravelly fine sandy loam, 0 to 6 percent slopes	300	600	2. 5	5. 0	------	------	4, 000	8, 000	125	175	150	250
Lairdsville silt loam, 2 to 6 percent slopes	300	600	2. 5	5. 0	------	------	4, 000	8, 000	125	175	150	250
Lake beaches	------	------	------	------	------	------	------	------	------	------	------	------
Lakemont silt loam	------	------	------	------	------	------	------	------	------	------	------	------
Lakemont silt loam, loamy subsoil variant	------	------	------	------	------	------	------	------	------	------	------	------
Lamson very fine sandy loam	------	------	------	------	------	------	------	------	------	------	------	------
Lima silt loam, 0 to 3 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------

TABLE 3.—*Estimated average yields per acre of specified fruit crops under two levels of management*—Continued

Soil	Apples		Sour cherries		Sweet cherries		Strawberries		Peaches		Pears	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Qt.*	*Qt.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Lima silt loam, 3 to 8 percent slopes												
Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes												
Lockport silty clay loam												
Lyons silt loam												
Madalin silty clay loam												
Made land												
Madrid fine sandy loam, 0 to 3 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Madrid fine sandy loam, 3 to 8 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Madrid fine sandy loam, 8 to 15 percent slopes					3.0	7.0						
Madrid very stony fine sandy loam, 3 to 8 percent slopes												
Massena fine sandy loam	200	600					3,000	7,000			150	250
Minoa very fine sandy loam	300	700					3,000	7,000			150	250
Muck, deep												
Muck, shallow												
Niagara silt loam	200	600					3,000	7,000			150	250
Niagara silt loam, loamy subsoil variant	200	600					3,000	7,000			150	250
Odessa silt loam, 0 to 2 percent slopes	200	400										
Odessa silt loam, 2 to 6 percent slopes	200	400										
Ontario fine sandy loam, 3 to 8 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Ontario fine sandy loam, 8 to 15 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Ontario loam, 3 to 8 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Ontario loam, 8 to 15 percent slopes	400	800	3.0	6.0	3.0	7.0	4,000	8,000	150	200	200	300
Ontario loam, 8 to 15 percent slopes, eroded	400	800	3.0	6.0			3,000	7,000	75	120	150	250
Ontario loam, 15 to 25 percent slopes, eroded												
Ontario loam, 25 to 60 percent slopes												
Ontario-Palmyra-Arkport complex, rolling												
Ontario-Palmyra-Arkport complex, hilly												
Ontario-Palmyra-Arkport complex, steep												
Ovid silt loam												
Ovid and Appleton silt loams, limestone substratum												
Palmyra gravelly fine sandy loam, 0 to 3 percent slopes	400	800	3.0	7.0	3.0	7.0	4,000	8,000	200	300	200	300
Palmyra gravelly fine sandy loam, 3 to 8 percent slopes	400	800	3.0	7.0	3.0	7.0	4,000	8,000	200	300	200	300
Palmyra gravelly fine sandy loam, 8 to 15 percent slopes	400	800	3.0	7.0	3.0	7.0	4,000	8,000	200	300	200	300
Palmyra gravelly fine sandy loam, 15 to 25 percent slopes	400	800										
Palmyra gravelly fine sandy loam, 25 to 60 percent slopes												
Palmyra gravelly loam, 3 to 8 percent slopes	400	800	3.0	7.0	3.0	7.0	4,000	8,000	200	300	200	300
Phelps gravelly fine sandy loam, 0 to 3 percent slopes	300	700	3.0	7.0	2.5	6.0	4,000	8,000	200	300	200	300
Phelps gravelly fine sandy loam, 3 to 8 percent slopes	300	700	3.0	7.0	2.5	6.0	4,000	8,000	200	300	200	300
Pits and Quarries												
Rhinebeck silt loam												
Riga silt loam, 2 to 8 percent slopes												
Rock land												
Schoharie silt loam, 0 to 2 percent slopes	300	700	2.5	5.0			4,000	8,000	105	175	150	250
Schoharie silt loam, 2 to 6 percent slopes	300	700	2.5	5.0			4,000	8,000	125	175	150	250
Schoharie silty clay loam, 6 to 12 percent slopes, eroded	150	500	2.0	4.0			3,000	7,000	100	150	100	200
Schoharie silty clay loam, 12 to 20 percent slopes, eroded												
Schoharie silty clay loam, 20 to 60 percent slopes												
Sodus gravelly fine sandy loam, 2 to 8 percent slopes	300	600	2.5	5.0	3.0	6.0	4,000	8,000	100	150	200	300
Sun fine sandy loam												
Sun loam, moderately shallow variant												
Urban land												
Wampsville cobbly loam, 0 to 3 percent slopes	400	800	4.0	8.0	4.0	8.0	4,000	8,000	200	300	200	300
Wampsville cobbly loam, 3 to 8 percent slopes	400	800	4.0	8.0	4.0	8.0	4,000	8,000	200	300	200	300
Wampsville cobbly loam, 8 to 15 percent slopes	300	700	3.0	7.0	3.0	7.0	3,000	7,000	150	250	150	250
Wassaic fine sandy loam, 0 to 4 percent slopes							4,000	8,000				
Wayland silt loam												

Supplemental irrigation is needed to obtain B-level yields for such crops as strawberries, tomatoes, broccoli, cauliflower, and market cabbage. Other crops, such as kraut cabbage, potatoes, and sweet corn, are grown both with and without supplemental moisture. The common field crops are generally grown without irrigation.

The figures in columns A represent yields to be expected under ordinary management. Under the A level of management, less than half of the recommended conservation and management practices needed are used. Such practices are application of fertilizer and lime, management of water, control of erosion, use of improved crop varieties, keeping tillage to a minimum, and selection of suitable cropping systems. Drainage and control of weeds, insects, and plant disease are also important. The estimates shown in columns A are a little above the average obtained by farmers during the late 1960's.

The figures in columns B show yields obtained by using the best combinations of management practices. A given yield estimate may vary as much as 10 percent from year to year, but improved management must be used consistently. These yield estimates can be expected to change in future years as new varieties become available and improved management practices evolve.

Some crops that are not rated in table 2, such as cucumbers, are used for labor distribution. Annual acreages of individual growers are varied by contract supply and demand. Under a high level of management, cucumber yields of 500 bushels of pickling cucumbers and 400 bushels of slicers per acre can be obtained from selected soils, such as those of the Arkport, Galen, Ontario, and Hilton series. Such management may include irrigation. Sugar beet yields of 22 to 24 tons per acre can be obtained on deep, neutral soils that have good available water capacity. Stone-free, medium-textured to fine-textured soils, such as those of the Collamer and Schoharie series, are preferred. A high, or B, level of management is important.

Use of the Soils for Woodland [4]

Approximately 16 percent, or 68,400 acres (*9*), of Monroe County is woodland. About 14 percent, or 61,700 acres, is commercial woodland.

[4] MEREDITH A. PETERS, woodland conservationist, Soil Conservation Service, helped prepare this section.

TABLE 4.—*Suitability*

Woodland groups	Potential productivity		Management problems
	Indicator species	Site index	Erosion hazard
Group 2o1. Deep or moderately deep, excessively drained to well drained or moderately well drained, nearly level to rolling, moderately coarse textured or medium-textured soils. These soils formed in a wide variety of materials ranging from sorted clay, silt, and fine sand to glacial till and outwash. The lime content ranges from medium to high. The soils have few or no properties that cause management problems. (ArB, ArC, AsC, CeA, CeB, CgA, CgB, ClA, ClB, CmA, CmB, DuB, GaA, GaB, HfA, HfB, HlA, HlB, HmA, HmB, HnB, HnC, HoA, HoB, HuB, LnA, LnB, LoB, MdA, MdB, MdC, MeB, OfB, OfC, OnB, OnC, OnC3, OpC, PaA, PaB, PaC, PgB, PhA, PhB, SeA, SeB, WcA, WcB, WcC, and WfA).	Sugar maple	65–70	Slight
Group 2o2. Deep, well drained to moderately well drained, level, medium-textured soils. These soils formed in recent alluvium. Flooding is usually seasonal. The lime content is medium to high. There are few or no soil properties that cause management problems. (Ee, Ge, and Hc).	Sugar maple	65–70	Slight
Group 2r1. Deep, well drained or moderately well drained, moderately sloping, medium-textured and moderately fine textured soils. These soils formed in water-sorted silt, very fine sand, and clay. The lime content is medium to high. The slope causes some management problems. The soils are erodible. (ClC, DuC3, and ShC3).	Sugar maple	65–70	Moderate
Group 2r2. Deep, well-drained to excessively drained, moderately steep, medium-textured or moderately coarse textured soils. These soils formed in glacial till, glacial outwash, or deltaic deposits. The lime content is medium to high. The slope causes some management problems. (ArD, AsD, OnD3, and OpD).	Sugar maple	65–70	Moderate
Group 2r3. Deep, well drained or moderately well drained, sloping and eroded or steep and very steep, medium-textured and moderately fine textured soils. These soils formed in water-sorted silt, very fine sand, and clay. The lime content is medium or high. The slope and the hazard of erosion cause some management problems. (DuD3, ShD3, and ShF).	Sugar maple	65–70	Severe
Group 2r4. Deep, well-drained to excessively drained, moderately steep, and moderately coarse textured soils. These soils formed in water-sorted sandy and gravelly material. The lime content is high. The slope causes some management problems. (PaD).	Sugar maple	65–70	Slight

Most of the woodland consists of small farm woodlots that average about 7 acres per farm. On many farms the woods cover soils that are steep or poorly drained or, in many places, soils that are poorly suited to tillage. About 30 percent of the woodlots are grazed.

Income from the sale of forest products is a minor part of the farm economy. The average annual harvest of 30 board feet per acre of woodland is considerably less than the stands are capable of producing (*5*). Light cutting has resulted in fairly heavy stocking of timber.

The area of commercial forest-type groups in the county (*9*) is as follows: white pine-red pine, 1,400 acres; other softwoods, including plantation, 3,700 acres; oak, 3,800 acres; elm-ash-red maple, 25,100 acres; maple-beech-birch, 25,300 acres; and aspen-birch 2,400 acres.

Woodland suitability grouping

The soils of Monroe County have been placed in 16 woodland suitability groups. The woodland groups and the suitability of the soils for woodland are described in table 4.

Each group is made up of soils that are similar in potential productivity, are suited to similar kinds of wood crops, and require similar management. The slope ranges used in determining woodland suitability groupings are 0 to 8 percent, 8 to 15 percent, 15 to 35 percent, and 35 percent or more. In this survey other slope ranges were also used.

The names of the soils in each group can be readily learned by referring to the "Guide to Mapping Units." In this county land types have not been placed in a woodland suitability group, because they are not suitable for commercial production of trees. These land types are Alluvial land, Cut and fill land, Fresh water marsh, Lake beaches, Made land, Muck (both deep and shallow phases), Pits and Quarries, Rock land, and Urban land.

In addition to a brief description of the soils in the group, table 4 gives an indicator species for each group and the site index for that species. Site index is the height that the tree will attain at 50 years of age. Under management problems for each group, ratings are given for erosion hazard, equipment limitations, seedling mortality, plant competition, and windthrow hazard. The ratings are slight, moderate, or severe, according to the severity of the problems. Also given in the table is species suitability for the soils of each group, both for planting and to favor in existing stands.

of the soils for woodland

Management problems—Continued					Species suitability—	
Equipment limitations	Seedling mortality	Plant competition		Windthrow hazard	For planting—	To favor in stand—
		Hardwoods	Conifers			
Slight	Slight	Moderate	Severe	Slight	White pine, Norway spruce, white spruce, and larches.	Sugar maple, white oak, basswood, white pine, hemlock, and yellow birch.
Slight	Slight	Moderate	Severe	Slight	White pine, Norway spruce, black walnut, and larches.	Sugar maple, white pine, white ash, and basswood.
Slight	Slight	Moderate	Severe	Slight	White pine, Norway spruce, white spruce, larches, and black locust.	Sugar maple, white pine, basswood, white ash, and black cherry.
Moderate	Slight	Moderate	Severe	Slight	Norway spruce, white spruce, white pine, and larches.	Sugar maple, white pine, red oak, black cherry, white ash, and basswood.
Moderate	Slight	Moderate	Severe	Slight	White pine, black walnut, and yellow-poplar.	Sugar maple, basswood, white ash, black walnut, red oak, and black cherry.
Moderate	Slight	Moderate	Severe	Slight	White pine and larches	Sugar maple, white pine, red oak, and hemlock.

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TABLE 4.—*Suita bility of the*

Woodland groups	Potential productivity		Management problems
	Indicator species	Site index	Erosion hazard
Group 2r5. Deep, well-drained to excessively drained, hilly to very steep, medium-textured to coarse-textured soils. These soils formed in glacial till or glacial water deposits. The lime content ranges from low to high. The slope causes some management problems. (AtF3, OnF, OpF, and PaF).	Sugar maple	65–70	Moderate
Group 3o1. Deep or moderately deep, somewhat excessively drained to moderately well drained, level to sloping, medium-textured and moderately coarse textured soils. These soils formed in a wide variety of materials. The lime content ranges from low to high. There are few soil properties that cause management problems. (AnA, AnB, AoB, AoC, IgB, LaB, RgB, and SoB).	Sugar maple	60–65	Slight
Group 3w1. Deep or moderately deep, somewhat poorly drained, level to gently sloping, medium-textured or moderately fine textured soils. These soils formed in shaly glacial till or water-sorted clayey sediments. The lime content is medium to high. Seasonal wetness causes some management problems. (BrA, ChB, Lp, OdA, OdB, and Rb).	Sugar maple	60–65	Slight
Group 3w2. Deep, somewhat poorly drained or moderately well drained, nearly level, moderately coarse textured to medium-textured soils. These soils formed in glacial till and lake-deposited silt and fine sand. The lime content is medium to high. Seasonal wetness causes some management problems. (ApA, Mf, Mn, Ng, Nr, Ov, and Ow).	Sugar maple	60–65	Slight
Group 3s1. Deep, moderately well drained, nearly level to sloping, coarse-textured soils. These soils formed in a mantle of sandy material over clay of lacustrine origin. The lime content is medium to low in the sandy material and high in the underlying clay. The sandy texture of the surface layer and subsoil causes some management problems. (CkA, CkB, and CkC).	Sugar maple	60–65	Slight
Group 4s1. Deep, moderately well drained to excessively drained, nearly level to sloping, coarse-textured soils. These soils formed in water-deposited or wind-deposited fine sand. The lime content is low to medium. The sandy texture of the soil causes some management problems. (CoB, CoC, ElA, and ElB).	White pine	60–70	Slight
Group 4s2. Deep, excessively drained, moderately steep, coarse-textured, eroded soils. These soils formed in water-deposited or wind-deposited fine sand. The lime content is low to medium. The slope and the sandy texture of the soil cause some management problems. (CoD3).	White pine	60–70	Slight
Group 4w1. Deep, somewhat poorly drained to very poorly drained, level or nearly level, medium-textured to coarse-textured soils. These soils formed in glacial or deposited materials. The lime content is low to high. Prolonged or seasonal wetness causes some management problems. (Ca, Cu, Lm, Ly, Ss, St, and Wg).	Red maple	60–70	Slight
Group 5d1. Shallow, somewhat excessively drained or excessively drained, level and gently sloping, medium-textured soils. The lime content is high. Bedrock is at a depth of 10 to 20 inches. This restricts rooting depth and causes some management problems. (BcB).	White pine	50–60	Slight
Group 5w1. Deep, very poorly drained and poorly drained, nearly level soils that have a medium-textured mineral soil or well-developed, organic surface materials. These soils formed in high-lime, mineral, or organic and marly deposits. Prolonged wetness causes management problems. (ChA, Ed, Ha, Le, Lk, and Ma).	Red maple	50–60	Slight

soils for woodland—Continued

Management problems—Continued					Species suitability—	
Equipment limitations	Seedling mortality	Plant competition		Windthrow hazard	For planting—	To favor in stand—
		Hardwoods	Conifers			
Severe	Slight	Moderate	Severe	Slight	White pine and larches	Sugar maple, white pine, red oak, and hemlock.
Slight	Slight	Slight	Moderate	Slight	White pine, Norway spruce, white spruce, and larches.	Sugar maple, white pine, basswood, white ash, red oak, and black cherry.
Moderate	Slight	Moderate	Severe	Moderate	White pine, white spruce, and Norway spruce.	Sugar maple, white pine, red oak, white ash, basswood, and hemlock.
Moderate	Moderate	Moderate	Severe	Moderate	White pine, white-cedar, white spruce, and Norway spruce.	Sugar maple, white pine, basswood, and white-cedar.
Slight	Slight	Slight	Moderate	Slight	White pine, Norway spruce, and white spruce.	Sugar maple, white pine, red oak, and black cherry.
Slight	Severe	Slight	Moderate	Slight	White pine, larches, and red pine.	White pine, sugar maple, red oak, and red pine.
Moderate	Severe	Slight	Moderate	Slight	White pine, black locust, larches, and red pine.	White pine, sugar maple, red oak, black locust, and red pine.
Severe	Severe	Severe	Severe	Severe	White pine and white spruce.	Red maple, white pine, and white-cedar.
Slight	Severe	Slight	Slight	Moderate	White pine	White pine, red oak, hemlock, and sugar maple.
Severe	Severe	Severe	Severe	Severe	Generally unsuitable for planting.	Red maple and white-cedar.

Erosion hazard is rated according to the risk of erosion on woodland where normal practices are used in managing and harvesting the trees. The hazard is slight if erosion control is not important. It is moderate if some attention must be given to check soil loss. It is severe if special treatment or special methods of operation are necessary to minimize erosion.

The ratings for equipment limitations are based on the degree to which the soils and topographic features restrict or prohibit the use of equipment commonly used in managing trees or in harvesting the crop. The limitation is slight if there is little or no restriction on the kind of equipment that can be used or the time of year the equipment can be used. It is moderate if the use of equipment is seasonally limited or if modified equipment or methods of harvesting are needed. The limitation is severe if special equipment is needed or if the use of such equipment is severely restricted by one or more unfavorable soil characteristics. Limitations on the use of equipment are affected by the degree of slope, height of the water table, rockiness, and soil texture.

Seedling mortality refers to the expected degree of mortality of naturally occurring or planted seedlings, as influenced by soil texture, depth, drainage, flooding, height of the water table, and degree of erosion. Normal rainfall, good planting stock, and proper planting methods are assumed. Mortality is slight if the expected loss is less than 25 percent, moderate if it is 25 to 50 percent, or severe if it is more than 50 percent.

Plant competition refers to the invasion or growth of unwanted trees, shrubs, vines, or other plants when openings are made in the canopy. Competition is slight if it does not hinder the establishment of a desirable stand for trees. It is moderate if competing plants delay the establishment of a desirable stand unless intensive cultural measures are applied. It is severe if competition prevents adequate natural or artificial regeneration without intensive site preparation and maintenance treatment, such as weeding. Some soil properties that affect plant competition are available moisture capacity, degree of erosion, and drainage.

Windthrow hazard depends on the development of roots and the capacity of the soils to hold trees firmly against the wind. The hazard is slight if windthrow is not a problem. It is moderate if roots hold the trees firmly, except when the soil is excessively wet or when the wind is strongest. It is severe if many trees are expected to be blown over because their roots do not provide enough stability.

Woodland group symbols

Each woodland suitability group is identified by a three-part symbol, such as 2o2, 3s1, or 4s1.

The first element of the group symbol indicates the woodland suitability class. It expresses site quality by an Arabic numeral ranging from 1 to 5; soils in class 1 have the highest potential productivity.

The second element in the symbol indicates the suitability subclass. It expresses selected soil properties that cause moderate to severe hazards or limitations in woodland use or management, by one of the following:

Subclass x (stoniness or rockiness). Soils that have restrictions or limitations for woodland use or management because of stones or rocks.

Subclass w (excessive wetness). Soils in which excessive water, either seasonally or the year around, causes significant limitations for woodland use or management. These soils have restricted drainage, a high water table, or a flooding hazard that adversely affects stand development or management.

Subclass d (restricted rooting depth). Soils that have restrictions or limitations for woodland use or management because of restricted rooting depth. Soils that are shallow to hard rock, to a hardpan, or to other layers that restrict roots are examples.

Subclass s (sandy soils). Sandy soils that have little or no textural B horizon and have moderate to severe restrictions or limitations for woodland use or management. These soils have limitations for use of equipment, have low moisture-holding capacity, and normally are low in available plant nutrients. However, where these soils occur in river bottoms, available moisture supply generally is very favorable to tree growth.

Subclass r (relief or slope). Soils that have restrictions or limitations for woodland use or management because of the slope.

Subclass o (slight or no limitations). Soils that have no significant restrictions or limitations for woodland use or management.

Some kinds of soil may have more than one set of subclass characteristics. Priority in placing each kind of soil into a subclass is in the order that the subclass characteristics are listed above.

The third element in the symbol indicates the differences in degree of hazards or limitations and the general suitability of the soils for certain kinds of trees.

Use of the Soils for Wildlife [5]

Wildlife is a valuable natural resource in Monroe County. Ring-necked pheasants and rabbits are abundant. In addition, the county has a limited population of white-tailed deer and gray squirrels. In urban areas songbirds are becoming increasingly important around homes. Large numbers of waterfowl and shore birds can be seen along the shores of Lake Ontario.

The kinds and numbers of wildlife that live in a given area are closely related to land use; to the kind, amount, and pattern of vegetation; and to the supply and distribution of water. These are generally related to the kinds of soil.

The soils are rated in table 5 for eight elements of wildlife habitat: grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, conifers, wetland food and cover plants, diked impoundments, and excavated impoundments. Ratings are given for three classes of wildlife: those that find habitat in openland, woodland, and wetland (*1*).

The ratings are based on the relative suitability of the soils for the development and management of each element of wildlife habitat. The class rating is based on an evaluation of the potential for developing all elements of wildlife habitat that are essential to the particular class of wildlife.

[5] By ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, Syracuse.

Elements of wildlife habitat

Each soil is rated in table 5 according to its suitability for various kinds of plants or developments that make up the wildlife habitat.

Grain and seed crops are such seed-producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, and sunflowers. Soils that are well suited to these plants are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They also have high available water capacity and are not subject to frequent flooding. These soils can be safely used for many kinds of grain crops each year. Soils that are not so well suited require more intensive management and are suited to fewer crops.

Grasses and legumes are domestic grasses and legumes that are established by planting. Among these are alfalfa, trefoil, clover, bluegrass, switchgrass, fescue, bromegrass, timothy, orchardgrass, and reed canarygrass. Soils that are rated well suited have slopes of 0 to 15 percent, are well drained or moderately well drained, and have moderately high or high available water capacity. An adequate stand of many kinds of plants can be easily maintained on these soils for at least 10 years without renovation. Occasional flooding and surface stones are not of serious concern, because the soils are seldom tilled.

Wild herbaceous upland plants are perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. Soils that are well suited to these plants vary widely in texture, drainage, and slope. Drainage ranges from well drained to somewhat poorly drained. Slope is not a limiting factor. Stoniness and occasional flooding are not of serious concern.

Hardwood plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. These plants are generally established naturally but are planted in some places. Among the native kinds are oak, beech, cherry, maple, birch, poplar, apple, hawthorn, dogwood, viburnum, grape, and briers. Soils that are well suited to these plants are deep or moderately deep, medium textured or moderately fine textured, and well drained to somewhat poorly drained. Slope and surface stoniness are of little significance.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Among the shrubs that can be grown on soils rated well suited are autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose (fig. 6), highbush cranberry, and silky dogwood. In addition, highbush cranberry, silky dogwood, and other shrubs that have similar site requirements can be planted on soils that have a rating of suited. Hardwoods that are not available commercially can commonly be transplanted successfully.

Conifers consist of cone-bearing evergreen trees and shrubs that are used by wildlife, primarily for cover but also for browse and seeds. Among these are Norway spruce, white pine, white-cedar, and hemlock. It is important that live branches be maintained close to the ground so that food and cover are readily available to rabbits, pheasants, and other small animals. The lower branches die if trees form a dense canopy that shuts out the light.

Soils rated well suited are those on which survival of conifer seedlings is good and growth rate is moderate to rapid. These soils are well drained or moderately well drained and have good available moisture capacity. Management of pure stands of conifers is somewhat difficult because the soils are also suitable for hardwoods, which readily invade the site. Planted conifers should be widely spaced to retard closure of the canopy. On soils rated poorly suited, conifers grow slowly and the canopy closes slowly. Establishment of stands is difficult, however, because of seedling mortality.

Wetland food and cover plants are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. They include smartweed, wild millet, rushes, spikerush, sedges, rice cutgrass, mannagrass, and cattails. Soils rated well suited are nearly level and very poorly drained. Soils rated suited are nearly level and poorly drained. The thickness, stoniness, and texture of the surface layer are of little significance.

Diked impoundments can be developed if the soil is suitable for construction of a low dike to impound shallow water. Included as impoundments are marshes that receive surface runoff and shallow ponds that have been developed as watering places for wildlife. Also included are fields used to grow domestic grains and then flooded in fall with as much as 18 inches of water to provide feeding grounds for ducks.

Soils that are rated well suited to diked impoundments are level or nearly level, more than 6 feet deep over bedrock, and poorly drained or very poorly drained. The subsoil must be very slowly permeable or slowly permeable and deep enough so that 2 feet of material can be left in place over limestone, sandstone, and other hard bedrock to prevent seepage through cracks in the rock.

Excavated impoundments are level ditches and potholes constructed in soils that have a high water table. These are used to create open-water areas, primarily for waterfowl. Well-suited soils are nearly level, more than 6 feet deep over bedrock, and poorly drained or very poorly drained. These soils have a seasonal high water table within 6 inches of the surface. The subsoil must be very slowly permeable or slowly permeable and deep enough so that at least 2 feet of material can be left in place over limestone, sandstone, or other hard bedrock to prevent seepage through cracks in the rock.

Detailed field investigation of soils and site is needed to determine feasibility of diked impoundments and excavated impoundments. These uses do not include fishponds.

Kinds of wildlife

The ratings for openland, woodland, and wetland wildlife are based on the ratings for elements of wildlife habitat. For example, the ratings for openland wildlife are based on the ratings for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and conifers. The ratings for woodland wildlife are based on the ratings listed for all these elements except grain and seed crops. Those for wetland wildlife are based on the ratings for wetland food and cover plants, shallow diked impoundments, and shallow excavated impoundments.

Examples of openland wildlife are pheasants, meadowlarks, field sparrows, doves, cottontail rabbits, red foxes, and woodchucks. These birds and mammals normally

TABLE 5.—*Rating of the*

[A rating of well suited means that limitations are slight, of suited means that limitations are moderate, and of poorly suited means that name of the mapping unit in

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants
Alluvial land: Al. Estimates are not given, because the soil material is variable.				
Alton: AnA, AnB, AoB, AoC	Suited	Well suited	Well suited	Suited
Appleton: ApA	Suited	Suited	Well suited	Well suited
Arkport:				
ArB, ArC, AsC	Suited	Well suited	Well suited	Suited
ArD, AsD	Poorly suited	Suited	Well suited	Suited
AtF3	Unsuited	Unsuited	Well suited	Suited
Benson: BcB	Suited	Suited	Suited	Suited
Brockport: BrA	Suited	Suited	Well suited	Well suited
Canandaigua: Ca	Unsuited	Poorly suited	Poorly suited	Suited
Cayuga:				
CeA	Suited	Well suited	Well suited	Well suited
CeB	Suited	Well suited	Well suited	Well suited
Cazenovia:				
CgA	Suited	Well suited	Well suited	Well suited
CgB	Suited	Well suited	Well suited	Well suited
Churchville:				
ChA	Suited	Suited	Well suited	Well suited
ChB	Suited	Suited	Well suited	Well suited
Claverack:				
CkA	Suited	Well suited	Well suited	Suited
CkB, CkC	Suited	Well suited	Well suited	Suited
Collamer:				
ClA, CmA	Suited	Well suited	Well suited	Well suited
ClB, ClC, CmB	Suited	Well suited	Well suited	Well suited
Colonie:				
CoB, CoC, CoD3	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Cosad: Cu	Poorly suited	Suited	Suited	Suited
Cut and fill land: Cw. Estimates are not given, because the soil material is variable.				
Dunkirk:				
DuB	Suited	Well suited	Well suited	Well suited
DuC3	Poorly suited	Well suited	Well suited	Well suited
DuD3	Unsuited	Suited	Well suited	Well suited
Edwards muck: Ed	Unsuited	Poorly suited	Poorly suited	Suited
Eel: Ee	Suited	Well suited	Well suited	Well suited
Elnora: ElA, ElB	Poorly suited	Suited	Suited	Suited
Fresh water marsh: Fw. Estimates are not given, because the soil material is variable.				
Galen: GaA, GaB	Suited	Well suited	Well suited	Well suited
Genesee: Ge	Suited	Well suited	Well suited	Well suited

soils for wildlife habitat

limitations are severe. Variants of Collamer, Lakemont, Niagara, and Sun serles can be identified by referring to the symbol and the the "Guide to Mapping Units"]

Elements of wildlife habitat—Continued				Classes of wildlife		
Conifers	Wetland food and cover plants	Diked impoundments	Excavated impoundments	Openland	Woodland	Wetland
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Unsuited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Poorly suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Suited	Suited	Suited	Suited	Poorly suited	Suited	Suited.
Suited	Unsuited	Suited	Poorly suited	Well suited	Well suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Suited	Unsuited	Poorly suited	Unsuited	Suited	Suited	Poorly suited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Unsuited	Suited	Suited	Poorly suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Well suited	Unsuited	Suited	Poorly suited	Poorly suited	Suited.
Well suited	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Poorly suited	Unsuited	Well suited	Well suited	Poorly suited.

TABLE 5.—*Rating of the soils*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants
Halsey: Ha	Unsuited	Poorly suited	Poorly suited	Suited
Hamlin: Hc	Suited	Well suited	Well suited	Well suited
Hilton:				
HfA, HlA	Suited	Well suited	Well suited	Well suited
HfB, HlB	Suited	Well suited	Well suited	Well suited
HmA	Suited	Suited	Well suited	Well suited
HmB	Suited	Suited	Well suited	Well suited
Honeoye:				
HnB, HnC, HoB	Suited	Well suited	Well suited	Well suited
HoA	Suited	Well suited	Well suited	Well suited
Hudson: HuB	Suited	Well suited	Well suited	Well suited
Ira: IgB	Suited	Well suited	Well suited	Suited
Lairdsville: LaB	Suited	Well suited	Well suited	Well suited
Lake beaches: Lb. Estimates are not given, because the soil material is variable.				
Lakemont: Le, Lk	Unsuited	Poorly suited	Poorly suited	Suited
Lamson: Lm	Unsuited	Poorly suited	Poorly suited	Suited
Lima:				
LnA	Suited	Well suited	Well suited	Well suited
LnB, LoB	Suited	Well suited	Well suited	Well suited
Lockport: Lp	Suited	Suited	Well suited	Well suited
Lyons: Ly	Unsuited	Poorly suited	Poorly suited	Suited
Madalin: Ma	Unsuited	Poorly suited	Poorly suited	Suited
Made land: Mb. Estimates are not given, because the soil material is variable.				
Madrid:				
MdA	Well suited	Well suited	Well suited	Well suited
MdB, MdC	Suited	Well suited	Well suited	Well suited
MeB	Poorly suited	Suited	Well suited	Well suited
Massena: Mf	Suited	Suited	Well suited	Well suited
Minoa: Mn	Suited	Suited	Well suited	Well suited
Muck:				
Mr	Unsuited	Poorly suited	Poorly suited	Suited
Ms	Unsuited	Poorly suited	Poorly suited	Suited
Niagara: Ng, Nr	Suited	Suited	Well suited	Well suited
Odessa:				
OdA	Suited	Suited	Well suited	Well suited
OdB	Suited	Suited	Well suited	Well suited
Ontario:				
OfB, OfC, OnB, OnC	Suited	Well suited	Well suited	Well suited
OnC3	Poorly suited	Well suited	Well suited	Well suited
OnD3	Unsuited	Suited	Well suited	Well suited
OnF	Unsuited	Unsuited	Well suited	Well suited
OpC	Suited	Well suited	Well suited	Suited
OpD	Poorly suited	Suited	Well suited	Suited
OpF	Unsuited	Unsuited	Well suited	Suited

for wildlife habitat—Continued

Elements of wildlife habitat—Continued				Classes of wildlife		
Conifers	Wetland food and cover plants	Diked impoundments	Excavated impoundments	Openland	Woodland	Wetland
Poorly suited	Well suited	Unsuited	Poorly suited	Poorly suited	Poorly suited	Poorly suited.
Well suited	Unsuited	Poorly suited	Unsuited	Well suited	Well suited	Poorly suited.
Well suited	Unsuited	Suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Poorly suited	Poorly suited	Suited	Suited	Poorly suited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Poorly suited	Unsuited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Suited	Unsuited	Well suited	Well suited	Poorly suited.
Suited	Unsuited	Suited	Poorly suited	Suited	Suited	Suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Suited	Suited	Well suited	Poorly suited	Suited	Suited.
Suited	Well suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Well suited	Unsuited	Suited	Poorly suited	Well suited	Well suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Poorly suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Suited	Suited	Suited	Suited	Poorly suited	Suited	Suited.
Suited	Suited	Suited	Well suited	Poorly suited	Suited	Suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Poorly suited	Poorly suited	Poorly suited	Suited	Well suited	Poorly suited.
Suited	Well suited	Unsuited	Suited	Poorly suited	Poorly suited	Poorly suited.
Suited	Well suited	Poorly suited	Poorly suited	Poorly suited	Poorly suited	Poorly suited.
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Poorly suited	Suited	Unsuited	Suited	Well suited	Suited.
Suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Unsuited	Suited	Unsuited.

TABLE 5.—*Rating of the soils*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood plants
Ovid:				
Ov, Ow	Suited	Suited	Well suited	Well suited
Palmyra:				
PaA, PaB, PaC, PgB	Suited	Well suited	Well suited	Suited
PaD	Poorly suited	Suited	Well suited	Suited
PaF	Unsuited	Unsuited	Well suited	Suited
Phelps: PhA, PhB	Suited	Well suited	Well suited	Suited
Pits and Quarries: Pu. Estimates are not given, because the soil material is variable.				
Rhinebeck: Rb	Suited	Suited	Well suited	Well suited
Riga: RgB	Suited	Well suited	Well suited	Well suited
Rock land: Ro				
Schoharie:				
SeA	Suited	Well suited	Well suited	Well suited
SeB	Suited	Well suited	Well suited	Well suited
ShC3	Poorly suited	Well suited	Well suited	Well suited
ShD3	Unsuited	Suited	Well suited	Well suited
ShF	Unsuited	Unsuited	Well suited	Well suited
Sodus: SoB	Suited	Well suited	Well suited	Suited
Sun:				
Ss	Unsuited	Poorly suited	Poorly suited	Suited
St	Unsuited	Unsuited	Suited	Suited
Urban land: Ub. Estimates are not given, because the soil material is variable.				
Wampsville:				
WcA	Well suited	Well suited	Well suited	Well suited
WcB, WcC	Suited	Well suited	Well suited	Well suited
Wassaic: WfA	Suited	Suited	Well suited	Suited
Wayland: Wg	Unsuited	Poorly suited	Poorly suited	Suited

for wildlife habitat—Continued

Elements of wildlife habitat—Continued				Classes of wildlife		
Conifers	Wetland food and cover plants	Diked impoundments	Excavated impoundments	Openland	Woodland	Wetland
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Unsuited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Poorly suited	Suited	Suited	Suited	Well suited	Suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Suited	Poorly suited	Well suited	Well suited	Suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Poorly suited	Well suited	Suited	Suited	Poorly suited	Poorly suited	Suited.
Poorly suited	Well suited	Suited	Unsuited	Poorly suited	Poorly suited	Suited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Suited	Poorly suited	Poorly suited	Poorly suited	Suited	Poorly suited.

Figure 6.—**A planting of multiflora rose hedge for feed and winter cover for small game and songbirds.**

make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife are such birds and mammals as ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, gray and red squirrels, gray foxes, white-tailed deer, and raccoons.

Wetland wildlife includes ducks, geese, rails, herons, shore birds, red-wing blackbirds, mink, muskrat, and beaver. These birds and mammals normally find habitat around ponds, marshes, and swamps, or in other wet areas.

Suitability ratings

The ratings for elements of wildlife habitat are useful in—

1. Selecting the best soils for creating, improving, or maintaining specific elements of wildlife habitat.
2. Determining the relative intensity of management required for individual elements of wildlife habitat.
3. Avoiding sites that would be difficult or not feasible to manage.

The ratings for kinds of wildlife can be used in—

1. Planning the broad use of land for wildlife refuges, nature study areas, or other developments for wildlife.
2. Determining areas that are suitable for acquisition for wildlife development.

Engineering Uses of the Soils [6]

This section provides information that is useful to engineers and others who use soil as structural material or foundation material on which structures are built. In this section are estimates and interpretations of some soil properties that are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. Among the properties important in engineering are permeability, shear strength, density, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and pH. Also important are depth to the water table, depth to bedrock, and topography.

Information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing sites for industrial, commercial, residential, and recreational uses.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground water conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction material.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining similar structures on like soils.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be used readily by others.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

[6] By JOHN B. FLECKENSTEIN, senior agronomist, New York State Department of Transportation, Bureau of Soil Mechanics, and WALTER S. ATKINSON, State conservation engineer, Soil Conservation Service.

With the use of the soil map for identification, the engineering interpretations in this section can be useful for many purposes. It should be emphasized, however, that these interpretations do not eliminate the need for sampling and testing and engineering analysis at the site of the proposed engineering works. In most places the intensity of investigation needed is proportional to the weight of the loads to be applied, to the depth and amount of earthwork involved, and to the cost of the planned structure. Nevertheless, this engineering section, with the soil map and the soil descriptions, is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Soil properties generally are estimated to a depth of about 5 or 6 feet. Consequently, the interpretations affecting engineering practices are limited to this depth of investigation, and normally do not apply to a greater depth.

The user should be cautioned not to apply specific values to the estimated values for bearing capacity. Also, soil mapping units shown on the maps in this survey may include small areas of a different soil material. These included soils may be as much as 2 acres in size. They are too small to be mapped separately but may be important in engineering planning.

Much of the information in this section is given in tables. Table 6 contains test data of selected soils in the county. Table 7 lists the soils and gives an estimate of their properties. In table 8 are interpretations of the engineering properties of the soils.

Many of the terms used are defined in this section. Others are defined in the Glossary.

Engineering classification systems

Engineers generally classify soils according to a system approved by the American Association of State Highway Officials (AASHO) (*2*) or according to the Unified classification system adopted by the United States Department of Defense (*10*). Agricultural scientists, in classifying soil texture, refer to a system used by the U.S. Department of Agriculture (*7*). According to the USDA system, textural classification depends on the size distribution of mineral particles. Those less than 2 millimeters in diameter determine the textural classes of the fine earth, such as loam, silt loam, or fine sandy loam. For soils in which 15 percent or more of the soil mass consists of particles larger than 2 millimeters, the textural classes are denoted by such names as gravelly sandy loam, channery silt loam, or cobbly loam.

Most highway engineers classify soil materials in accordance with the AASHO system. This system is based on field performance in relation to particle-size distribution, liquid limit, and plasticity index of soil materials. All mineral soils having about the same general load-carrying capacity are grouped into seven basic groups, although the range in load-carrying capacity within each group is wide and there is an overlapping in load-carrying capacity from one group to another. The groups range from A–1, the best soils for subgrade, to A–7, the poorest for subgrade. The relative engineering value of each group is indicated by an index number that ranges from 0 for the best to 20 for the poorest.

Some engineers prefer to use the Unified soil classification system. In this system soils are identified according to their texture and plasticity and are grouped according to their performance as engineering construction materials. Letters are used to designate each of 15 possible classes. The letters G, S, C, M, and O stand for gravel, sand, clay, silt, and organic material respectively. The letters W, P, L, and H refer to well graded, poorly graded, low liquid limit, and high liquid limit, respectively. In this system SM and GM are sands and gravel that include fines of silt, ML and CL are silts and clays that have a liquid limit below 50 percent, and MH and CH are silts and clays that have a liquid limit above 50 percent. Soils on the borderline between two classes are designated by symbols for both classes, for example, SM–SC or ML–CL.

Engineering test data

Samples were taken from several soil series that are extensive in Monroe County. Some series were sampled at more than one location. To help evaluate the soil material for engineering purposes, laboratory tests of the samples were made according to standard procedures and the test data are given in table 6. These soils formed in highly variable glacial till or water-deposited material, and consequently, the range in texture, or grain size, of some soils is fairly wide. The engineering classifications given in table 6, therefore, do not apply in every place where the soils are mapped, but they do apply to the soils as they occur in most of the county. Also, for the engineering classifications in table 6, coarse fragments larger than 3 inches in diameter were not considered. Most soils were tested to a depth of 6 feet or less; consequently, the data cannot be used for estimating properties at a depth of more than 6 feet.

Some of the column headings in the table are self-explanatory. The few that are not are further explained as follows.

Moisture-density relations are obtained by compacting soil material at a successively higher moisture content. Assuming that the compactive effort remains constant, the dry density of the compacted material increases as the moisture content increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Moisture-density relationship is important in earthwork. As a rule, optimum strength is obtained for any given compactive effort if the soil is compacted when it is at approximately the optimum moisture content. Maximum dry density is expressed as pounds per cubic foot.

The moisture content generally expressed as a percentage is the ratio of the weight of water in the soil to the ovendry weight of the solid material.

Percolation refers to the downward or lateral movement of water through the soil, and testing is made to determine the absorptive capacity of the soil mass. The percolation rate, as expressed in table 6, is given in minutes per inch.

The lineal shrinkage indicates that change in volume of the soil mass that occurs when the moisture content is reduced from a stipulated percentage to the content at the shrinkage limit. As moisture is removed, the volume of a soil decreases in direct proportion to the loss of moisture until the shrinkage limit is reached. Beyond the shrinkage limit, more moisture may be removed, but the volume of the soil does not change.

Mechanical analyses show the percentage, by weight, of soil particles that pass sieves of specified sizes. Sand

TABLE 6.—*Engineering*

[Tests performed by the New York State Department of Transportation, Bureau of Soil Mechanics, in cooperation with U.S. Department Officials (AASHO). The

Soil name and location	Parent material	SCS report No. S64NY– 28—	Depth from surface	Moisture-density[1]				Percolation rate[3]	Lineal shrinkage	Reaction	Organic matter[4]
				Maximum dry density	Optimum moisture	In-place dry density	In-place moisture content				
			In.	*Lb./cu. ft.*	*Pct.*	*Lb./cu. ft.*	*Pct.*	*Min./in.*	*Pct.*	*pH*	*Pct.*
Churchville silt loam:											
Town of Henrietta, 1,500 feet north of junction of Maple (Bailey) Road and John Street, 500 feet west of John Street. (Modal profile.)	Lacustrine sediments of reddish clay underlain by calcareous, gravelly and medium-textured to moderately fine textured glacial till.	12–1	0–8	87	31	76	21	-------	14. 0	6. 9	6. 3
		12–2	8–17	93	27	85	20	-------	15. 4	7. 5	. 9
		12–3	17–38	91	28	94	20	>120. 0	12. 6	7. 8	. 6
		12–4	38–43	132	9	133	8	>120. 0	6. 4	7. 8	------
Collamer silt loam:											
Town of Webster, 3,520 feet west of junction of Holt and Lake Roads, 200 feet west of the main road in Boy Scout camp. (Modal profile.)	Calcareous lacustrine silt and very fine sand and thin lenses of clay.	4–1	0–9	97	22	80	8	-------	5. 0	5. 0	4. 1
		4–2	9–14	------	------	------	-------	-------	------	------	------
		4–3	14–30	110	17	105	12	29. 0	8. 0	5. 8	. 5
		4–4	30–41	107	18	99	13	-------	5. 0	6. 4	------
		4–5	41–55	111	16	106	11	30. 0	2. 0	7. 9	------
Town of Greece, 1,100 feet north of junction of Manitou and Frisbee Hill Roads, 350 feet east of Manitou Road. (Formed over till.)	Multiple layers of neutral to calcareous lacustrine silt and very fine sand overlying lacustrine silt and clay underlain by water-worked sandy till.	17–1	0–9	97	21	84	12	-------	4. 4	5. 9	3. 8
		17–2	9–16	113	14	------	8	-------	2. 0	6. 0	1. 7
		17–3	16–22	104	20	93	15	28. 0	7. 0	6. 6	. 7
		17–4	22–43	104	20	96	15	-------	6. 0	7. 7	------
		17–5	43–48	125	11	124	9	62. 0	1. 0	7. 9	------
Colonie loamy fine sand:											
Town of Henrietta, 2,500 feet west of junction of Jefferson Road and John Street, 500 feet south of Jefferson Road. (Modal profile.)	Lacustrine and eolian fine sand.	11–1	0–7	106	16	91	7	-------	1. 0	4. 8	2. 5
		11–2	7–14	108	14	93	5	-------	0	5. 2	. 6
		11–3	14–21	110	14	98	4	-------	0	5. 3	------
		11–4	21–27	110	14	97	4	1. 0	0	5. 7	------
		11–5	27–51	107	14	94	4	-------	0	5. 9	------
		11–6	51–57	105	15	------	6	-------	0	5. 8	------
		11–7	57–60	117	12	98	13	13. 0	1. 0	5. 7	------
Town of Pittsford, one-half mile south of junction of Marsh Road and New York State Route 31, 25 feet south of Marsh Road at the edge of borrow pit on New York State Barge Canal property. (Coarser textured than modal profile.)	Lacustrine and eolian fine sand.	1–1	0–11	107	16	91	4	-------	0	5. 2	1. 3
		1–2	11–19	110	14	91	6	-------	0	5. 8	. 5
		1–3	19–38	105	15	88	5	. 8	0	6. 2	. 4
		1–4	38–84	104	15	95	4	. 7	0	6. 4	------
Town of Perinton, 1,050 feet north of junction of Baird and Whitney Roads, 50 feet east of Baird Road. (Finer textured than modal profile.)	Medium acid to calcareous lacustrine and eolian fine and very fine sand.	2–1	0–10	99	20	79	6	-------	1. 2	5. 5	3. 4
		2–2	10–27	99	16	86	5	. 7	0	5. 8	. 8
		2–3	27–42	105	15	103	5	-------	0	5. 7	. 4
		2–4	42–48	103	15	100	6	-------	. 4	6. 7	------
		2–5	48–61	101	22	101	22	-------	4. 0	6. 0	------
		2–6	61–84	103	21	102	23	7. 0	5. 2	7. 9	------

See footnotes at end of table.

test data

of Commerce, Bureau of Public Roads (BPR), in accordance with standard procedures of the American Association of State Highway symbol > means more than]

Mechanical analysis[2]												Liquid limit	Plasticity index	Classification	
Percentage passing sieve—								Percentage smaller than—							
3-in.	1½-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified[5]
												Pct.			
			100	99	98	96	90	(6)				53	20	A-7-5(15)	MH-OH
				100	99	99	97	91	77	62	47	55	28	A-7-6(18)	CH
100	99	99	99	98	97	96	93	88	75	67	48	50	28	A-7-6(17)	CL
97	94	89	78	69	55	50	38	33	22	13	8	18	5	A-4(1)	SM-SC
			100	99	97	96	87	(6)				33	9	A-4(8)	ML-CL
				100	99	98	93	82	56	30	20	30	11	A-6(8)	CL
				100	99	98	81	68	39	18	13	24	9	A-4(8)	CL
				100	99	99	94	76	34	8	4	19	3	A-4(8)	ML
			100	99	96	93	82	(6)				30	10	A-4(8)	CL
100	99	99	97	94	85	79	63	52	26	13	7	22	5	A-4(6)	ML-CL
		100	99	98	95	93	80	65	32	20	16	31	15	A-6(10)	CL
			100	99	97	95	86	71	38	23	15	24	7	A-4(8)	ML-CL
			100	97	88	83	62	49	19	7	6	16	1	A-4(5)	ML
				100	97	82	35	27	9	1	1		(7)	A-2-4(0)	SM
				100	97	79	28	20	3				(7)	A-2-4(0)	SM
				100	97	80	27	20	2				(7)	A-2-4(0)	SM
				100	98	80	21	14	1				(7)	A-2-4(0)	SM
				100	98	78	14	.8					(7)	A-2-4(0)	SM
				100	99	89	17	.5					(7)	A-2-4(0)	SM
				100	97	79	20	16	7	4	4		(7)	A-2-4(0)	SM
				100	98	87	21	15	1				(7)	A-2-4(0)	SM
				100	96	84	20	11	.4				(7)	A-2-4(0)	SM
				100	97	87	22	16					(7)	A-2-4(0)	SM
						100	52	37	3				(7)	A-2-4(3)	ML
					100	98	61	(6)					(7)	A-4(5)	ML
					100	98	49	34					(7)	A-4(3)	SM
					100	97	42	28					(7)	A-4(1)	SM
					100	97	48	36	7	3	2		(7)	A-4(3)	SM
				100	99	98	86	72	38	15	9	26	8	A-4(8)	CL
					100	99	93	74	28	5	2	19	3	A-4(8)	ML

TABLE 6.—*Engineering*

Soil name and location	Parent material	SCS report No. S64NY– 28—	Depth from surface	Moisture-density [1]				Percolation rate [3]	Lineal shrinkage	Reaction	Organic matter [4]
				Maximum dry density	Optimum moisture	In-place dry density	In-place moisture content				
			In.	*Lb./cu. ft.*	*Pct.*	*Lb./cu. ft.*	*Pct.*	*Min./in.*	*Pct.*	*pH*	*Pct.*
Galen very fine sandy loam:											
Town of Webster, 2,400 feet east of junction of Holt and Wall Roads, 170 feet south of Wall Road. (Modal profile.)	Multiple lacustrine deposits of neutral to weakly calcareous fine sand and silt.	5–1	0–7	97	22	70	7	-------	1.0	5.3	2.6
		5–2	7–13	102	18	86	7	-------	.8	5.2	1.7
		5–3	13–25	111	16	104	14	14.0	4.0	5.3	.3
		5–4	25–45	115	14	107	12	-------	1.4	5.2	------
		5–5	45–63	108	18	100	6	-------	0	5.9	------
		5–6	63–67	119	13	122	12	>120.0	.8	6.4	------
Town of Webster, 2,100 feet north of junction of Schlegel and Phillips Roads, 2,000 feet east of Phillips Road. (Finer textured than modal profile.)	Calcareous lacustrine fine sand and very fine sand and silt, mainly very fine and fine sand.	6–1	0–14	103	17	83	6	-------	2.0	6.0	3.0
		6–3	14–18	116	13	-------	7	4.0	1.0	6.0	.7
		[8] 6–4	18–23	120	11	-------	9	-------	2.0	6.7	------
		[8] 6–5	18–23	120	11	-------	11	-------	2.0	7.4	------
		6–6	23–27	119	11	-------	12	-------	2.0	7.8	------
		6–7	27–60	119	13	118	13	>120.0	1.0	7.9	------
Hilton fine sandy loam:											
Town of Henrietta, 3,200 feet south of junction of Jefferson and East River Roads, 800 feet east of East River Road. (Modal profile.)	A thin eolian mantle underlain by calcareous gravelly fine sandy loam till.	10–1	0–9	107	15	94	5	-------	3.2	5.8	1.9
		10–2	9–13	120	11	-------	4	-------	2.0	6.3	.6
		10–3	13–22	112	16	100	6	48.0	5.0	6.8	.3
		10–4	22–32	131	9	125	3	-------	3.4	7.8	------
		10–5	32–52	129	10	122	7	36.0	4.0	7.7	------
Madrid fine sandy loam:											
Town of Penfield, 1,600 feet west of junction of Fairport-Ninemile Point Road, and Penfield Center Road, 50 feet south of Penfield Center Road. (Modal profile.)	Multiple eolian deposits of silt and very fine sand underlain by water-worked till, dominantly sandstone and dolomite.	7–1	0–10	104	17	89	10	-------	2.0	5.2	2.7
		7–2	10–21	109	14	88	11	5.0	1.2	5.5	1.3
		7–3	21–32	119	11	110	7	-------	0	6.0	.2
		7–4	32–44	122	11	-------	11	-------	1.0	7.4	------
		7–5	44–54	-------	------	-------	-------	12.0	.4	7.6	------
Town of Penfield, one-half mile north of junction of Penfield and Salt Roads, 400 feet west of Salt Road. (Not as stony as modal profile.)	Thin eolian mantle of poorly graded silt and very fine sand underlain by neutral to calcareous, water-worked till, dominantly sandstone and limestone.	8–1	0–8	104	17	82	6	-------	2.0	6.3	3.4
		8–2	8–20	116	14	94	5	9.0	1.0	5.6	1.2
		8–3	20–31	117	12	108	5	-------	0	5.6	.4
		8–4	31–46	121	10	-------	7	-------	0	5.1	------
		8–5	40–60	120	13	106	9	73.0	0	6.4	------
Town of Penfield, 2,200 feet east of junction of Fairport and Whalen Roads, 50 feet south of Whalen Road. (Finer textured than modal profile.)	Thin eolian mantle of poorly graded silt and very fine sand underlain by calcareous, water-worked till, dominantly sandstone and limestone.	3–1	0–10	99	20	79	9	-------	3.0	5.2	4.6
		3–2	10–15	110	17	94	11	-------	1.2	5.8	1.2
		3–3	15–18	118	11	-------	-------	-------	.6	6.3	.4
		3–4	18–23	123	12	114	6	30.0	1.8	6.8	------
		3–5	23–48	121	12	110	9	-------	.2	7.9	------
		3–6	48–56	122	9	-------	11	>120.0	.2	7.8	------
Odessa silt loam:											
Town of Henrietta, one mile east of junction of New York State Route 15A and Calkins Road, 1,300 feet south of Calkins Road and the Henrietta Town Hall. (Modal profile.)	Lacustrine sediments of calcareous, reddish silt and clay.	13–1	0–7	91	26	85	15	-------	10.6	5.9	5.9
		13–2	7–23	93	26	93	19	-------	12.0	7.3	1.4
		13–3	23–45	92	28	97	23	-------	12.0	8.0	------
		13–4	45–56	116	15	-------	20	-------	5.2	7.9	------
		13–5	56–60	113	16	-------	22	-------	4.2	7.8	------

See footnotes at end of table.

test data—Continued

Mechanical analysis [2]												Liquid limit	Plasticity index	Classification	
Percentage passing sieve—								Percentage smaller than—							
3-in.	1½-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [5]
												Pct.			
				100	98	95	40	30	6				([7])	A-4(1)	SM
			100	99	98	96	48	35	5				([7])	A-4(3)	SM
				100	97	95	65	54	31	9	6		([7])	A-4(6)	ML
				100	99	98	47	36	13	8	6		([7])	A-4(3)	SM
						100	43	26					([7])	A-4(2)	SM
						100	99	72	55	14	5	3	([7])	A-4(7)	ML
			100	98	95	93	54	([6])					([7])	A-4(4)	ML
		100	99	98	94	89	35	26	7	2	.3		([7])	A-4(0)	SM
			100	96	96	93	52	40	10	5	3		([7])	A-4(3)	ML
			100	99	97	96	65	51	19	9	5	18	3	A-4(6)	ML
				100	99	99	76	58	18	6	4		([7])	A-4(8)	ML
				100	99	98	68	52	13	4	2		([7])	A-4(7)	ML
	100	97	92	89	83	78	58	47	23	10	4	22	3	A-4(5)	ML
	100	99	95	92	86	80	61	48	20	9	6		([7])	A-4(5)	ML
	96	94	92	90	85	80	57	46	23	12	9	21	6	A-4(4)	ML–CL
[9]	96	91	85	81	73	68	48	39	19	9	4	16	3	A-4(3)	SM
[9]	100	86	78	75	69	64	46	37	18	8	4	15	2	A-4(2)	SM
	100	99	93	89	82	77	56	44	14	3	1	22	3	A-4(4)	ML
			96	86	76	70	47	35	9	2	.5		([7])	A-4(2)	SM
	100	99	84	78	70	61	38	29	8	2	.7		([7])	A-4(1)	SM
[10]	100	54	43	42	38	36	23	17	5	2	2		([7])	A-1-b(0)	GM
[10]	59	38	30	26	23	21	13	10	3	1	.8		([7])	A-1-a(0)	GM
	100	98	90	87	81	76	54	([6])					([7])	A-4(4)	ML
100	96	93	84	79	72	66	40	29	6	1	.6		([7])	A-4(1)	SM
	100	97	90	86	79	72	42	32	8	3	1		([7])	A-4(1)	SM
100	99	96	88	85	78	70	39	27	5	3	2		([7])	A-4(1)	SM
100	96	95	88	85	80	74	43	38	11	3	2		([7])	A-4(2)	SM
100	99	97	92	89	83	78	60	([6])					([7])	A-4(5)	ML
100	99	97	92	87	81	75	53	40	11	2	1		([7])	A-4(4)	ML
100	99	99	94	91	85	79	55	43	13	3	1		([7])	A-4(4)	ML
100	96	94	91	88	82	76	51	40	14	6	3		([7])	A-4(3)	ML
[11]	100	98	94	86	82	75	70	44	34	11	4	2	([7])	A-4(2)	SM
[11]	100	98	93	82	77	68	62	36	27	9	3	1	([7])	A-4(0)	SM
					100	97	96	91	([6])				50	19	A-7-5(14)	ML
					100	99	98	97	90	78	71	55	57	31	A-7-6(19)	CH
				100	99	99	99	98	94	87	80	63	53	29	A-7-6(19)	CH
			100	99	97	93	91	82	73	54	22	12	22	7	A-4(8)	CL
		100	99	98	97	95	94	88	80	62	24	11	22	7	A-4(8)	CL

TABLE 6.—*Engineering*

Soil name and location	Parent material	SCS report No. S64NY– 28—	Depth from surface	Moisture-density [1]				Percolation rate [3]	Lineal shrinkage	Reaction	Organic matter [4]
				Maximum dry density	Optimum moisture	In-place dry density	In-place moisture content				
			In.	*Lb./cu. ft.*	*Pct.*	*Lb./cu. ft.*	*Pct.*	*Min./in.*	*Pct.*	*pH*	*Pct.*
Odessa silt loam—Con.											
Town of Henrietta, 2,600 feet south of junction of Lehigh Station Road and New York State Route 15A, 2,000 feet east of New York Route 15A. (Gravel in substratum not contained in the modal profile.)	Lacustrine sediments of calcareous, reddish silt and clay; considerable amount of coarse fragments in the lower part of the profile and some evidence of slight reworking in the lower part of the profile.	14–1	0–11	92	26	86	19	-------	12. 8	7. 1	5. 8
		14–2	11–16	96	22	-------	18	-------	12. 8	7. 3	4. 5
		14–3	16–24	104	20	-------	31	-------	13. 0	7. 6	2. 6
		14–4	24–46	95	20	-------	19	-------	14. 6	7. 3	------
Ontario loam:											
Town of Perinton, 200 feet west and 500 feet south of junction of Ayrault and Lyndon Roads. (Modal profile.)	Calcareous till, dominantly sandstone and limestone.	9–1	0–8	101	19	86	6	-------	5. 0	6. 3	3. 0
		9–2	8–25	112	16	92	6	27. 0	4. 0	6. 4	1. 0
		9–3	25–39	114	15	98	8	-------	7. 0	6. 7	. 3
		9–4	39–49	128	10	120	7	>120. 0	5. 6	7. 9	------
Ontario fine sandy loam:											
Town of Henrietta, one-half mile north of junction of Brooks and East River Roads, 500 feet west of East River Road. (Coarser textured than modal profile.)	Very thin eolian mantle of fine and very fine sand underlain by very stony, calcareous sandy till, dominantly sandstone and limestone.	16–1	0–9	104	17	86	8	-------	3. 6	5. 5	2. 3
		16–2	9–15	122	10	-------	5	-------	3. 0	5. 6	1. 8
		16–3	15–21	125	10	-------	5	32. 0	2. 0	6. 0	. 4
		16–4	21–38	122	12	112	5	-------	7. 0	5. 9	. 4
		16–5	38–42	135	8	125	8	>120. 0	4. 0	7. 9	------
Town of Henrietta, one-fourth mile east of junction of New York State Route 15A and Erie Station Road, 500 feet north of Erie Station Road. (Thinner solum and coarser texture than in modal profile.)	Very thin eolian mantle of fine and very fine sand underlain by multiple deposits of calcareous sandy till, dominantly sandstone and limestone.	15–1	0–8	118	12	97	4	-------	2. 0	5. 1	1. 6
		15–2	8–14	123	10	-------	5	-------	1. 4	5. 7	. 4
		15–3	14–26	124	11	-------	7	-------	3. 6	6. 0	. 4
		15–4	26–42	127	10	122	10	>120. 0	1. 6	7. 8	------

[1] Based on AASHO Designation T 99–57 (*2*).

[2] Mechanical analysis according to AASHO Designation T 88–57. Results by this procedure frequently differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for use in naming textural classes of soils.

[3] Percolation rate is based on standard percolation test given in Bulletin No. 1, New York State Health Department.

[4] Organic-matter content determined by wet combustion method, based on Cornell University agronomy test procedure, as modified by the Bureau of Soil Mechanics.

[5] SCS and BPR have agreed to consider that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. Examples of borderline classifications so obtained are ML–CL, MH–OH, and SM–SC.

[6] Analyses were not made, because the high content of organic matter had a flocculating effect on the inorganic components, and results by the hydrometer method were unreliable.

[7] Nonplastic.

[8] The horizon was discontinuous at the place of sampling.

[9] Coarse fragments, 3 to 10 inches in diameter, made up an estimated 2 percent, by volume, of the horizon. None were discarded.

test data—Continued

Mechanical analysis[2]												Liquid limit	Plasticity index	Classification	
Percentage passing sieve—								Percentage smaller than—						AASHO	Unified[5]
3-in.	1½-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
												Pct.			
-------	100	97	87	85	83	81	72	(6)	------	------	------	43	16	A-7-6(10)	ML-CL
-------	------	100	98	97	94	92	83	74	51	33	18	46	17	A-7-6(12)	ML
-------	------	------	100	99	98	97	92	85	67	53	39	43	22	A-7-6(13)	CL
(12)	------	------	100	99	97	96	92	82	59	43	30	55	26	A-7-6(17)	MH-CH
[13] 97	97	94	89	87	80	75	54	43	17	6	2	26	6	A-4(4)	ML-CL
(13)	100	98	96	93	86	81	56	45	18	8	4	20	3	A-4(4)	ML
[13] 100	96	93	88	85	78	73	53	43	23	11	8	20	6	A-4(4)	ML-CL
[13] 98	98	94	87	83	74	69	50	40	22	10	7	16	4	A-4(3)	SM-SC
(14)	100	95	85	82	73	66	47	38	17	6	3	22	3	A-4(2)	SM
[14] 86	86	84	77	72	62	56	39	30	12	5	2	19	2	A-4(1)	SM
[14] 100	97	95	90	89	76	67	30	23	11	4	3	16	1	A-2-4(0)	SM
(14)	100	97	92	90	83	77	52	43	22	11	11	21	9	A-4(3)	CL
[14] 100	98	94	87	82	75	69	48	38	14	6	3	16	3	A-4(3)	SM
(15)	100	98	89	85	77	71	47	37	14	5	2	------	(7)	A-4(2)	SM
[15] 93	87	85	80	77	70	65	43	34	14	6	2	------	(7)	A-4(2)	SM
(15)	99	97	91	86	80	74	52	42	18	8	6	20	4	A-4(3)	ML
[15] 100	95	90	78	71	63	58	39	31	14	6	3	------	(7)	A-4(1)	SM

[10] Cobblestones and flagstones larger than 3 inches in diameter made up an estimated 70 percent, by volume, of the horizon; also, some coarse fragments larger than 10 inches in diameter were in the horizon; approximately 30 percent of the fragments larger than 3 inches in diameter were discarded.

[11] Cobblestones and a few flagstones larger than 3 inches in diameter and coarse fragments larger than 10 inches in diameter made up an estimated 15 percent, by volume, of the soil horizon. About 2 to 3 percent of the fragments larger than 3 inches in diameter were discarded.

[12] Coarse fragments, mainly gravel, cobblestones, and a few stones, made up approximately 10 percent, by volume, of the horizon. None were discarded.

[13] Cobblestones larger than 3 inches in diameter were common, and there were a few coarse fragments larger than 10 inches in diameter throughout the soil. None were discarded.

[14] A few coarse fragments larger than 10 inches in diameter and some cobblestones larger than 3 inches in diameter occur throughout the solum. None were discarded.

[15] Gravel and cobblestones made up approximately 6 percent, by volume, of the soil mass. None were discarded.

TABLE 7.—*Estimated engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The the instructions for referring to other series that appear in the first column of this table. Variants of Collamer, Lakemont, Niagara,

Soil series and map symbols	Depth to		Depth from surface (typical profile)	Classification
	Bedrock	Seasonal high water table		Dominant USDA texture
	Feet	*Feet*	*Inches*	
Alluvial land: Al.[3] Estimates are not given, because the soil material is variable.				
Alton: AnA, AnB, AoB, AoC	6+	4+	0–16	Gravelly sandy loam and fine sandy loam
			16–32	Very gravelly loam or sandy loam
			32–60	Gravel and sand, stratified
Appleton: ApA	6+	½–1	0–12	Loam
			12–19	Fine sandy loam
			19–30	Loam
			30–50	Loam
*Arkport: ArB, ArC, ArD, AsC, AsD, AtF3 For Dunkirk part of AsC and AsD, and for Dunkirk and Colonie parts of AtF3, see the respective series.	6+	4+	0–12	Very fine sandy loam
			12–44	Loamy very fine sand and thin bands or lamellae of very fine sandy loam.
			44–60	Loamy fine sand and thin bands or lamellae of very fine sandy loam.
Benson: BcB	1–1½		0–18	Channery loam and channery silt loam
			18	Bedrock; hard limestone.
Brockport: BrA	1½–3½]	½–1	0–9	Silty clay loam
			9–30	Clay
			30	Bedrock; soft shale.
Canandaigua: Ca Estimates are not given for depths below 30 inches, because the material is variable.	6+	0–½	0–30	Silt loam and silty clay loam
			30–50	Very fine sand and silt, stratified.
Cayuga: CeA, CeB	4+	1½–2	0–7	Silt loam
			7–37	Clay and silty clay loam
			37–50	Gravelly loam
Cazenovia: CgA, CgB	6+	1½–2	0–12	Gravelly loam and gravelly silt loam
			12–50	Gravelly silty clay loam
Churchville: ChA, ChB	6+	½–1	0–8	Silt loam and silty clay loam
			8–38	Silty clay and clay
			38–51	Gravelly loam
Claverack: CkA, CkB, CkC Estimates are not given for depths below 45 inches, because the material is variable.	6+	1½–2	0–32	Loamy fine sand
			32–45	Clay or silty clay
			45–50	Varved silt and clay and lenses of fine sand.
Collamer: ClA, ClB, ClC	6+	1½–2	0–14	Silt loam and very fine sandy loam
			14–30	Silt loam and silty clay loam
			30–55	Silt loam, silt, and very fine sand in layers and lenses of clay.
CmA, CmB	6+	1½–2	0–14	Silt loam and very fine sandy loam
			14–32	Silt loam, silty clay loam, and sandy clay loam.
			32–48	Gravelly loam and gravelly fine sandy loam

See footnotes at end of table.

properties of the soils

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully and Sun series can be identified by referring to the symbol and the name of the mapping unit in the "Guide to Mapping Units"]

Classification—Continued		Coarse fraction larger than 3 inches	Percentage passing sieve—				Permeability	Available water capacity [1]	Reaction [2]
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
		Percent					*Inches per hour*	*Inches per inch of soil*	*pH range*
SM	A-2 or A-4	<5	65–75	55–65	35–60	20–40	2. 0–6. 3	0. 08–0. 09	5. 0–6. 5
GM	A-1	<10	45–55	35–45	25–40	10–30	>6. 3	0. 05–0. 08	5. 5–7. 3
GP, GW, GP–GM, or GW–GM	A-1	<10	25–45	15–35	10–30	0–10	>6. 3	----------	6. 0–7. 6+
ML, CL, SM, or SC	A-4	<10	80–100	75–95	60–90	40–70	0. 63–2. 0	0. 13–0. 16	6. 0–7. 3
SM or ML	A-4	<10	80–100	75–95	55–85	35–60	0. 63–2. 0	0. 12–0. 15	6. 5–7. 3
CL, ML, SM, or SC	A-4	<10	80–100	70–95	60–90	40–70	0. 20–0. 63	0. 12–0. 16	6. 5–7. 3
CL, ML, SM, or SC	A-4	5–10	75–90	70–85	60–80	40–60	<0. 63	----------	7. 6+
ML	A-4	0	100	100	85–95	50–65	2. 0–6. 3	0. 17	5. 5–7. 3
ML or SM	A-4	0	100	95–100	85–95	40–60	0. 63–6. 3	0. 10–0. 11	5. 5–7. 3
SM	A-2 or A-4	0	100	95–100	65–85	25–40	[4] 0. 63–6. 3+	----------	7. 6+
ML, CL, SM, SC, GM, or GC	A-2, A-4, or A-6	0–10	50–90	45–85	40–85	30–70	0. 63–2. 0	0. 10–0. 19	7. 0–7. 6+
CL, CH, or OL	A-7 or A-6	0	100	90–100	85–100	75–95	<0. 20	0. 15–0. 17	7. 0–7. 6+
CL or CH	A-7	0	100	90–100	80–100	70–95	<0. 20	0. 12–0. 13	7. 0–7. 6+
ML, CL, or OL	A-4 or A-6	0	100	100	90–100	80–90	0. 63–2. 0	0. 17–0. 20	6. 5–7. 3
ML or CL	A-4 or A-6	0	100	95–100	95–100	80–90	0. 63–2. 0	0. 19–0. 20	6. 0–7. 3
CL or CH	A-7 or A-6	0–2	95–100	95–100	95–100	90–100	<0. 63	0. 12–0. 17	6. 0–7. 6+
SM	A-4	5–15	75–90	65–80	50–65	35–50	<0. 63	----------	7. 6+
ML, SM, or GM	A-4	0–10	75–85	70–80	60–75	45–65	0. 63–2. 0	0. 12–0. 16	5. 0–7. 3
ML or CL	A-4	0–10	65–80	60–75	55–75	50–70	<0. 63	0. 10–0. 13	5. 0–7. 6+
ML, CL, MH, or OH	A-7 or A-6	0	100	95–100	95–100	85–95	0. 63–2. 0	0. 19–0. 20	6. 1–7. 3
CH or CL	A-7	0	95–100	95–100	95–100	90–100	<0. 20	0. 12–0. 14	6. 1–7. 6+
SM or SC	A-4	5–15	75–85	65–80	50–65	35–50	<0. 63	----------	7. 6+
SM	A-2	----------	95–100	95–100	65–85	25–35	>2. 0	0. 09–0. 11	5. 0–6. 0
CL or CH	A-7	----------	95–100	95–100	85–100	80–95	<0. 20	----------	6. 1–7. 3
ML or CL	A-4	0	100	100	90–100	80–90	0. 63–2. 0	0. 17–0. 20	5. 1–7. 3
CL	A-6 or A-4	0	100	100	95–100	85–95	<0. 63	0. 17–0. 20	5. 1–7. 3
ML or CL	A-4	0	100	100	95–100	80–95	<0. 63	----------	6. 5–7. 6+
ML or CL	A-4	0	95–100	90–100	85–100	60–85	0. 63–2. 0	0. 15–0. 20	5. 1–7. 3
CL or ML	A-4 or A-6	0	95–100	90–100	85–100	65–90	<0. 63	0. 14–0. 20	5. 6–7. 6+
SM or ML	A-2 or A-4	5–10	65–85	60–80	50–75	30–60	<0. 63	----------	7. 6+

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to		Depth from surface (typical profile)	Classification
	Bedrock	Seasonal high water table		Dominant USDA texture
	Feet	*Feet*	*Inches*	
Colonie: CoB, CoC, CoD3	6+	4+	0–57	Loamy fine sand and fine sand
Cosad: Cu	6+	½–1	0–30	Loamy fine sand
			30–52	Silty clay
Cut and fill land: Cw. Estimates are not given, because the materials are variable.				
Dunkirk: DuB, DuC3, DuD3	6+	4+	0–17	Silt loam
			17–31	Silty clay loam
Estimates are not given for depths below 31 inches, because the material is variable.			31–56	Silt and clay in layers.
Edwards: Ed	6+	0	0–29	Muck
			29–50	Marl
Some estimates are not given, because the soil material is variable.				
Eel: Ee [3] [5]	1½–3½+	1½–2	0–48	Silt loam and very fine sandy loam
Elnora: ElA, ElB	6+	1½–2	0–50	Loamy fine sand
Fresh water marsh: Fw [3] Estimates are not given, because the soil material is variable.				
Galen: GaA, GaB	6+	1½–2	0–85	Very fine sandy loam and loamy very fine sand.
Genesee: Ge [3]	6+	3½	0–51	Silt loam, loam, and very fine sandy loam
Halsey: Ha	6+	0–½	0–15	Gravelly loam
			15–27	Gravelly very fine sandy loam and gravelly fine sandy loam.
Estimates are not given for depths below 27 inches, because the material is variable.			27–54	Sand and gravel, poorly sorted or stratified.
Hamlin: Hc [3]	4+	1½–2	0–40	Silt loam and very fine sandy loam
			40–50	Gravelly fine sandy loam or sand and gravel, stratified.
Estimates are not given for depths below 40 inches, because the material is variable.				
*Hilton: HfA, HfB, HlA, HlB, HmA, HmB [6]	4+	1½–2	0–17	Loam and fine sandy loam
			17–41	Loam, sandy clay loam, and gravelly loam
For Cazenovia part of HmA and HmB, see Cazenovia series.			41–50	Gravelly loam and gravelly fine sandy loam
Honeoye: HnB, HnC	6+	2½+	0–26	Silt loam and loam
			26–52	Gravelly loam
HoA, HoB. Units HoA and HoB are underlain by a limestone substratum at a depth of 3½ to 6 feet; otherwise, soil properties are the same as in units HnB and HnC.				
Hudson: HuB	6+	1½–2	0–12	Silt loam
			12–34	Clay and silty clay
			34–50	Clay and thin lenses of silt or sand
Ira: IgB	4+	1½–2	0–18	Gravelly fine sandy loam and gravelly silt loam.
			18–51	Gravelly fine sandy loam or gravelly loam fragipan and till.
Lairdsville: LaB	1½–3½	1½–2	0–8	Silt loam
			8–28	Clay and silty clay
			28	Bedrock; soft shale.

See footnotes at end of table.

properties of the soils—Continued

Classification—Continued		Coarse fraction larger than 3 inches	Percentage passing sieve—				Permeability	Available water capacity [1]	Reaction [2]
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
		Percent					*Inches per hour*	*Inches per inch of soil*	*pH range*
SM	A-2	0	100	100	95–100	10–35	>6. 3	0. 08–0. 11	5. 0–6. 5
SM	A-2	0	100	100	95–100	15–35	>6. 3	0. 09–0. 11	5. 5–7. 3
CL or CH	A-4 or A-7	0	100	100	95–100	85–95	<0. 20	----------	7. 6+
ML or CL	A-4	0	100	95–100	85–100	60–85	0. 63–2. 0	0. 19–0. 20	5. 0–6. 0
CL	A-6 or A-4	0	100	95–100	95–100	75–90	0. 20–0. 63	0. 16–0. 20	5. 0–6. 0
Pt	----------	0	----------	----------	----------	----------	>6. 3	0. 50	6. 6–7. 5
----------	----------	----------	----------	----------	----------	----------	----------	0. 20	7. 6+
ML	A-4	0	95–100	90–100	85–100	60–85	0. 63–2. 0	0. 14–0. 20	6. 6–7. 6+
SM	A-2	0	100	100	95–100	20–35	>6. 3	0. 09–0. 11	5. 0–6. 5
SM or ML	A-4	0	100	95–100	90–100	40–65	0. 63–6. 3	0. 14–0. 16	5. 6–7. 6+
ML	A-4	0	95–100	95–100	90–100	60–80	0. 63–2. 0	0. 16–0. 20	6. 1–7. 6+
ML or SM	A-4 or A-2	<2	70–80	65–75	55–70	30–55	0. 63–2. 0	0. 11–0. 13	5. 5–7. 3
GM, SM, GC, or SC	A-2 or A-4	<5	60–70	55–65	40–60	25–40	>2. 0	0. 08–0. 10	6. 5–7. 6+
ML	A-4	0	95–100	95–100	80–95	60–85	0. 63–2. 0	0. 19–0. 20	6. 1–7. 3
ML or SM	A-4 or A-2	<2	75–95	70–95	60–85	30–60	0. 63–2. 0	0. 11–0. 16	5. 6–7. 3
SM–SC, ML, or CL	A-4	<5	75–95	70–90	60–85	35–60	0. 20–2. 0	0. 09–0. 15	5. 6–7. 6+
SM or SC	A-4	5–10	70–90	65–85	55–75	35–50	<0. 63	----------	7. 6+
ML or CL	A-4 or A-6	<5	85–95	80–90	70–90	55–70	0. 63–2. 0	0. 14–0. 18	5. 6–7. 3
ML, CL, GM, or GC	A-4	5–10	65–75	60–70	50–65	40–55	<0. 63	0. 10–0. 12	7. 6+
ML or CL	A-4 or A-6	0	100	100	90–100	70–90	0. 63–2. 0	0. 18–0. 20	5. 6–7. 3
CL	A-7 or A-6	0	100	100	90–100	80–95	<0. 20	0. 12–0. 14	5. 6–7. 3
CL	A-7, A-6, or A-4	0	100	100	90–100	75–95	<0. 20	----------	6. 6–7. 6+
GM, SM, ML, or GC	A-4 or A-2	5–10	60–75	55–70	40–65	25–55	0. 63–2. 0	0. 10–0. 14	4. 5–6. 0
GM or GC	A-4, A-2, or A-1	10–15	45–70	40–65	30–60	20–45	<0. 20	----------	5. 5–7. 6+
ML or CL	A-4 or A-6	0	95–100	90–100	80–100	65–90	0. 63–2. 0	0. 19–0. 20	5. 1–6. 5
ML or CL	A-6 or A-7	0	90–95	85–95	75–95	70–90	<0. 20	0. 11–0. 13	6. 1–7. 3+

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to		Depth from surface (typical profile)	Classification
	Bedrock	Seasonal high water table		Dominant USDA texture
	Feet	*Feet*	*Inches*	
Lake beaches: Lb. Estimates are not given, because the soil material is variable.				
Lakemont:				
Le	6+	0–½	0–8	Silt loam
			8–36	Clay and silty clay
			36–60	Varved clay and thin lenses of silt and very fine sand.
Lk	6+	0–½	0–7	Silt loam
			7–28	Silty clay and clay
			28–51	Gravelly sandy loam
Lamson: Lm. Estimates are not given for depths below 36 inches, because the material is variable.	4+	0–½	0–8	Very fine sandy loam
			8–36	Fine sandy loam, very fine sandy loam, and loamy very fine sand.
			36–54	Very fine sandy loam, loamy very fine sand, fine sand and silt, stratified.
*Lima:				
LnA, LnB	6+	1½–2	0–14	Silt loam and loam
			14–25	Loam and silt loam
			25–51	Gravelly loam
LoB. To depth of limestone substratum, estimates for Lima part of LoB are the same as for LnA and LnB; estimates for Cazenovia part are the same as for CgA and CgB. For properties of Cazenovia part of LoB, see the Cazenovia series.	3½–6			
Lockport: Lp	1½–3½	½–1	0–8	Silty clay loam
			8–26	Clay and silty clay
			26	Bedrock; soft shale.
Lyons: Ly	4+	0–½	0–8	Silt loam
			8–20	Loam
			20–50	Gravelly fine sandy loam
Madalin: Ma	6+	0–½	0–10	Silty clay loam
			10–34	Clay and silty clay
			34–52	Varved clay, silt, and very fine sand
Made land: Mb. Estimates are not given, because the material is variable.				
Madrid: MdA, MdB, MdC, MeB [7]	6+	4+	0–32	Fine or very fine sandy loam and gravelly fine sandy loam.
			32–44	Gravelly and cobbly sandy loam and fine sandy loam.
			44–54	Very gravelly and cobbly or gravelly fine sandy loam.
Massena: Mf	6+	½–1½	0–12	Fine sandy loam
			12–50	Gravelly fine sandy loam
Minoa: Mn	6+	½–1	0–10	Very fine sandy loam
			10–54	Loamy very fine sand, very fine sandy loam, and loamy fine sand.

See footnotes at end of table.

properties of the soils—Continued

Classification—Continued		Coarse fraction larger than 3 inches	Percentage passing sieve—				Permeability	Available water capacity [1]	Reaction [2]
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
		Percent					*Inches per hour*	*Inches per inch of soil*	*pH range*
ML or CL	A–4 or A–6	0	100	95–100	95–100	80–90	0. 63–2. 0	0. 19–0. 20	6. 1–7. 3
CH or CL	A–7	0	100	100	95–100	90–100	<0. 20	0. 13–0. 14	6. 1–7. 6+
CL, MH, or CH	A–7, A–4, or A–6	0	95–100	95–100	90–100	80–95	<0. 20	----------	7. 6+
ML or CL	A–6 or A–4	<2	90–100	85–100	75–100	65–90	0. 63–2. 0	0. 17–0. 20	6. 1–7. 3
CL or CH	A–6 or A–7	<5	90–100	85–100	75–100	70–95	<0. 20	0. 11–0. 14	6. 1–7. 3+
SM or SC	A–4 or A–2	10–15	65–85	60–80	40–70	25–45	<0. 63	----------	7. 6+
ML, SM, or OL	A–4	0	100	100	90–100	40–60	0. 63–6. 3	0. 17	6. 1–7. 3
SM or ML	A–4	0	100	95–100	85–100	35–65	0. 63–6. 3	0. 15–0. 16	6. 1–7. 3
ML, CL, SM, or SC	A–4	<5	85–90	80–85	70–85	45–75	0. 63–2. 0	0. 16–0. 17	6. 1–7. 3
ML or CL	A–4 or A–6	<5	80–90	75–85	65–80	50–65	0. 63–2. 0	0. 13–0. 14	6. 1–7. 3+
ML, CL, SM, SC, GM, or GC	A–4	5–15	65–80	60–75	50–70	35–60	<0. 63	----------	7. 6+
CL or ML	A–6 or A–4	0	95–100	95–100	85–95	65–75	0. 63–2. 0	0. 16–0. 17	5. 6–7. 3
CL or ML	A–6 or A–7	0	95–100	95–100	95–100	85–95	<0. 20	0. 12–0. 14	5. 6–7. 3
ML, CL, OL	A–4 or A–6	<2	95–100	90–100	80–100	65–90	0. 63–2. 0	0. 19–0. 20	6. 1–7. 3
ML, CL, SM, or SC	A–4	<5	80–95	75–90	65–85	45–65	0. 63–2. 0	0. 13–0. 15	6. 5–7. 6+
SM or SC	A–4 or A–2	5–15	65–75	60–70	45–65	30–45	<0. 63	----------	7. 6+
CL or OL	A–6 or A–7	0	100	100	95–100	85–95	0. 63–2. 0	0. 17	5. 5–7. 3
CL	A–7 or A–6	0	100	100	90–100	80–95	<0. 20	0. 13–0. 14	6. 0–7. 3
CL	A–6	0	100	100	90–100	75–95	<0. 20	----------	7. 6+
SM or ML	A–4	<5	85–95	80–90	70–85	40–60	2. 0–6. 3	0. 12–0. 15	5. 6–7. 3
GM or SM	A–1, A–4, or A–2	5–15	45–90	40–85	35–80	20–45	>2. 0	0. 06–0. 12	6. 6–7. 6
GM or SM	A–1, A–4, or A–2	10–40	30–85	25–80	20–75	10–45	>6. 3	----------	7. 4–7. 6+
SM or ML	A–4	<2	95–100	90–100	65–90	40–70	0. 63–6. 3	0. 14–0. 16	6. 1–7. 3
GM or SM	A–1, A–2, or A–4	5–20	55–80	50–75	40–70	20–50	>2. 0	0. 08–0. 12	6. 1–7. 6+
ML	A–4	0	100	100	85–95	50–65	0. 63–6. 3	0. 16–0. 17	5. 6–6. 0
SM or ML	A–4	0	100	95–100	90–100	40–65	0. 63–6. 3	0. 14–0. 16	5. 6–7. 6+

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to		Depth from surface (typical profile)	Classification
	Bedrock	Seasonal high water table		Dominant USDA texture
	Feet	*Feet*	*Inches*	
Muck, deep: Mr Some estimates are not given, because the soil material is variable.	6+	0	0–23 23–50	Muck Peaty material
Muck, shallow: Ms [5] Estimates are not given, because the soil material is variable.	1½–3½+	0		
Niagara:				
Ng	6+	½–1	0–10 10–25 25–50	Silt loam and very fine sandy loam Silt loam and silty clay loam Varved silt and thin lenses of clay and very fine sand.
Nr	6+	½–1	0–14 14–32 32–53	Silt loam and very fine sandy loam Silty clay loam and silt loam Gravelly sandy loam and gravelly loam
Odessa: OdA, OdB	6+	½–1	0–7 7–45 45–60	Silt loam Clay and silty clay Varved clay, silt, and very fine sand
*Ontario: OfB, OfC, OnB, OnC, OnC3, OnD3, OnF, OpC, OpD, OpF. For Palmyra and Arkport parts of OpC, OpD, and OpF, see the respective series.	6+	2½–4	0–25 25–39 39–50	Loam and fine sandy loam Gravelly loam and sandy clay loam Gravelly loam and gravelly sandy loam
*Ovid:				
Ov	6+	½–1	0–16 16–24 24–51	Silt loam Silty clay loam Gravelly loam
Ow To depth of limestone substratum, estimates for Ovid part of Ow are the same as for Ov; estimates for Appleton part, to the depth of the limestone substratum, are the same as for ApA. For properties of Ovid part and for Appleton part of Ow, see the respective series.	3½–6			
Palmyra: PaA, PaB, PaC, PaD, PaF, PgB	6+	6+	0–15 15–22 22–30 30–60	Gravelly loam and gravelly fine sandy loam Gravelly loam and gravelly sandy clay loam. Gravelly fine sandy loam and gravelly loam. Sand and gravel, stratified
Phelps: PhA, PhB	6+	1½–2	0–19 19–32 32–52	Gravelly fine sandy loam and gravelly loam Gravelly sandy clay loam and gravelly loam. Sand and gravel, stratified
Pits and Quarries: Pu. Estimates are not given, because the material is variable.				
Rhinebeck: Rb	6+	½–1	0–12 12–31 31–55	Silt loam Silty clay loam and clay Varved clay and thin lenses of silt and very fine sand.

See footnotes at end of table.

properties of the soils—Continued

Classification—Continued		Coarse fraction larger than 3 inches	Percentage passing sieve—				Permeability	Available water capacity [1]	Reaction [2]
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
		Percent					*Inches per hour*	*Inches per inch of soil*	*pH range*
Pt							>6. 3	0. 50	5. 6–7. 3
Pt									5. 6–7. 3
ML or CL	A–4	0	100	100	90–100	60–80	0. 63–2. 0	0. 17–0. 20	6. 1–7. 3
CL	A–6 or A–4	0	100	100	95–100	80–90	0. 20–2. 0	0. 17–0. 20	6. 1–7. 3
ML or CL	A–4	0	100	100	90–100	75–95	<0. 63		6. 5–7. 6+
ML or CL	A–4	0	100	100	90–100	60–80	0. 63–2. 0	0. 17–0. 20	5. 1–7. 3
CL	A–6 or A–4	<2	95–100	90–100	80–100	70–90	0. 20–2. 0	0. 15–0. 20	6. 1–7. 5
SM or GM	A–1, A–2, or A–4	10–20	55–75	50–70	35–65	15–50	<0. 20–6. 3+		6. 5–7. 6+
ML	A–7	0	100	100	95–100	80–90	0. 63–2. 0	0. 20	5. 6–7. 3
CH or CL	A–7	0	100	100	100	95–100	<0. 20	0. 13–0. 14	5. 6–7. 6+
CL, MH, or CH	A–4, A–7, or A–6	<2	95–100	95–100	90–95	80–90	<0. 20		7. 6+
SM, ML, or CL	A–4	<5	75–95	70–95	60–85	40–55	0. 63–2. 0	0. 11–0. 16	5. 6–7. 3
ML or CL	A–4	<10	85–95	80–90	75–85	50–60	0. 20–2. 0	0. 10–0. 15	5. 6–7. 3
SM or SC	A–4	5–15	75–90	70–85	60–75	40–50	<0. 63		7. 6+
ML or CL	A–6 or A–7	0	95–100	95–100	90–95	80–85	0. 63–2. 0	0. 19–0. 20	5. 6–7. 3
CL	A–6 or A–7	<2	85–100	80–100	80–100	75–95	<0. 63	0. 14–0. 17	5. 6–7. 3
CL	A–6 or A–4	<10	75–95	70–95	65–95	55–90	<0. 63		7. 6+
ML or SM	A–4 or A–2	<5	70–80	65–75	50–65	30–55	2. 0–6. 3	0. 10–0. 13	6. 1–7. 3
SM, SC, GM, or GC	A–4 or A–2	<5	65–75	60–70	50–65	25–50	0. 63–2. 0	0. 08–0. 12	6. 1–7. 3
GM or GC	A–2 or A–4	<10	60–70	55–65	40–60	25–45	2. 0–6. 3+	0. 08–0. 11	6. 1–7. 6+
GM, GW, or GC	A–1 or A–2	5–10	35–55	30–50	15–35	5–20	>6. 3		7. 6+
SM or SC	A–4 or A–2	<5	65–75	60–70	45–60	25–45	2. 0–6. 3	0. 10–0. 12	6. 1–7. 3
GM, GC, SM, or SC	A–4 or A–2	<5	60–75	55–70	45–65	25–50	0. 63–2. 0	0. 07–0. 12	6. 6–7. 6
GM, GW, or GP	A–1	5–10	30–40	20–30	10–20	5–15	>6. 3		6. 6–7. 6+
CL or ML	A–6 or A–4	0	95–100	95–100	90–95	80–90	0. 63–2. 0	0. 19–0. 20	5. 6–7. 3
CL	A–7 or A–6	0	100	95–100	95–100	85–95	<0. 20	0. 12–0. 17	5. 6–7. 8
CL	A–6 or A–7	0	95–100	95–100	90–100	90–100	<0. 20		7. 4–7. 6+

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to		Depth from surface (typical profile)	Classification
	Bedrock	Seasonal high water table		Dominant USDA texture
	Feet	*Feet*	*Inches*	
Riga: RgB	1½–3½	1½–2	0–8	Silt loam
			8–30	Silty clay and silty clay loam
			30	Bedrock; soft shale.
Rock land: Ro. Estimates are not given, because the soil material is variable.				
Schoharie: SeA, SeB, ShC3, ShD3, ShF	6+	1½–2	0–11	Silt loam and silty clay loam
			11–38	Silty clay and clay
			38–51	Varved clay and thin lenses of silt and very fine sand.
Sodus: SoB	4+	1½–2½	0–19	Gravelly fine sandy loam and gravelly silt loam.
			19–60	Gravelly fine sandy loam and gravelly loam fragipan and till.
Sun:				
Ss	6+	0–½	0–9	Fine sandy loam and very fine sandy loam
			9–30	Gravelly fine sandy loam and gravelly very fine sandy loam.
			30–52	Very gravelly, very fine, or fine sandy loam
St	1½–3½	0–½	0–8	Loam and fine sandy loam
			8–25	Gravelly very fine sandy loam and gravelly loam.
			25–36	Gravelly or very gravelly very fine sandy loam and very gravelly loam.
			36	Bedrock; hard limestone.
Urban land: Ub. Estimates are not given, because the soil material is variable.				
Wampsville: WcA, WcB, WcC. Estimates are not given for depths below 30 inches, because the material is variable.	6+	6+	0–8	Cobbly loam
			8–20	Cobbly or gravelly silty clay loam and cobbly or gravelly clay loam.
			20–30	Gravelly or cobbly sandy loam
			30–53	Gravel and cobblestones, poorly sorted.
Wassaic: WfA	1½–3½	1½–2	0–18	Fine sandy loam and loamy fine sand
			18–32	Gravelly loamy fine sand and gravelly fine sandy loam.
			32	Bedrock; hard limestone.
Wayland: Wg[3 5]. Estimates are not given for depths below 32 inches, because the material is variable.	1½–3½+	0–1	0–8	Silt loam
			8–32	Silty clay loam and silt loam
			32–51	Silt, sand, clay, and gravel, stratified.

[1] Estimates generally are given to a depth of 30 inches, or to the depth of rooting if less than 30 inches.
[2] A single pH value of 7.6+ indicates that free carbonates are present and that the layer is calcareous; pH 7.6+ in a range of values indicates that as the depth from surface increases, the lower part of the layer may be calcareous.
[3] Subject to flooding.
[4] The stratified material has variable permeability; permeability is rapid in the loamy fine sand, and moderate in the thin bands of very fine sandy loam.

properties of the soils—Continued

Classification—Continued		Coarse fraction larger than 3 inches	Percentage passing sieve—				Permeability	Available water capacity [1]	Reaction [2]
Unified	AASHO		No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)			
		Percent					*Inches per hour*	*Inches per inch of soil*	*pH range*
ML, CL, or MH	A-6, A-7, or A-4	0	80–100	75–100	70–100	55–90	0. 20–2. 0	0. 15–0. 20	6. 1–7. 5
MH, ML, or CL	A-7 or A-6	0	80–100	75–100	65–100	55–95	<0. 20	0. 11–0. 17	6. 1–7. 5
ML or CL	A-6 or A-7	0	95–100	95–100	90–100	80–90	0. 63–2. 0	0. 16–0. 20	6. 5–7. 3
CL or CH	A-7 or A-6	0	95–100	95–100	95–100	90–100	<0. 20	0. 12–0. 14	6. 5–7. 6+
CL, CH, or MH	A-7, A-6, or A-4	0	95–100	95–100	90–95	80–95	<0. 20	----------	7. 6+
SM, GM, ML, or GC	A-2 or A-4	15	60–75	55–70	40–65	25–55	0. 63–2. 0	0. 09–0. 12	5. 1–6. 0
GM or GC	A-2, A-4, or A-1	15	45–70	40–65	30–60	20–45	<0. 20	----------	5. 1–7. 6+
SM, ML, or OL	A-4	<2	90–95	85–95	65–85	40–60	0. 63–6. 3	0. 12–0. 16	6. 1–7. 6+
GM or SM	A-2 or A-4	10	60–70	55–65	40–60	25–40	0. 63–6. 3	0. 08–0. 11	6. 6–7. 6+
GM	A-1 or A-2	15	45–55	40–50	30–45	15–30	0. 63–6. 3	----------	7. 6+
ML, OL, or SM	A-4	5	90–95	85–95	70–90	45–70	0. 63–6. 3	0. 12–0. 16	6. 1–7. 6+
ML or SM	A-4	10	80–90	75–85	65–80	40–55	0. 63–6. 3	0. 12–0. 14	6. 1–7. 6+
GM	A-2, A-4, or A-1	10–15	50–65	45–60	40–55	25–40	0. 63–6. 3	----------	7. 6+
ML or CL	A-4	25	90–95	85–95	70–90	55–70	2. 0–6. 3	0. 14–0. 16	6. 1–7. 3
ML or CL	A-4 or A-6	15	75–85	70–80	65–80	55–70	0. 63–2. 0	0. 10–0. 14	6. 6–7. 6+
SM or SC	A-1 or A-2	15	70–80	65–75	40–55	20–30	2. 0–6. 3	0. 07–0. 09	6. 6–7. 6+
ML or SM	A-4 or A-2	0	90–95	90–95	65–90	30–65	0. 63–6. 3	0. 10–0. 15	5. 6–7. 3
SM or SC	A-1, A-2, or A-4	10	70–80	65–75	45–65	25–50	0. 63–6. 3	0. 06–0. 10	6. 1–7. 3+
ML, CL, or OL	A-4 or A-6	0	100	100	90–100	70–90	0. 63–2. 0	0. 20	6. 6–7. 3
ML or CL	A-4, A-6, or A-7	0	100	100	90–100	75–95	0. 20–0. 63	0. 17–0. 20	6. 6–7. 3

[5] In some areas of Ee, Ms, and Wg, a bedrock substratum is at a depth of 20 to 40 inches. In some areas of Ms, a loamy or clay substratum is at a depth of 16 to 40 inches.

[6] Units HmA and HmB contain 0.15 to 1.5 cubic yards of stone per acre-foot.

[7] Unit MeB contains 1.5 to 50 cubic yards of stone larger than 10 inches in diameter per acre-foot.

TABLE 8.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table. Variants of Collamer, Lakemont, Niagara, and Sun

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Alluvial land: Al	Variable: wet in places.	Generally unsuitable.	Variable	Subject to flooding; high water table; cut slopes are unstable.	Variable strength; underlain in places by wet, compressible material.
Alton: AnA, AnB, AoB, AoC	Poor: gravelly	Generally good; cemented in places as depth increases.	Generally good: sandy material is erodible.	Generally, no adverse features.	Adequate strength for moderately high embankment.
Appleton: ApA	Good to fair: seasonal wetness; contains gravel in places.	Unsuitable	Generally good: seasonally wet and contains some large stones.	Seasonal high water table; cut slopes subject to seepage and sloughing.	Adequate strength for high embankments.
*Arkport: ArB, ArC, ArD, AsC, AsD, AtF3. (For properties of Dunkirk part of AsC, AsD, and AtF3, and for Colonie part of AtF3, see the respective series, except for slope features.	Fair to good: low to moderate available water capacity in places.	Unsuitable	Fair to poor: very erodible.	Subgrade is subject to differential frost heaving; cut slopes are very erodible and unstable; units ArD, AsD, and AtF3 are moderately steep to very steep.	Generally adequate strength for low embankments; underlain in places by wet, compressible material; units ArD, AsD, and AtF3 are moderately steep to very steep.
Benson: BcB	Unsuitable: channery.	Unsuitable: possible source of limestone for crushing purposes.	Poor: very low yield per acre; stony in places.	Limestone bedrock at depth of 1 to 1½ feet.	Adequate strength for high embankments.
Brockport: BrA	Poor: high clay content.	Unsuitable	Poor: low soil yield per acre; clayey; difficult to work if wet.	Shale bedrock at depth of 1½ to 3½ feet; seasonal high water table; subject to seepage.	Material above bedrock is subject to shrinking and swelling.
Canandaigua: Ca	Fair to good: seasonal wetness.	Unsuitable	Fair to poor: surface material high in organic-matter content; silty and clayey; material difficult to work if wet.	High water table; cut slopes subject to seepage and sloughing; trafficability is poor if soil is wet.	Variable strength; generally underlain by wet, compressible soil material.

See footnotes at end of table.

interpretations

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions series can be identified by referring to the symbol and the name of the mapping unit in the "Guide to Mapping Units"]

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Subject to flooding; high water table; variable compressibility.	Subject to frequent flooding; rapid permeability in places.	Variable soil material.	Cut slopes unstable; natural outlets inadequate.	Generally not irrigated; variable soil material.	Nearly level	Nearly level; variable soil material.
Variable bearing capacity depending on character of underlying material; extensive settling possible under vibratory loads.	Moderately rapid to rapid permeability.	Good stability and shear strength for outside shell; rapid permeability.	Drainage not needed in most places; well-drained to somewhat excessively drained.	High intake rate; moderate to low available water capacity.	Rapid permeability at a depth below about 16 inches.	Rapid permeability at a depth below about 16 inches; highly erodible in sandy material.
Moderately high bearing capacity; moderately low compressibility; seasonal high water table.	Seasonal high water table; moderate to moderately slow permeability below about 19 inches.	Generally, no adverse features.	Cut slopes subject to seepage; seasonal high water table.	Moderate intake rate; moderate to high available water capacity.	Depressional relief.	Subject to prolonged flow.
Variable bearing capacity and compressibility; extensive settling possible under vibratory loads; units ArD, AsD, and AtF3 are moderately steep to very steep.	Variable permeability; sand lenses subject to excess seepage and piping; units ArC, ArD, AsC, AsD, and AtF3 are moderately sloping to very steep.	Poor stability; poorly graded fine and very fine sands; subject to piping; very erodible.	Drainage generally not needed; well drained.	High intake rate; moderate available water capacity; units ArC, ArD, AsC, AsD, and AtF3 are moderately sloping to very steep.	Variable permeability; units ArD, AsD, and AtF3 are moderately steep to very steep.	Very erodible; units ArD, AsD, and AtF3 are moderately steep to very steep.
High bearing capacity; limestone bedrock at depth of 1 to 1½ feet; numerous rock outcrops.	Limestone bedrock at depth of 1 to 1½ feet.	Very low yield per acre; stony in places.	Drainage not needed; somewhat excessively drained to excessively drained.	Moderate to moderately high intake rate; moderate to very low available water capacity.	Limestone bedrock at depth of 1 to 1½ feet.	Limestone bedrock at depth of 1 to 1½ feet.
Shale bedrock at depth of 1½ to 3½ feet; seasonal high water table; subject to seepage.	Shale bedrock at depth of 1½ to 3½ feet.	Low shear strength; poor workability when wet; low yield per acre.	Shale bedrock at depth of 1½ to 3½ feet; slow permeability; seasonal high water table.	Generally not irrigated; somewhat poorly drained.	Shale bedrock at depth of 1½ to 3½ feet; slow permeability.	Shale bedrock at depth of 1½ to 3½ feet; somewhat poorly drained; subject to prolonged flow.
Variable bearing capacity and compressibility; prolonged high water table.	Prolonged high water table; sand lenses subject to seepage when water table is low.	Surface material high in content of organic matter; stability fair to poor; subject to piping.	Prolonged high water table; cut slopes unstable; subject to piping; natural outlets generally inadequate.	Generally not irrigated; prolonged high water table.	Flat and depressional relief.	Flat and depressional relief.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Cayuga: CeA, CeB	Fair to good: high clay content in places.	Unsuitable	Poor in surface layer and subsoil; high clay content; good below a depth of about 20 to 40 inches	Seasonal high water table; clayey material underlain by till; cut slopes subject to seepage and sloughing.	Adequate strength for high embankments.
Cazenovia: CgA, CgB	Poor: gravelly	Unsuitable	Fair: poor workability if wet.	Seasonal high water table; cut slopes subject to seepage and sloughing in places.	Adequate strength for moderately high embankments.
Churchville: ChA, ChB	Fair: clayey in places.	Unsuitable	Poor in surface and subsurface layers; high clay content; good at depth below 20 to 40 inches; wet in places.	Seasonal high water table; contrasting layers of clayey material underlain by till; cut slopes subject to seepage and sloughing.	Adequate strength for high embankments.
Claverack: CkA, CkB, CkC	Poor: sandy; low available water capacity.	Unsuitable	Good in surface layer; sandy material is very erodible; poor in clayey substratum.	Seasonal high water table; cut slopes subject to seepage and sloughing; underlying clayey material hinders hauling operations when wet; subgrade subject to differential frost heaving.	Adequate strength for low embankments; compressible in places.
Collamer:					
ClA, ClB, ClC	Good	Unsuitable	Fair to poor: highly erodible; silty; difficult to work if wet.	Seasonal high water table; unstable cut slopes and subject to seepage; subgrade subject to differential frost heaving.	Variable strength; underlain in places by wet, compressible material.
CmA, CmB	Good	Unsuitable	Fair to poor in surface and subsurface layers; highly erodible; good in substratum below a depth of 20 to 40 inches; contains stones in places.	Seasonal high water table; unstable cut slopes and subject to seepage; subgrade subject to severe differential frost heaving.	Adequate strength for high embankments in material below 20 to 40 inches.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Moderately high bearing capacity; low compressibility; seasonal high water table.	Seasonal high water table; moderately slow to slow permeability.	Surface and subsoil clayey; low shear strength; underlying till is stable; slow permeability.	Seasonal high water table; moderately slow to slow permeability.	Moderate intake rate; seasonal high water table; moderate to high available water capacity.	Generally, no adverse features.	Subject to prolonged flow.
Moderately high bearing capacity; subject to shrinking and swelling in places; seasonal high water table.	Seasonal high water table; moderately slow to slow permeability.	Fair stability; slow permeability for inside core.	Seasonal high water table; moderately slow to slow permeability.	Moderate intake rate; moderate to high available water capacity.	Generally, no adverse features.	Generally, no adverse features.
Moderately high bearing capacity; low compressibility; seasonal high water table.	Seasonal high water table; moderately slow to slow permeability.	Surface and subsoil are clayey; poor stability; subject to shrinking and swelling; good stability in substratum; slow permeability.	Seasonal high water table; moderately slow to slow permeability.	Moderate intake rate; moderate to low available water capacity; somewhat poorly drained.	Generally, no adverse features.	Subject to prolonged flow.
Low bearing capacity; seasonal high water table; clayey substratum is compressible.	Seasonal high water table; generally slow permeability in clayey substratum, except rapid permeability in sand lenses.	Fair to poor stability; rapid permeability and high erodibility in sandy material; clayey substratum is difficult to compact.	Seasonal high water table; cut slopes unstable; fine sand over clay; subject to piping.	High intake rate; low to moderate available water capacity.	Sandy surface and subsoil; subject to soil blowing and water erosion.	Sandy surface and subsoil; very erodible.
Low bearing capacity; variable compressibility; seasonal high water table.	Generally moderately slow or slow permeability; in places, excess seepage in sand layers; seasonal high water table.	Fair stability; erodible; poor workability when wet.	Cut slopes subject to seepage and sloughing; seasonal high water table; subject to piping.	Moderate intake rate; high available water capacity.	Subject to channel siltation and piping.	Subject to channel siltation and piping; very erodible.
Generally high bearing capacity in material below 20 to 40 inches; low compressibility; seasonal high water table.	Seasonal high water table; moderately slow to slow permeability below 20 to 40 inches.	Good stability in material below 20 to 40 inches; slow permeability.	Seepage and unstable slopes; seasonal high water table; subject to piping above 20 to 40 inches.	Moderate intake rate; high available water capacity.	Subject to channel siltation and piping above 20 to 40 inches.	Subject to channel siltation and piping; very erodible to depth of 20 to 40 inches.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Colonie: CoB, CoC, CoD3	Poor: sandy; low available water capacity.	Generally unsuitable; fine sand.	Good to fair: highly erodible.	Cut slopes unstable; subject to differential frost heaving; fine sand hinders hauling operations; unit CoD3 is moderately steep.	Generally adequate strength for moderately high or low embankments; underlain in places by wet, compressible material; unit CoD3 is moderately steep.
Cosad: Cu	Poor: sandy; low available water capacity.	Unsuitable	Good in sandy surface and subsurface layers, but erodible; poor in clayey substratum.	Seasonal high water table; cut slopes and subgrade unstable; nearly level; clayey substratum hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Cut and fill land: Cw. (Interpretations are not given, because the materials are too variable.)					
Dunkirk: DuB, DuC3, DuD3	Good	Unsuitable	Fair to poor: silty; highly erodible; difficult to work if wet.	Cut slopes subject to seepage and sloughing; unstable subgrade; silty material hinders hauling operations if wet; unit DuD3 is moderately steep.	Generally adequate strength for low embankments; underlain in places by wet, compressible material; unit DuD3 is moderately steep.
Edwards: Ed	Unsuitable: muck; possible use as amendment to mineral soils.	Unsuitable; muck over marl.	Unsuitable: muck over marl.	Highly compressible organic soil over marl; prolonged high water table.	Highly compressible organic material over marl; prolonged high water table.
Eel: Ee [2]	Good	Unsuitable	Generally unsuitable.	Subject to flooding; seasonal high water table.	Variable strength and compressibility.
Elnora: E1A, E1B	Poor: sandy; low available water capacity.	Unsuitable	Good to fair: very erodible fine sandy material.	Seasonal high water table; cut slopes and subgrade unstable; fine sand hinders hauling operations.	Variable strength; underlain in places by wet, compressible material.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Fair stability; variable compressibility; extensive settling possible under heavy or vibratory loads; unit CoD3 is moderately steep.	Rapid permeability.	Fair stability; fine sand subject to piping; very erodible.	Generally not applicable; well drained to excessively drained.	High intake rate; low to moderate available water capacity; subject to soil blowing; unit CoD3 is moderately steep.	Rapid permeability; subject to channel siltation; erodible.	Rapid permeability; subject to channel siltation; erodible.
Low bearing capacity; variable compressibility; seasonal high water table.	Seasonal high water table; rapid permeability in sandy surface and subsoil; slow permeability in clayey substratum below 20 to 40 inches.	Fair stability; sandy surface and subsoil material pervious and highly erodible; clayey material below 20 to 40 inches is difficult to work when wet.	Ditchbanks unstable; fine sand subject to piping; seasonal high water table.	High intake rate; moderate to very low available water capacity; somewhat poorly drained.	Subject to soil blowing, channel siltation, and piping; nearly level.	Erodible; subject to channel siltation; nearly level.
Generally low bearing capacity; variable compressibility; unit DuD3 is moderately steep.	Permeability variable; sandy layers subject to excess seepage; unit DuD3 is moderately steep.	Moderate to low strength and stability; highly erodible; slow permeability when compacted and used for core of embankment.	Generally not applicable; well drained.	Moderate intake rate; high available water capacity; unit DuD3 is moderately steep.	Irregular relief; highly erodible.	Irregular relief; highly erodible.
Highly compressible organic material, underlain by marl; prolonged high water table.	Prolonged high water table; rapid permeability; muck over marl.	Organic material over marl.	Very high shrinkage if drained; marl at depth of 20 to 40 inches; prolonged high water table; outlets not adequate.	Not applicable unless drained; high intake rate; variable available water capacity.	Nearly level or depressional relief; prolonged high water table.	Nearly level or depressional relief; prolonged high water table.
Subject to flooding; variable strength and compressibility; seasonal high water table.	Subject to flooding; seasonal high water table; variable permeability in substratum.	Fair to poor stability: silty material highly erodible and subject to piping.	Subject to flooding; cut slopes unstable; seasonal high water table.	Moderate intake rate; high available water capacity; subject to flooding.	Not applicable; nearly level.	Not generally applicable; nearly level.
Variable bearing capacity; differential settling under heavy or vibratory loads; seasonal high water table.	Seasonal high water table; rapid permeability.	Poor stability: fine sand subject to piping; rapid permeability; highly erodible.	Seasonal high water table, ditchbanks very unstable; fine sand subject to piping.	High intake rate; low to moderate available water capacity.	Rapid permeability; subject to channel siltation; very erodible; subject to piping.	Rapid permeability subject to channel siltation; very erodible; subject to piping.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Fresh water marsh: Fw. (Interpretations are not given, because the soil materials are too variable.)					
Galen: GaA, GaB	Good to fair: low to moderate available water capacity in places.	Unsuitable	Fair: very fine sand; very erodible.	Seasonal high water table; cut slopes subject to seepage and sloughing; sandy material hinders hauling operations.	Variable strength; underlain in places by wet, compressible material.
Genesee: Ge	Good	Unsuitable	Generally unsuitable.	Nearly level; subject to flooding.	Variable strength and compressibility.
Halsey: Ha	Poor: gravelly	Generally good; poorly sorted and wet in places.	Generally good; wet in places; sandy material is highly erodible.	Nearly level; prolonged high water table; subgrade subject to differential frost heaving.	Generally adequate strength for moderately high embankments.
Hamlin: Hc	Good	Unsuitable	Generally unsuitable.	Nearly level; seasonal high water table; subject to flooding.	Variable strength; underlain in places by wet, compressible material.
*Hilton: HfA, HfB, HlA, HlB, HmA, HmB. (For properties of Cazenovia part of HmA and HmB, see Cazenovia series, except for stony features.)	Good to fair in units HfA, HfB, HlA, and HlB: poor in units HmA and HmB; stony; contains gravel in places.	Unsuitable	Generally good, but units HmA and HmB are stony.	Seasonal high water table; cut slopes subject to seepage.	Adequate strength for high embankments.
Honeoye: HnB, HnC, HoA, HoB	Good to fair: contains stone fragments in places.	Unsuitable; possible source of limestone for crushing purposes in units HoA and HoB at depth of 3½ to 6 feet.	Generally good; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.	Cut slopes subject to seepage in material above till; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.	Adequate strength for high embankments.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Variable bearing capacity; differential settling under heavy or vibratory loads; seasonal high water table.	Seasonal high water table; variable permeability; sandy material subject to excess seepage.	Poor stability; subject to piping in very fine sands and fine sands; variable permeability; highly erodible.	Seasonal high water table; ditchbanks unstable; subject to piping in very fine sands and fine sands.	High intake rate; low to moderate available water capacity.	Variable permeability; subject to channel siltation and piping; erodible.	Variable permeability; subject to channel siltation and piping; erodible.
Subject to flooding; variable strength and compressibility.	Subject to flooding; rapid permeability and subject to excess seepage in places in sandy layers at depth below 40 inches.	Fair stability; slow permeability; highly erodible; subject to piping.	Generally not applicable; well drained.	Subject to flooding; moderate intake rate; high available water capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Moderately high bearing capacity; differential settling possible under heavy or vibratory loads; prolonged high water table.	Prolonged high water table; moderately rapid or rapid permeability.	Good stability; variable permeability if compacted.	Prolonged high water table; in places, sand lenses subject to piping; natural outlets generally not adequate.	Generally not irrigated; prolonged high water table.	Nearly level or depressional relief; prolonged high water table.	Nearly level or depressional relief; prolonged high water table.
Subject to flooding; variable strength and compressibility; seasonal high water table.	Seasonal high water table; subject to flooding; sandy layers subject to excess seepage in places.	Fair stability; slow permeability; highly erodible; subject to piping.	Seasonal high water table; ditchbanks unstable; subject to flooding; natural outlets inadequate in places.	Subject to flooding; moderate intake rate; high available water capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Generally high bearing capacity; low compressibility; seasonal high water table.	Seasonal high water table; moderately slow or slow permeability.	Good stability and shear strength; slow permeability if compacted; units HmA and HmB are stony.	Seasonal high water table; subject to seepage.	Moderate intake rate; moderate to high available water capacity.	Generally, no adverse features; units HmA and HmB are stony.	Units HmA and HmB are stony; subject to seepage.
Generally high bearing capacity; low compressibility; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.	Moderately slow or slow permeability; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.	Generally, no adverse features; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB; low yield per acre.	Generally not needed; well drained.	Moderate intake rate; high available water capacity; unit HnC is moderately sloping.	Generally, no adverse features; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.	Generally, no adverse features; limestone bedrock at depth of 3½ to 6 feet in units HoA and HoB.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Hudson: HuB	Good to fair: high clay content in places.	Unsuitable	Poor: clayey; difficult to work if wet.	Seasonal high water table; cut slopes and subgrade unstable; subject to seepage; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Ira: IgB	Poor: gravelly	Unsuitable	Generally good; stony in places.	Seasonal high water table; cut slopes subject to seepage.	Adequate strength for high embankments.
Lairdsville: LaB	Fair: high clay content in places.	Unsuitable	Poor: clayey; difficult to work if wet; low yield per acre.	Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Adequate strength for high embankments.
Lake beaches: Lb	Unsuitable	Suitable in places	Generally good; erodible in places.	Subject to wave overflow.	Generally adequate strength for low embankments; subject to wave action.
Lakemont:					
Le	Good to fair: clayey in places; seasonal wetness.	Unsuitable	Poor: clayey; poor workability if wet.	Prolonged high water table; nearly level or depressional relief; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in most places by wet, compressible material.
Lk	Good to fair: high clay content in places; seasonal wetness.	Unsuitable	Poor in surface and subsurface layers; clayey; generally good in substratum at depth below 20 to 40 inches; wet in places.	Prolonged high water table; nearly flat or depressional relief; clayey subsoil hinders hauling operations if wet.	Adequate strength for moderately high or high embankments.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Generally low bearing capacity; moderately high compressibility; seasonal high water table.	Seasonal high water table; slow permeability.	Poor stability and shear strength; slow permeability if used for inside core; poor workability if wet.	Seasonal high water table; cut slopes unstable; slow permeability in subsoil and substratum.	Moderate intake rate; moderate to high available water capacity.	Irregular topography; erodible.	Irregular topography; erodible.
Generally high bearing capacity; low compressibility; seasonal high water table.	Seasonal high water table; slow permeability.	Good stability and shear strength; slow permeability; stony in places.	Seasonal high water table; slow permeability in fragipan below about 18 inches.	Limited rooting depth above fragipan; moderate intake rate; low to moderate available water capacity.	Generally, no adverse features.	Subject to prolonged flow.
Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Clayey; poor stability and shear strength; slow permeability for inside core; poor workability if wet; low yield per acre.	Seasonal high water table; slow permeability in subsoil; shale bedrock at depth of 1½ to 3½ feet.	Moderate to low intake rate; moderate to high available water capacity.	Shale bedrock at depth of 1½ to 3½ feet.	Shale bedrock at depth of 1½ to 3½ feet.
Subject to overflow by waves.	Subject to overflow by waves.	Fair stability; sandy and gravelly material is very erodible; variable permeability.	Not applicable; sandy or gravelly material.	Not applicable; sandy or gravelly material.	Not applicable; sandy or gravelly material.	Not applicable; sandy or gravelly material.
Prolonged high water table; generally low bearing capacity; moderately high to high compressibility.	Prolonged high water table; slow permeability.	Poor stability; subject to shrinking and swelling; poor workability if wet.	Prolonged high water table; slow permeability; cut slopes unstable; natural outlets inadequate.	Generally not irrigated; prolonged high water table.	Depressional or nearly level relief.	Depressional or nearly level relief; subject to prolonged flow.
Prolonged high water table; generally high bearing capacity and low compressibility in material below 20 to 40 inches.	Prolonged high water table; slow or moderately slow permeability.	Surface and subsoil are poor material—too clayey; material below 20 to 40 inches is stable and slowly permeable when compacted; wet in places.	Prolonged high water table; slow to moderately slow permeability; cut slopes unstable; natural outlets inadequate.	Generally not irrigated; prolonged high water table.	Depressional or nearly level relief.	Depressional or nearly level relief; subject to prolonged flow.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Lamson: Lm	Good: seasonal wetness.	Unsuitable	Poor: highly erodible; surface layer is high in organic-matter content.	Prolonged high water table; nearly level or depressional relief; subgrade unstable; fine and very fine sand hinders hauling operations.	Generally adequate strength for low embankments; moderately high compressibility.
*Lima: LnA, LnB, LoB (For properties of Cazenovia part of LoB, see Cazenovia series, except for depth to bedrock.)	Good to fair: contains stone fragments in places.	Unsuitable: possible source of limestone for crushing purposes in unit LoB at depth of 3½ to 6 feet.	Generally good: stones in places; low yield per acre in unit LoB.	Seasonal high water table; cut slopes subject to seepage; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Adequate strength for high embankments.
Lockport: Lp	Poor: high clay content.	Unsuitable	Unsuitable	Seasonal high water table; nearly level; shale bedrock at depth of 1½ to 3½ feet; clayey material hinders hauling operations if wet.	Adequate strength for high embankments.
Lyons: Ly	Generally good: seasonally wet.	Unsuitable	Fair if dry: surface layer high in organic-matter content.	Prolonged high water table; nearly level or depressional relief; cut slopes subject to seepage and sloughing.	Adequate strength for high embankments.
Madalin: Ma	Poor: high in clay content.	Unsuitable	Poor: clayey material; subject to shrinking and swelling.	Prolonged high water table; nearly level or depressional relief; cut slopes unstable; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Made land: Mb. (Interpretations are not given, because the soil materials are too variable.)					

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Prolonged high water table; generally low bearing capacity; moderately high compressibility.	Prolonged high water table; variable permeability; sand lenses subject to excess seepage.	Fair to poor stability; very erodible; subject to piping.	Prolonged high water table; fine and very fine sand; cut slopes very unstable; subject to piping; natural outlets generally inadequate.	Generally not irrigated; prolonged high water table.	Nearly level or depressional relief.	Nearly level or depressional relief; subject to channel siltation.
Generally high bearing capacity; low compressibility; seasonal high water table; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Seasonal high water table; moderately slow or slow permeability at depth below about 25 inches; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Good stability and shear strength; slow permeability; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Seasonal high water table; moderately slow to slow permeability below about 25 inches; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Moderate intake rate; moderate to high available water capacity.	Generally, no adverse features; limestone bedrock at depth of 3½ to 6 feet in unit LoB.	Subject to prolonged flow.
Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Poor stability; slow permeability for inside core; clayey material and difficult to work; shale bedrock at depth of 1½ to 3½ feet; low yield per acre.	Somewhat poorly drained; slow permeability; shale bedrock at depth of 1½ to 3½ feet.	Generally not irrigated; somewhat poorly drained.	Nearly level----	Nearly level relief; subject to prolonged flow; shale bedrock at depth of 1½ to 3½ feet.
Prolonged high water table; generally high bearing capacity; low compressibility.	Prolonged high water table; moderately slow or slow permeability at depth below about 20 inches.	Good stability and shear strength; slow permeability if compacted; wet in places; high content of organic matter in surface layer.	Prolonged high water table; nearly level or depressional relief; natural outlets are inadequate in places; moderately slow to slow permeability.	Generally not irrigated; prolonged high water table.	Nearly level or depressional relief.	Nearly level or depressional relief; subject to prolonged flow.
Prolonged high water table; generally very low bearing capacity; high compressibility.	Prolonged high water table; slow permeability.	Poor stability; poor workability if wet; subject to shrinking and swelling.	Prolonged high water table; cut slopes unstable; slow permeability; natural outlets inadequate in places.	Generally not irrigated; prolonged high water table.	Nearly level or depressional relief.	Nearly level or depressional relief; subject to prolonged flow.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Madrid: MdA, MdB, MdC, MeB.	Fair: stone fragments in places; poor in unit MeB; very stony.	Unsuitable	Generally good, but stone in units MdB and MdC; very stony in unit MeB.	Generally, no adverse features; very stony and bouldery in unit MeB.	Generally adequate strength for moderately high embankments; underlain in places by wet, compressible material.
Massena: Mf	Fair: stone fragments in places.	Unsuitable	Generally good, but stony and wet in places.	Seasonal high water table; nearly level; cut slopes subject to seepage and sloughing.	Generally adequate strength for moderately high embankments.
Minoa: Mn	Good: seasonally wet.	Unsuitable	Good to fair: fine and very fine sand; highly erodible.	Seasonal high water table; nearly level; cut slopes unstable; subgrade unstable below the water table.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Muck: Mr, Ms [2]	Poor: possible use as amendment to mineral soil.	Unsuitable	Unsuitable	Prolonged high water table; 16 inches to several feet of organic material, underlain by variable material.	Wet, compressible organic soil to depth of 16 inches or several feet, underlain by variable material.
Niagara: Ng	Good: seasonally wet.	Unsuitable	Poor: silt and very fine sand; highly erodible.	Seasonal high water table; nearly level; cut slopes and subgrade are unstable.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Generally moderate to moderately high bearing capacity; moderate compressibility.	Moderately rapid or rapid permeability.	Good stability and shear strength; contains stones; variable permeability if compacted; unit MeB is very stony.	Drainage not needed; well drained.	High intake rate; moderate to high available water capacity; unit MdC is moderately sloping; unit MeB is very stony.	Moderately rapid or rapid permeability; unit MeB is very stony.	Moderately rapid or rapid permeability; subject to channel siltation and piping; unit MeB is very stony.
Generally moderate to moderately high bearing capacity; moderate compressibility; seasonal high water table.	Seasonal high water table; moderately rapid or rapid permeability.	Good stability and shear strength; stones in places; variable permeability if compacted.	Seasonal high water table; cut slopes subject to seepage, sloughing, and piping; moderately rapid or rapid permeability.	High intake rate; low to moderate available water capacity; somewhat poorly drained to poorly drained.	Nearly level	Nearly level; moderately rapid or rapid permeability; subject to channel siltation and piping.
Variable bearing capacity; differential settling possible under heavy or vibratory loads; seasonal high water table.	Seasonal high water table; sand lenses subject to excess seepage.	Fair stability; fine and very fine sands; highly erodible; subject to piping.	Seasonal high water table; ditchbanks unstable; subject to piping.	Moderate to high intake rate; moderate available water capacity; somewhat poorly drained.	Nearly level	Nearly level; subject to channel siltation and piping.
Wet, compressible organic soil to depth of 16 inches or several feet, underlain by variable material; prolonged high water table.	Wet, compressible organic soil to depth of 16 inches or several feet, underlain by variable material; prolonged high water table.	Wet, compressible organic soil to depth of 16 inches or several feet, underlain by variable material.	Prolonged high water table unless drained; very high shrinkage when first drained; in unit Mr, organic soil is 40 inches to several feet thick over variable material; in unit Ms, organic material is 16 to 40 inches thick over variable material or bedrock; bedrock at a depth of 20 to 40 inches in some areas of Ms.	High intake rate; variable permeability and available water capacity; prolonged high water table unless drained.	Nearly level; not applicable..	Nearly level; 16 inches to several feet of organic soil over variable material.
Low bearing capacity; variable compressibility; seasonal high water table.	Seasonal high water table; sand lenses in places subject to excess seepage.	Fair to poor stability; silt and very fine sand subject to piping; very erodible.	Seasonal high water table; cut slopes unstable; subject to piping.	Moderate intake rate; moderate to high available water capacity; somewhat poorly drained.	Nearly level	Nearly level; subject to channel siltation and piping.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Niagara—Continued Nr	Good: seasonally wet.	Unsuitable	Poor in surface and subsurface layers; generally good in substratum at depth below 20 to 40 inches; wet in places.	Seasonal high water table; nearly level; cut slopes and subgrade unstable in material above 20 to 40 inches.	Generally adequate strength for high embankments in material below 20 to 40 inches.
Odessa: OdA, OdB	Fair to good: clayey in places.	Unsuitable	Poor: clayey; unstable.	Seasonal high water table; cut slopes and subgrade unstable; unit OdA is nearly level; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Ontario: OfB, OfC, OnB, OnC, OnC3, OnD3, OnF.	Good to fair in units OfB, OfC, OnB, and OnC: contains gravel in places; poor in units OnC3, OnD3, and OnF; low fertility; contains gravel in most places.	Unsuitable	Generally good; stony in places.	Cut slopes subject to seepage; moderately steep to very steep in units OnD3 and OnF.	Adequate strength for high embankments; moderately steep to very steep in units OnD3 and OnF.
OpC, OpD, OpF: (Interpretations are not given, because soil properties vary considerably within short distances.)					
*Ovid: Ov, Ow (For properties of Appleton part of Ow, see Appleton series, except for depth to bedrock.)	Good to fair: high clay content in places.	Unsuitable	Fair to good, but wet in places; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Seasonal high water table; nearly level; cut slopes unstable; subject to seepage and differential frost heaving; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Generally adequate strength for high embankments.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
High bearing capacity and low compressibility in material below 20 to 40 inches; seasonal high water table.	Seasonal high water table; variable permeability; subject to excess seepage.	Fair to poor stability in surface and subsoil; silt and very fine sand subject to piping; very erodible substratum material; good stability and shear strength below 20 to 40 inches; variable permeability if compacted.	Seasonal high water table; cut slopes unstable to depth of 20 to 40 inches; subject to piping.	Moderate intake rate; moderate to high available water capacity; somewhat poorly drained.	Nearly level----	Nearly level; subject to channel siltation and piping.
Variable bearing capacity and compressibility; seasonal high water table; subject to shrinking and swelling.	Seasonal high water table; slow permeability.	Low shear strength; clayey material subject to shrinking and swelling; poor workability.	Seasonal high water table; cut slopes unstable; slow permeability.	Generally not irrigated; somewhat poorly drained.	OdA is level; OdB is erodible.	OdA is level; OdB is erodible and subject to prolonged flow.
Generally high bearing capacity; low compressibility; moderately steep to very steep in units OnD3 and OnF.	Variable permeability to a depth of 39 inches; moderately slow or slow permeability below 39 inches; moderately sloping to very steep in units OnC, OnC3, OnD3, and OnF.	Good stability and shear strength; slow permeability if compacted; stony in places.	Drainage not needed in most places; well drained.	Moderate intake rate; moderate to high available water capacity; moderately steep to very steep in units OnD3 and OnF.	Generally, no adverse features, except units OnD3 and OnF are moderately steep to very steep.	Erodible where steep; units OnD3 and OnF are moderately steep to very steep.
Generally moderately high bearing capacity; low compressibility; seasonal high water table; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Seasonal high water table; moderately slow or slow permeability; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Good stability; slow permeability if compacted; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Seasonal high water table; cut slopes unstable; moderately slow to slow permeability; limestone bedrock at depth of 3½ to 6 feet in unit Ow.	Generally not irrigated; somewhat poorly drained.	Nearly level----	Nearly level; erodible; subject to prolonged flow; unit Ow has limestone bedrock at depth of 3½ to 6 feet.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soils features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Palmyra: PaA, PaB, PaC, PaD, PaF, PgB.	Poor: gravelly	Good	Good: erodible in sandy material.	Moderately steep to very steep in units PaD and PaF; cut slopes generally stable above water table; subgrade subject to differential frost heaving.	Generally adequate strength for moderately high embankments; units PaD and PaF are moderately steep to steep.
Phelps: PhA, PhB	Poor: gravelly	Generally good, but wet in places.	Good: erodible in sandy material; wet in places.	Seasonal high water table; cut slopes and subgrade unstable below the water table; subject to differential frost heaving.	Generally adequate strength for moderately high embankments.
Pits and Quarries: Pu. (Interpretations are not given, because the soil materials are too variable.)					
Rhinebeck: Rb	Good to fair: high clay content in places.	Unsuitable	Generally poor: clayey; poor workability.	Seasonal high water table; nearly level; cut slopes and subgrade unstable; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material.
Riga: RgB	Fair to poor: high clay content.	Unsuitable	Poor: clayey; shale bedrock at depth of 1½ to 3½ feet.	Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet; clayey material hinders hauling operations if wet.	Adequate strength in bedrock as foundation for high embankments.
Rock land: Ro	Unsuitable	Unsuitable: some areas provide good source of rock for crushing.	Unsuitable	Bedrock exposed in most areas; some areas are very steep.	Adequate strength for high embankments; some areas are very steep.
Schoharie: SeA, SeB, ShC3, ShD3, ShF.	Good to fair in units SeA and SeB: high clay content in places; poor in units ShC3, ShD3, and ShF: high clay content.	Unsuitable	Poor: clayey; poor workability.	Seasonal high water table; cut slopes and subgrade unstable; moderately steep to very steep in units ShD3 and ShF; clayey material hinders hauling operations if wet.	Generally adequate strength for low embankments; underlain in places by wet, compressible material; moderately steep to very steep in units ShD3 and ShF.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Moderately high bearing capacity; differential settling possible under vibratory loads; units PaD and PaF are moderately steep to very steep.	Rapid permeability at a depth below 30 inches; units PaC, PaD and PaF are moderately sloping to very steep.	Good stability and shear strength for outside shell; rapid permeability in places.	Drainage not needed; well drained to excessively drained.	High intake rate; moderate available water capacity; units PaD and PaF are moderately steep to steep.	Rapid permeability; units PaD and PaF are moderately steep to very steep.	Rapid permeability; erodible where steep; units PaD and PaF are moderately steep to very steep.
Generally moderately high bearing capacity; differential settling possible under vibratory loads; seasonal high water table.	Seasonal high water table; rapid permeability below about 32 inches.	Good stability and shear strength for outside shell; variable permeability if compacted.	Seasonal high water table; cut slopes unstable; subject to piping.	High intake rate; moderate available water capacity.	PhA is nearly level; moderately rapid to rapid permeability.	PhA is nearly level; moderately rapid to rapid permeability; erodible.
Generally low bearing capacity; moderately high compressibility; seasonal high water table.	Seasonal high water table; slow permeability; sand lenses that are subject to excess seepage in places.	Poor stability and shear strength; slow permeability for inside core; poor workability.	Seasonal high water table; cut slopes unstable; slow permeability.	Generally not irrigated; somewhat poorly drained.	Nearly level----	Nearly level; erodible; subject to prolonged flow.
Shale bedrock at depth of 1½ to 3½ feet; seasonal high water table.	Seasonal high water table; shale bedrock at depth of 1½ to 3½ feet.	Shale bedrock at depth of 1½ to 3½ feet; limited yield per acre; clayey material; poor workability.	Seasonal high water table; slow permeability; shale bedrock at depth of 1½ to 3½ feet.	Low intake rate; moderate to high available water capacity.	Shale bedrock at depth of 1½ to 3½ feet.	Shale bedrock at depth of 1½ to 3½ feet.
Bedrock exposed in most places; some areas are very steep.	Bedrock exposed in most places; some areas are very steep.	Bedrock exposed in most places.	Bedrock exposed in most areas.	Bedrock exposed in most areas.	Bedrock exposed in most places.	Bedrock exposed in most places.
Generally low bearing capacity; variable compressibility; units ShD3 and ShF are moderately steep to very steep; seasonal high water table.	Seasonal high water table; slow permeability; units ShD3 and ShF are moderately steep to very steep.	Poor stability and shear strength; slow permeability for inside core; clayey; poor workability.	Seasonal high water table; cut slopes unstable; slow permeability; moderately steep to very steep in units ShD3 and ShF.	Moderate to low intake rate; moderate to high available water capacity; units ShD3 and ShF are moderately steep to very steep.	Clayey; poor workability; units ShD3 and ShF are moderately steep to very steep.	Erodible; units ShD3 and ShF are moderately steep to very steep.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soils features affecting—	
	Topsoil	Sand and gravel	Fill material	Highway location	Embankment foundations
Sodus: SoB	Poor: gravelly	Unsuitable	Generally good; contains some large stones and boulders.	Generally no adverse features, except seepage on cut slopes above fragipan.	Adequate strength for high embankments.
Sun: Ss	Fair: high sand content.	Unsuitable	Good to fair: wet in places; surface layer high in content of organic matter; contains stones in places.	Prolonged high water table; nearly level or depressional relief; cut slopes subject to seepage and sloughing.	Generally adequate strength for moderately high embankments.
St	Generally good, but seasonally wet.	Unsuitable	Poor: surface layer high in content of organic matter; limestone bedrock at depth of 1½ to 3½ feet; low yield per acre; contains stones in places.	Prolonged high water table; nearly level; limestone bedrock at depth of 1½ to 3½ feet.	Generally adequate strength for high embankments.
Urban land: Ub. (Interpretations are not given, because the soil materials are too variable.)					
Wampsville: WcA, WcB, WcC.	Poor: cobbly	Good to fair: poorly sorted in places.	Good	Cut slopes subject to seepage and sloughing in places; subgrade subject to differential frost heaving.	Generally adequate strength for moderately high embankments.
Wassaic: WfA	Fair: moderate content of sand.	Unsuitable: possible source of limestone for crushing.	Generally good: low yield per acre; bedrock at depth of 1½ to 3½ feet; contains some stones in places.	Seasonal high water table; bedrock at depth of 1½ to 3½ feet.	Adequate strength for high embankments.
Wayland: Wg[2]	Good, but wet for long periods.	Unsuitable	Unsuitable	Prolonged high water table; subject to frequent flooding; nearly level relief.	Variable strength and compressibility.

[1] Engineers and others should not apply specific values to the estimates given for bearing capacity of soils.

interpretations—Continued

Soil features affecting—Continued						
Foundations for low buildings [1]	Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
	Reservoir areas	Embankments				
Generally high bearing capacity; low compressibility.	Slow permeability below about 19 inches.	Good stability and shear strength; slow permeability if compacted; contains some large stones and boulders.	Drainage not needed; well drained.	Moderate intake rate; moderate to low available water capacity.	Slowly permeable fragipan below about 19 inches.	Slowly permeable fragipan below about 19 inches.
Generally moderate to moderately high bearing capacity; moderate compressibility; prolonged high water table.	Prolonged high water table; moderate to moderately rapid permeability; subject to excess seepage.	Surface layer high in content of organic matter; stability of subsurface good; pervious in places and contains some stones.	Prolonged high water table; cut slopes unstable; subject to piping; moderate to moderately rapid permeability; natural outlets inadequate in places.	Generally not irrigated; poorly drained to very poorly drained.	Nearly level or depressional relief.	Nearly level or depressional relief; subject to channel siltation and piping; prolonged flow.
Prolonged high water table; limestone bedrock at depth of 1½ to 3½ feet.	Prolonged high water table; limestone bedrock at depth of 1½ to 3½ feet.	Surface layer high in content of organic matter; limestone bedrock at depth of 1½ to 3½ feet; low yield per acre; contains some stones in places.	Prolonged high water table; cut slopes unstable; subject to piping; limestone bedrock at depth of 1½ to 3½ feet.	Generally not irrigated; poorly drained to very poorly drained.	Nearly level or depressional relief.	Nearly level or depressional relief; limestone bedrock at depth of 1½ to 3½ feet.
Generally moderately high bearing capacity; differential settling possible under vibratory loads.	Moderately rapid to rapid permeability below about 20 inches.	Good stability; variable permeability if compacted.	Drainage not needed; well drained.	High intake rate; moderate to high available water capacity.	Moderately rapid to rapid permeability.	Moderately rapid to rapid permeability; erodible.
Bedrock at depth of 1½ to 3½ feet; seasonal high water table.	Seasonal high water table; bedrock at depth of 1½ to 3½ feet.	Good stability; low yield per acre; bedrock at depth of 1½ to 3½ feet; contains some stones in places.	Seasonal high water table; bedrock at depth of 1½ to 3½ feet.	Moderate intake rate; low to high available water capacity.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet.
Prolonged high water table; subject to frequent flooding; variable strength and compressibility.	Prolonged high water table; subject to frequent flooding; variable permeability below about 32 inches.	Poor stability; variable material.	Prolonged high water table; subject to frequent flooding; natural outlets inadequate.	Generally not irrigated; poorly drained and very poorly drained.	Nearly level----	Nearly level; subject to frequent flooding.

[2] In units Ee, Ms, and Wg, bedrock is at a depth of 20 to 40 inches in places.

and coarser material do not pass the No. 200 sieve, but silt and clay do. In engineering classification systems, silt is the material larger than 0.002 millimeter in diameter that passes the No. 200 sieve. Clay is the part smaller than 0.002 millimeter in diameter that passes the No. 200 sieve. The clay fraction was determined by the hydrometer method, rather than the pipette method most soil scientists use in determining the percentage of clay in soil samples.

The tests for plastic limit and liquid limit measure the effect of water on the consistence of soil material. As the moisture content of soil increases from a very dry state, the material changes from semisolid to a plastic state. As the moisture content is further increased, the material passes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Estimated properties of the soils

Table 7 lists the soil series and the map symbols of the soils in Monroe County. Also, it gives estimates of soil properties that are significant in engineering. The estimates are based on test data in table 6, on the experience and knowledge gained from using the soil for engineering purposes, and on information in other parts of the survey.

The depth to bedrock was based on field observations during the course of the survey. From place to place, the depth to bedrock varies considerably from the estimated depth. The depth to a seasonal high water table applies to soil conditions in frost-free periods and refers to the highest level at which ground water or a perched water table stands for a significant period of time. The depth from the surface of the soil layers indicates significant changes in textural composition or some other important feature and corresponds to the depths of the major horizons in the technical profile described as representative of the series. It should be pointed out, however, that the estimated data given are for the typical range of the soil features in each series other than depth.

The percentage of material passing sieves of various sizes, as given in table 7, represents the normal range of material that would be expected to pass the given sieve size if a large number of samples were screened.

Permeability refers to the rate at which water moves through layers of the undisturbed soil. The estimates in table 7 given as a range of values are based on soil structure, texture, and porosity, and on results of percolation tests and observations of the drainage and the hydraulic conductivity of the soil.

The available water capacity is the capacity of the soil to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at the wilting point. It is commonly expressed as inches of water per inch of soil. Estimates of available water capacity given in table 7 generally are for a depth of 30 inches or to the depth of rooting if rooting is restricted to 30 inches or less from the surface.

Soil reaction refers to the degree of acidity or alkalinity of a soil, expressed in terms of pH value. A value in a range of 6.6 to 7.3 is neutral; lower values indicate acidity, and higher values show alkalinity. The range of pH value given in table 7 represents the average of many field determinations.

Engineering interpretations

The soils of Monroe County are rated in table 8 according to their suitability as a source of topsoil, sand and gravel, and fill material. Also listed are soil features that affect suitability as sites for highways, farm ponds, terraces and diversions, and waterways. Other interpretations in the table provide guidelines for the use of soils in irrigation, agricultural drainage, embankment foundations, and for low buildings. Generally, adverse or undesirable soil features are emphasized, but some important desirable features are also listed. In the following paragraphs are discussed engineering practices, soil features, and interpretations.

Topsoil.—The thickness, texture, and natural fertility of the surface layer were used to determine the suitability of the soil as a topdressing for establishment and maintenance of vegetative cover on roadbanks, embankments, and other areas that require improvement, such as lawns and gardens. Only the surface layer was considered for this use, unless otherwise noted.

Sand and gravel.—The suitability of the soil for sand and gravel depends mainly on the texture and arrangement of the material in the substratum. Ratings in table 8 do not indicate the quality or the size of the deposits.

Fill material.—Fill material is used for embankments and subgrade in road construction and for other structures. Among the factors considered in making the suitability ratings were the condition of the borrow area, the ease of excavation and hauling, and the compaction characteristics and performance of the fill material when placed. The more important soil features considered were texture, erodibility, stoniness, depth to bedrock, organic-matter content, and moisture content. The shrink-swell potential is not rated in table 8.

Highway location.—The more important features that affect highway location are texture, stoniness, depth to bedrock, slope, stability of slopes, erodibility, high water table, seepage, wetness, hazard of flooding, and frost hazard.

Embankment foundations.—Among the soil features that affect use of soils for foundations are drainage, slope, depth to bedrock, shrink-swell potential, compressibility, and shear strength. Compressibility refers to the capability of a soil to be compressed by a superimposed load. Shear strength is the ability of the soil material to resist sliding along internal surfaces within a soil mass if external force is applied. Most soils formed in deep glacial till provide good embankment foundations, but those formed in glacial outwash, lacustrine sediments, and alluvium are variable. Peat and muck are unsuitable and should be avoided.

Foundations for low buildings.—Soil features that affect the capacity of the undisturbed soil to support low buildings that have normal foundation loads are texture, compressibility, slope, high water table, hazard of flooding, stoniness, depth to bedrock, shrink-swell potential, and bearing capacity. Bearing capacity is the unit load

that can be placed on a soil without excessive deformation to the structure that is supported. In this survey, ratings given for bearing strength or capacity are estimated and should not be assigned specific values.

FARM PONDS.—The suitability of the soil as a reservoir for farm ponds depends on the ability of the soil to hold water. Soil properties that affect the seepage rate and the sealing potential of the reservoir area are given primary concern. In addition to the depth to the water table, the depth to bedrock, and the susceptibility to flooding, such features as permeability, stoniness, texture, slope, and the properties of the substratum also are important. The suitability of the soil as embankments for the impoundment of water or for use in the construction of dikes and levees depends on the ability of compacted soil material to stop or control the flow of water. The effectiveness of the soil material for these purposes depends on the stability and permeability of the compacted material. The degree of permeability as given in table 8 is for soil material compacted at optimum moisture content. Other important features are piping, workability, compaction characteristics, shear strength, and shrink-swell potential.

AGRICULTURAL DRAINAGE.—Among the soil features described in table 8 for agricultural drainage are those that affect the drainage of an undisturbed soil, or the soil under natural conditions. Examples of such features are depth to the water table, permeability, texture, slope, and relief. Also given are the additional features that affect artificial drainage. Among these are depth to bedrock, stability of cut slopes or ditchbanks, availability of drainage outlets, seepage, and piping.

IRRIGATION.—The main soil features that affect suitability of the soil for irrigation practices are those that influence the infiltration, percolation, and drainage of water and that regulate soil-moisture relationships, such as the available water capacity.

DIVERSIONS.—The main soil features that affect suitability of the soil for terraces and diversions are soil slope and erodibility of the soil material. Other features that were considered are depth to bedrock, presence of stones, relief, depth to the water table, permeability, texture, and susceptibility to piping. Nearly level or steep soils are not well suited to diversions. Soils that are highly erodible require special care if used to construct terraces and diversions.

WATERWAYS.—The same soil features that affect diversions also affect waterways. If waterways are constructed in places where seepage is likely, the prolonged runoff of water makes the establishment and maintenance of protective vegetation difficult.

Engineering properties of geologic deposits and bedrock

Characteristics of the geologic deposits in which the soils of Monroe County formed serve as a basis for placing the soils into broad categories for engineering uses. The following geologic deposits or materials occur in the county: glacial till, glacial outwash, lacustrine sediments, alluvium, muck and peat, and bedrock. Each geologic material has engineering significance that differs from that of others. The materials are described in the following paragraphs, and their broad significance in engineering is given.

THICK GLACIAL TILL

Thick glacial till occurs mostly on sloping or hilly uplands. Generally, the deposits extend to a depth of 3½ feet or more over bedrock. Compactness of the material depends on whether it was overridden by the ice or deposited when the ice melted. Glacial till generally is not stratified, but, in places, some local sorting has formed pockets of sand, gravel, silt, or clay within the soil mass.

Soils formed dominantly in thick glacial till are those of the Appleton, Cazenovia, Hilton, Honeoye, Lima, Lyons, Madrid, Massena, Ontario, Ovid, Sodus, and Sun series. In places soils of the Appleton, Cazenovia, Honeoye, Lima, and Ovid series are underlain by limestone bedrock at a depth of 3½ to 6 feet.

Generally, these soils provide stable subgrade material, good embankment foundations for fill material to a height of 10 feet or more, and, with proper treatment, stable slopes in highway construction. They also furnish good foundation support for buildings. Material excavated from till deposits, if properly compacted, can be used to form stable fills and embankments.

Soils of the Cayuga and Churchville series and the loamy subsoil variants of Collamer, Lakemont, and Niagara series have a layer of lacustrine clay or silt to a depth of 20 to 40 inches underlain by till. In these soils material at a depth of 20 to 40 inches has characteristics similar to those of soils formed in deep glacial till.

THIN GLACIAL TILL

This material is similar to deep glacial till, except that the depth to bedrock generally is less than 3½ feet. Consequently, even in light grading operations, bedrock generally is exposed in cuts. Also in places, in thin glacial till, the content of channery- and flaggy-size fragments is higher than in deep glacial till.

Soils formed in thin till underlain by limestone bedrock are of the Benson and Wassaic series, as well as the moderately shallow variant of the Sun series. The limestone bedrock underlying these soils is very durable and is a good source of material for crushing purposes.

Soils formed in thin till, lacustrine silt, or clay underlain by soft shale bedrock are those of the Brockport, Lairdsville, Lockport, and Riga series.

The soft shale bedrock underlying these soils will weather and is unstable if exposed to the effects of frost and alternate wetting and drying. In Queenston shale, north of Ridge Road, there are layers of hard shale in the formation that resist weathering and are difficult to excavate.

GLACIAL OUTWASH

These deposits include outwash terraces, eskers, valley trains, kames, and lake beaches and bars. The material consists of sorted sand and gravel that was deposited by glacial melt water. Many deposits include localized silt and clay strata that impede drainage.

The soils that formed in deposits of glacial outwash are those of the Alton, Halsey, Palmyra, Phelps, and Wampsville series.

Sand and gravel derived from outwash are suitable for many uses. Depending on gradation, soundness, and plasticity, outwash can be used for such purposes as (1) fill material for underwater placement; (2) ordinary fill; (3) material to strengthen unstable subgrade soils; (4) subbase for pavements; (5) wearing surfaces for driveways, park-

ing lots, and some roads; (6) material for highway shoulders; (7) free-draining, granular backfill for structures and pipes; (8) outside shells of dams for impounding water; and (9) abrasives for control of ice on highways.

These granular materials are too permeable in places for use in construction of a homogeneous embankment that is intended to hold water. Cut slopes in the more sandy material are subject to severe erosion and sloughing. Soils formed in glacial outwash are underlain in places by wet, compressible material that is not suitable as foundation for embankments more than 5 to 10 feet in height.

LACUSTRINE SEDIMENTS

Lacustrine sediments consist of fine-textured to coarse-textured materials that were washed into glacial lakes and that eventually settled to the bottom. In places, they are stratified fine sand and silt, and in other places, they are varved silt and clay. In a few places sand lenses are interbedded with the varved material, and because lake elevations fluctuate, many areas of outwash deposits are underlain by lacustrine sediments of silt and clay.

Many of the soils that formed in lacustrine sediments have a high water table, and wet silt and clay underlie the surface material. Wetness generally increases with increasing depth. Infiltration is restricted, and where the relief is nearly flat, runoff is slow.

Lacustrine sediments occur as nearly level areas or as dissected terraces or deltas. These sediments are extremely erodible, even on slight grades. Wherever steep terrace fronts occur, erosion is severe and landslides are numerous.

Soils of the following series formed in lacustrine sediments. In deep sandy deposits are soils of the Arkport, Colonie, Elnora, Galen, Minoa, and Lamson series; in deposits of sand underlain by clay are soils of the Claverack and Cosad series; in deep, silty deposits are soils of the Dunkirk, Collamer, Niagara, and Canandaigua series; and in deep, clayey deposits are soils of the Hudson, Madalin, Odessa, Rhinebeck, Schoharie, and Lakemont series.

Soils formed in lacustrine sediments present more engineering problems than other soils in the county, except those formed in muck and peat deposits. Problems result because of the position of these soils and their low strength and low stability. Some soils in silty, clayey deposits are difficult to drain and are highly susceptible to frost heaving. Also, they lose strength seasonally when thawing occurs and the water content of the material is increased sufficiently. Generally, these soils are suitable for low embankments of 5 feet or less in height. It is possible for a considerable amount of settlement to occur in places of heavy fill or under structures. Cut slopes generally are very unstable, and piping is a problem in silty and sandy areas of these deposits.

ALLUVIUM

Alluvial material is deposited wherever streams carrying sediments drop their load. These deposits, which form the flood plain adjacent to streams, vary in texture within short distances. Soils formed in alluvium are subject to periodic flooding, the natural surface drainage varies from place to place, and a water table near the surface is characteristic.

In Monroe County, Alluvial land and soils of the Eel, Genesee, Hamlin, and Wayland series formed in alluvial sediments. In some areas of Eel and Wayland soils, limestone bedrock is at a depth of 1½ to 3½ feet.

Alluvial sediments provide a poor base for foundations in some locations. Soils formed in recent alluvium are subject to flooding and should be avoided as building sites. Disposal of sewage effluent by infiltration in alluvial deposits is a problem because of a seasonal or permanently high water table. Most alluvial soils are good sources of topsoil.

MUCK AND PEAT

Deposits of muck and peat occupy swamps and the surface of other very poorly drained depressed areas. These deposits are accumulations of plant and animal remains and are mostly organic, but in some places, they contain varying amounts of inorganic material.

Organic soils in the county are mapped as Edwards muck and as shallow and deep phases of Muck. Generally, organic soils are not suitable for highway and other engineering structures, because they are highly compressible and unstable. In places these materials are underlain by soft wet alluvium, marl, or lacustrine sediments. In some shallow areas of muck, limestone bedrock or loamy or clayey material is at a depth of 1½ to 3½ feet.

BEDROCK

The section "General Nature of the County" in this survey describes the extent and geographical occurrence of the different kinds of bedrock in Monroe County. In addition to some exposed rock, bedrock is near the surface in many areas. In many places bedrock is exposed in shallow cuts in thin glacial deposits and in deeper cuts of some thick glacial deposits.

Nonfarm Uses of the Soils

This section is of special interest to developers, planners, and others who are concerned with community and industrial expansion in Monroe County. It is also of interest to those concerned with urban expansion into farming areas (fig. 7). Table 9 lists the soils of the county and shows the estimated degree and kind of limitations of the soils when they are used for certain community development and recreational uses. In most places soil investigations for the survey did not extend to depths below 3½ to 5 feet. Included in mapping were small spots of soils that differ from the dominant soils, and consequently, onsite determination is necessary for most uses, especially those that require deep excavations, such as sanitary land fills. The main features considered in rating the soils for this use were permeability, depth to seasonal or prolonged high water table, depth to bedrock, slope, stoniness, and the hazard of flooding or ponding.

The major properties that affect the nonfarm uses of the soils are slope; drainage or depth to seasonal high water table; soil permeability, or the rate at which water moves through the soil; stoniness, or the content of stones 10 inches or more across; surface texture, or particle-size (sand, silt, clay, gravel, cobblestones) distribution; the presence of hard bedrock, which generally requires blasting before it can be removed; the presence of soft bedrock, which generally can be removed with power tools; and the hazard of flooding and ponding.

In table 9, the limitations of the soils are rated slight, moderate, or severe. If the rating is moderate or severe, the chief limitations for the specified use are listed. A rating of slight indicates that the soil has few limitations, if any,

and is considered desirable for the specified use. A rating of moderate shows that a moderate problem is recognized, but it can be overcome or corrected. A rating of severe indicates that the use of the soil is seriously limited by a hazard or restrictions that are difficult to overcome. A rating of severe does not imply that a soil so rated cannot be used for the stated purpose. Also, it should be recognized that large-scale cuts or fills in an area may alter the natural soil to the extent that ratings given in the table no longer apply.

No single property restricts all types of nonfarm uses equally. For example, a seasonal high water table that is a moderate limitation for many uses can severely limit the use of the soil for the disposal of septic tank effluent.

Following are explanations of the uses rated in table 9 and identification of the features considered in evaluating the limitations of the soils for such uses.

SANITARY LAND FILL.—It is assumed that the land fill operations for the disposal of trash and garbage will be performed by the trench method. Importation of fill or cover material was not considered in the ratings.

The main features that affect the use of the soils for sanitary land fill are depth to seasonal high water table, permeability, slope, texture, depth to bedrock, and hazard of flooding. In general, soils that are deep, well drained, level or gently sloping, not stony, not too permeable, not too plastic and sticky, and not flooded are suitable for sanitary land fill. Rapidly permeable gravelly and sandy soils can be handled easily, but pollution is a severe hazard to nearby wells, lakes, and streams.

UNDERGROUND PUBLIC UTILITIES.—The selection of a soil suitable for the installation of such underground service facilities as storm drains, sewers, water or gas mains, or underground electric or telephone cables is determined mainly by the depth to bedrock. Locally, the Queenston shales are rippable, but the Rochester shales contain hard lenses that require blasting, as do most of the other rock formations in the county. Other important soil features are slope, texture, content of large stones and boulders, and depth to a prolonged high water table. The hazard of flooding and the depth to the water table are severe seasonal limitations. Corrosion potential was not considered in making the ratings.

DISPOSAL OF SEPTIC TANK EFFLUENT.—It is assumed that septic-tank systems have been adequately designed and installed (*11*). The source of water supply, whether from individual or community systems, was not considered in making the ratings, but the hazard of pollution of the water supply is noted in the table for some of the soils. Specific location of drainage fields for disposal of effluent requires onsite investigation.

HOMESITES.—The soils are rated for use as foundations for homes or other buildings of three stories or less, with basements. The main features considered were depth to a

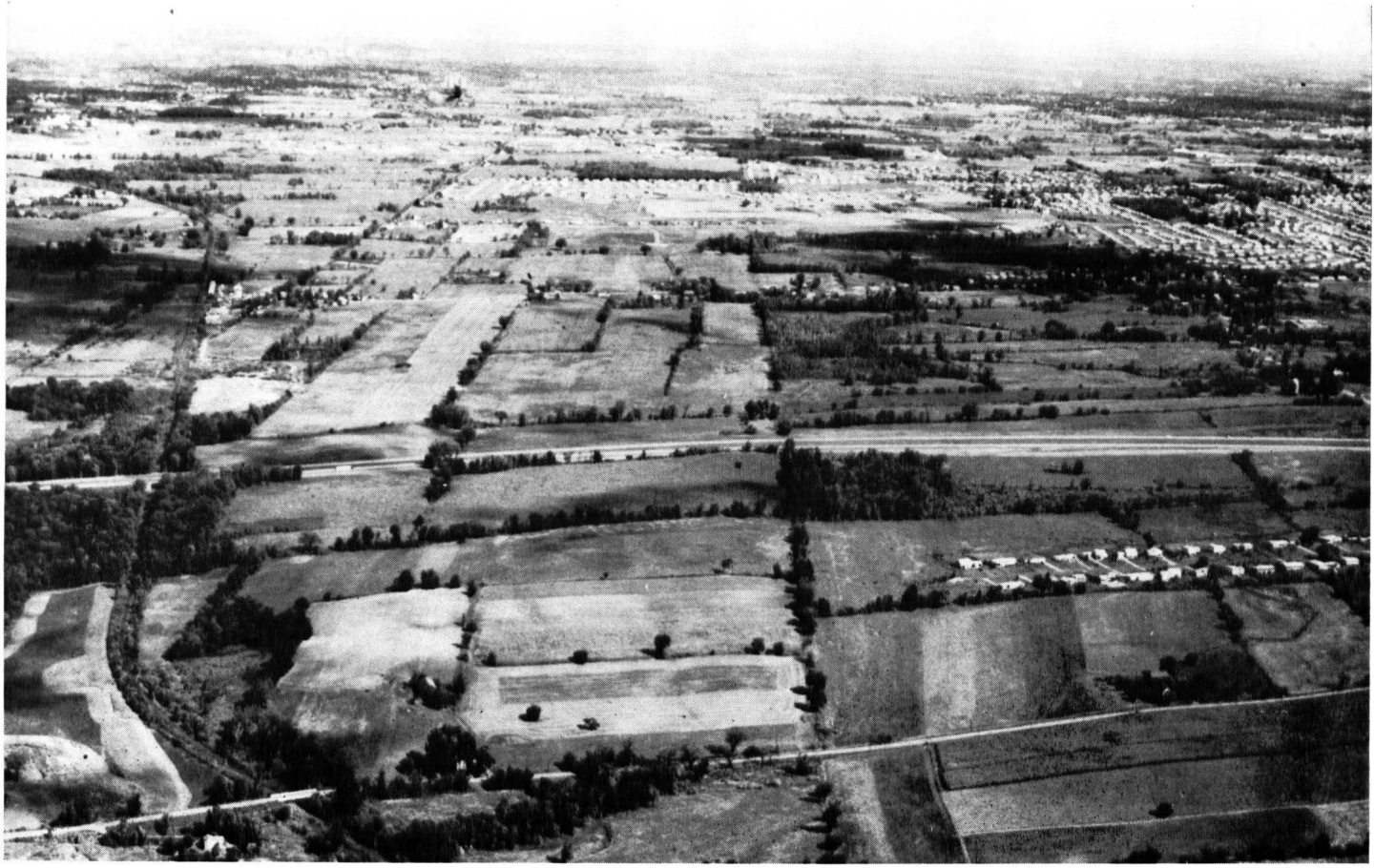

Figure 7.—**Housing developments in areas formerly used for farming. The area in the background is the town of Henrietta.**

TABLE 9.—*Estimated degree and kind of*

[Variants of Collamer, Lakemont, Niagara, and Sun series can be identified by referring

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Alluvial land: A1	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.
Alton:				
AnA, AnB, AoB	Severe: rapidly permeable below a depth of 6 inches; pollution hazard.	Moderate: loose sand and gravel below a depth of 32 inches subject to sloughing.	Slight: severe pollution hazard.	Slight
AoC	Severe: rapidly permeable below a depth of 6 inches; pollution hazard.	Moderate: slope; loose sand and gravel below a depth of 32 inches subject to sloughing.	Moderate: slope; severe pollution hazard.	Moderate: slope
Appleton: ApA	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; moderately slow or slow permeability below a depth of 19 inches.	Severe: seasonal high water table ½ to 1 foot below surface.
Arkport:				
ArB	Severe: rapidly permeable layers; pollution hazard.	Moderate: loose sand subject to sloughing.	Moderate: variable permeability in subsoil and substratum; severe pollution hazard.	Slight
ArC	Severe: rapidly permeable layers; pollution hazard.	Moderate: loose sand subject to sloughing.	Moderate: slope; rapidly permeable layers; severe pollution hazard.	Moderate: slope
ArD	Severe: rapidly permeable layers; pollution hazard; slope.	Moderate: slope; loose sand subject to sloughing.	Severe: slope; severe pollution hazard.	Severe: slope
AsC	Moderate to severe: slope; variable permeability; pollution hazard.	Moderate: loose sand subject to sloughing.	Moderate: slope; variable permeability; severe pollution hazard.	Moderate: slope
AsD	Severe: slope	Moderate: slope; loose sand subject to sloughing.	Severe: slope; severe pollution hazard.	Severe: slope
AtF3	Severe: slope; pollution hazard.	Severe: slope	Severe: slope; severe pollution hazard.	Severe: slope
Benson: BcB	Severe: hard bedrock 1 to 1½ feet below surface.	Severe: hard bedrock 1 to 1½ feet below surface.	Severe: hard bedrock 1 to 1½ feet below surface	Severe: hard bedrock 1 to 1½ feet below surface.
Brockport: BrA	Severe: seasonal high water table ½ to 1 foot below surface; soft shale bedrock at 1½ to 3½ feet.	Moderate: soft shale bedrock 1½ to 3½ feet below surface; seasonal high water table at ½ to 1 foot.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability; soft shale bedrock at 1½ to 3½ feet.	Severe: seasonal high water table ½ to 1 foot below surface.
Canandaigua: Ca	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; silt and sand subject to sloughing.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.

limitations for selected nonfarm uses

to the symbol and the name of the mapping unit in the "Guide to Mapping Units"]

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.	Severe: subject to frequent flooding; seasonal high water table.
Slight	Slight	Severe: gravelly surface texture.	Moderate: gravelly surface texture.	Slight	Moderate: gravelly surface texture.
Severe: slope	Moderate: slope	Severe: gravelly surface texture; slope.	Moderate: slope; gravelly surface texture.	Slight	Moderate: slope; gravelly surface texture.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; moderately slow or slow permeability below a depth of 19 inches.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Slight	Slight	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: hard bedrock 1 to 1½ feet below surface.	Severe: hard bedrock 1 to 1½ feet below surface.	Severe: hard bedrock 1 to 1½ feet below surface.	Severe: hard bedrock 1 to 1½ feet below surface.	Slight	Severe: hard bedrock 1 to 1½ feet below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; silty clay loam surface layer.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability.	Moderate: seasonal high water table ½ to 1 foot below surface; silty clay loam surface layer.	Moderate: seasonal high water table ½ to 1 foot below surface; silty clay loam surface layer.
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Cayuga: CeA, CeB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Severe: slow to moderately slow permeability below a depth of 7 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Cazenovia: CgA, CgB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Severe: moderately slow to slow permeability below a depth of 12 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Churchville: ChA, ChB.	Severe: seasonal high high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow to moderately slow permeability.	Severe: seasonal high water table ½ to 1 foot below surface.
Claverack:				
CkA	Severe: clay or silty clay below a depth of 20 to 40 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; sand overlying clay subject to sloughing.	Severe: slow permeability at a depth of 20 to 40 inches below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.
CkB	Severe: clay or silty clay below a depth of 20 to 40 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; sand overlying clay subject to sloughing.	Severe: slow permeability at a depth of 20 to 40 inches below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.
CkC	Severe: clay or silty clay below a depth of 20 to 40 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; sand overlying clay subject to sloughing.	Severe: slow permeability at a depth of 20 to 40 inches below surface; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.
Collamer:				
ClA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of 14 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
ClB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of 14 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
ClC	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of 14 inches; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.
CmA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of 14 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
CmB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of 14 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: slow to moderately slow permeability below a depth of 7 inches.	Severe: slow to moderately slow permeability below a depth of 7 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: gravelly surface; moderately slow to slow permeability below a depth of 12 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow to slow permeability below a depth of 12 inches.	Slight	Slight.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow to moderately slow permeability.	Severe: seasonal high water table ½ to 1 foot below surface; slow to moderately slow permeability.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer.	Slight	Moderate: sandy surface layer.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Moderate: sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer; slope.	Slight	Moderate: sandy surface layer.
Severe: slope	Moderate: sandy surface layer; slope.	Severe: seasonal high water table 1½ to 2 feet below surface; sandy surface layer; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer; slope.	Slight	Moderate: sandy surface layer; slope.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Severe: seasonal high water table 1½ to 2 feet below surface; slope.	Moderate: slope	Severe: slope	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: slope.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Colonie:				
CoB	Severe: rapidly permeable; pollution hazard.	Moderate: sand subject to sloughing.	Slight: severe pollution hazard.	Slight
CoC	Severe: rapidly permeable; pollution hazard.	Moderate: sand subject to sloughing.	Moderate: slope; severe pollution hazard.	Moderate: slope
CoD3	Severe: rapidly permeable; pollution hazard.	Moderate: sand subject to sloughing.	Severe: slope; severe pollution hazard.	Severe: slope
Cosad: Cu	Severe: seasonal high water table ½ to 1 foot below surface; clay or silty clay 20 to 40 inches below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; sand overlying clay subject to sloughing.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability 20 to 40 inches below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Cut and fill land: Cw. Estimates are not given, because the soil material is variable.				
Dunkirk:				
DuB	Slight	Moderate: silt and very fine sand subject to sloughing.	Severe: moderately slow permeability below a depth of 17 inches.	Slight
DuC3	Moderate: slope	Moderate: silt and very fine sand subject to sloughing.	Severe: moderately slow permeability below a depth of 17 inches.	Moderate: slope
DuD3	Severe: slope	Moderate: silt and very fine sand subject to sloughing.	Severe: moderately slow permeability below a depth of 17 inches; slope.	Severe: slope
Edwards: Ed	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.
Eel: Ee	Severe: flooding; bedrock at a depth of 20 to 40 inches in places.	Moderate: flooding; silt and very fine sand subject to sloughing; severe where bedrock is at a depth of 20 to 40 inches.	Severe: flooding; bedrock at a depth of 20 to 40 inches in places.	Severe: flooding; bedrock at a depth of 20 to 40 inches in places.
Elnora:				
E1A	Severe: rapidly permeable; pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface; sand subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface.
E1B	Severe: rapidly permeable; pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface; sand subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Fresh water marsh: Fw	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Slight to moderate: slope.	Moderate: sandy surface layer.	Moderate: slope; sandy surface layer.	Moderate: sandy surface layer.	Slight	Severe: sandy.
Severe: slope	Moderate: sandy surface layer; slope.	Severe: slope	Moderate: slope; sandy surface layer.	Slight	Severe: sandy.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: sandy; slope.
Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; sandy surface layer.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability 20 to 40 inches below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; slow permeability 20 to 40 inches below surface.
Slight	Slight	Moderate: slope; moderately slow permeability below a depth of 17 inches.	Slight	Slight	Slight.
Severe: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Severe: eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope; eroded.
Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.	Severe: prolonged high water table; muck overlying marl.
Severe: flooding; bedrock at a depth of 20 to 40 inches in places.	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding.	Moderate: flooding.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer.	Slight	Severe: sandy surface layer.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: sandy surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; sandy surface layer.	Slight	Severe: sandy surface layer.
Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Galen:				
GaA	Moderate: seasonal high water table 1½ to 2 feet below surface; possible pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface; very fine sand subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately rapid or moderate permeability; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface.
GaB	Moderate: seasonal high water table 1½ to 2 feet below surface; possible pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface; very fine sand subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately rapid or moderate permeability; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Genesee: Ge	Severe: flooding	Moderate: flooding; silt and very fine sand subject to sloughing.	Severe: flooding	Severe: flooding
Halsey: Ha	Severe: prolonged high water table; some ponding; pollution hazard.	Severe: prolonged high water table; some ponding.	Severe: prolonged high water table; some ponding.	Severe: prolonged high water table; some ponding.
Hamlin: Hc	Severe: flooding	Moderate: flooding; silt and very fine sand subject to sloughing.	Severe: flooding	Severe: flooding
Hilton:				
HfA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
HfB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
HlA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
HlB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
HmA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 10 to 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
HmB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 10 to 17 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Severe: flooding	Moderate: flooding	Moderate: flooding	Moderate: flooding	Slight	Moderate: flooding.
Severe: prolonged high water table; some ponding.	Severe: prolonged high water table; some ponding.	Severe: prolonged high water table; some ponding; gravelly surface layer.	Severe: prolonged high water table; some ponding.	Severe: prolonged high water table.	Severe: prolonged high water table; some ponding.
Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: seasonal high water table 1½ to 2 feet below surface; flooding.	Moderate: flooding	Moderate: flooding.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; stony.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of 10 to 17 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; stony; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of 10 to 17 inches.	Slight	Slight.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Honeoye:				
HnB	Moderate: seasonal high water table 2½ to 4 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of 26 inches.	Slight
HnC	Moderate: seasonal high water table 2½ to 4 feet below surface; slope.	Slight	Severe: moderately slow or slow permeability below a depth of 26 inches.	Moderate: slope
HoA	Severe: hard bedrock 3½ to 6 feet below surface.	Moderate: hard bedrock 3½ to 6 feet below surface.	Severe: moderately slow or slow permeability below a depth of 26 inches.	Moderate: hard bedrock 3½ to 6 feet below surface.
HoB	Severe: hard bedrock 3½ to 6 feet below surface.	Moderate: hard bedrock 3½ to 6 feet below surface.	Severe: moderately slow or slow permeability below a depth of 26 inches.	Moderate: hard bedrock 3½ to 6 feet below surface.
Hudson: HuB	Severe: slow permeability below a depth of 12 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; unstable silt and clay.	Severe: slow permeability below a depth of 12 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Ira: IgB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: slow permeability below a depth of about 18 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
Lairdsville: LaB	Severe: clay or silty clay below a depth of about 8 inches; soft shale bedrock 1½ to 3½ feet below surface.	Moderate: soft shale bedrock 1½ to 3½ feet below surface.	Severe: slow permeability below a depth of about 8 inches; soft shale bedrock 1½ to 3½ feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; soft shale bedrock 1½ to 3½ feet below surface.
Lake beaches: Lb. Estimates are not given, because the soil material is variable.				
Lakemont:				
Le	Severe: prolonged high water table; ponding; clay or silty clay below a depth of 8 inches.	Moderate: prolonged high water table; silt and clay subject to sloughing.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table; ponding.
Lk	Severe: prolonged high water table; ponding.	Moderate: prolonged high water table.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table; ponding.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Moderate: slope	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; stony; slope.	Moderate: moderately slow or slow permeability below a depth of 26 inches.	Slight	Slight.
Severe: slope	Moderate: slope	Severe: slope	Moderate: moderately slow or slow permeability below a depth of 26 inches.	Slight	Moderate: slope.
Moderate: hard bedrock 3½ to 6 feet below surface.	Slight	Moderate: moderately slow or slow permeability below a depth of 26 inches; hard bedrock 3½ to 6 feet below surface.	Moderate: moderately slow or slow permeability below a depth of 26 inches.	Slight	Slight.
Moderate: hard bedrock 3½ to 6 feet below surface; slope.	Slight	Moderate: moderately slow or slow permeability below a depth of 26 inches; hard bedrock 3½ to 6 feet below surface; slope.	Moderate: moderately slow or slow permeability below a depth of 26 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Severe: slow permeability 12 inches below surface.	Severe: slow permeability 12 inches below surface.	Slight	Slight.
Moderate; seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: gravelly surface layer; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; slow permeability below a depth of about 18 inches; gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Moderate: seasonal high water table 1½ to 2 feet below surface; soft shale bedrock 1½ to 3½ feet below surface; slope.	Slight	Severe: slow permeability below a depth of about 8 inches; slope.	Severe: slow permeability below a depth of about 8 inches.	Slight	Moderate: soft shale bedrock 1½ to 3½ feet below surface.
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; clay subsoil material.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table.	Severe: prolonged high water table; ponding.
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 8 inches.	Severe: prolonged high water table.	Severe: prolonged high water table; ponding.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Lamson: Lm	Severe: prolonged high water table; ponding.	Moderate: prolonged high water table; fine and very fine sand subject to sloughing.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.
Lima:				
LnA	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of about 25 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
LnB	Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: moderately slow or slow permeability below a depth of about 25 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
LoB	Severe: hard bedrock 3½ to 6 feet below surface.	Moderate: hard bedrock 3½ to 6 feet below surface.	Severe: moderately slow to slow permeability 12 to 25 inches below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; hard bedrock 3½ to 6 feet below surface.
Lockport: Lp	Severe: seasonal high water table ½ to 1 foot below surface; clay or silty clay about 8 inches below surface; soft shale bedrock 1½ to 3½ feet below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; soft shale bedrock 1½ to 3½ feet below surface.	Severe: slow permeability about 8 inches below surface; seasonal high water table ½ to 1 foot below surface; soft shale bedrock 1½ to 3½ feet below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Lyons: Ly	Severe: prolonged high water table; ponding.	Moderate: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; moderately slow or slow permeability at a depth of about 20 inches below surface.	Severe: prolonged high water table; ponding.
Madalin: Ma	Severe: prolonged high water table; ponding; clay or silty clay about 10 inches below surface.	Moderate: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 10 inches.	Severe: prolonged high water table; ponding.
Made land: Mb. Estimates are not given, because the soil material is variable.				
Madrid:				
MdA	Severe: moderately rapidly or rapidly permeable; pollution hazard.	Slight	Slight: possible pollution hazard.	Slight
MdB	Severe: moderately rapidly or rapidly permeable; pollution hazard.	Slight	Slight: possible pollution hazard.	Slight

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of about 25 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of about 25 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of about 25 inches; slope.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability below a depth of about 25 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface; hard bedrock 3½ to 6 feet below surface.	Slight	Moderate: seasonal high water table 1½ to 2 feet below surface; hard bedrock 3½ to 6 feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; moderately slow or slow permeability 12 to 25 inches below surface.	Slight	Slight.
Severe: seasonal high water table ½ to 1 foot below surface; soft shale bedrock 1½ to 3½ feet below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability at a depth of about 8 inches below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability at a depth of about 8 inches below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; silty clay loam surface layer.	Moderate: seasonal high water table ½ to 1 foot below surface; silty clay loam surface layer.
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.
Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; slow permeability below a depth of about 10 inches.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.
Slight	Slight	Moderate: some gravel in surface layer.	Slight	Slight	Slight.
Moderate: slope	Slight	Moderate: slope; some gravel in surface layer and subsoil.	Slight	Slight	Slight.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Madrid—Continued				
MdC	Severe: moderately rapidly or rapidly permeable; pollution hazard.	Slight	Moderate: slope; possible pollution hazard.	Moderate: slope
MeB	Severe: moderately rapidly or rapidly permeable; very stony; pollution hazard.	Moderate: very stony	Slight: possible pollution hazard.	Moderate: very stony
Massena: Mt	Severe: seasonal high water table ½ foot to 1½ feet below surface; possible pollution hazard.	Moderate: seasonal high water table ½ foot to 1½ feet below surface.	Severe: seasonal high water table ½ foot to 1½ feet below surface; possible pollution hazard.	Severe: seasonal high water table ½ foot to 1½ feet below surface.
Minoa: Mn	Severe: seasonal high water table ½ to 1 foot below surface; possible pollution hazard.	Moderate: seasonal high water table ½ to 1 foot below surface; fine sand subject to sloughing.	Severe: seasonal high water table ½ to 1 foot below surface; possible pollution hazard.	Severe: seasonal high water table ½ to 1 foot below surface.
Muck:				
Mr	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; severe pollution hazard.	Severe: prolonged high water table; ponding; organic soil.
Ms	Severe: prolonged high water table; ponding; organic soil; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; ponding; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; ponding; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; ponding; organic soil; bedrock is at a depth of 20 to 40 inches in places.
Niagara:				
Ng	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; silt and very fine sand subject to sloughing.	Severe: moderately slow or slow permeability below a depth of about 25 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Nr	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: moderately slow or slow permeability below a depth of about 25 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Odessa:				
OdA	Severe: seasonal high water table ½ to 1 foot below surface; silty clay or clay material below a depth of about 7 inches.	Moderate: seasonal high water table ½ to 1 foot below surface; unstable silt and clay.	Severe: slow permeability below a depth of about 7 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
OdB	Severe: seasonal high water table ½ to 1 foot below surface; silty clay or clay material below a depth of about 7 inches.	Moderate: seasonal high water table ½ to 1 foot below surface; unstable silt and clay.	Severe: slow permeability below a depth of about 7 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Severe: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Moderate: slope	Slight	Moderate: slope; very stony; gravelly or cobbly substratum.	Moderate: slope; very stony surface layer.	Slight	Severe: very stony.
Moderate: seasonal high water table ½ foot to 1½ feet below surface.	Moderate: seasonal high water table ½ foot to 1½ feet below surface.	Severe: seasonal high water table ½ foot to 1½ feet below surface.	Severe: seasonal high water table ½ foot to 1½ feet below surface.	Moderate: seasonal high water table ½ foot to 1½ feet below surface.	Moderate: seasonal high water table ½ foot to 1½ feet below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.
Severe: prolonged high water table; ponding; organic soil; bedrock is at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.	Severe: prolonged high water table; ponding; organic soil.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 7 inches.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; clay subsoil at a depth below 7 inches.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 7 inches.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Ontario:				
OfB	Moderate: seasonal high water table below a depth of about 2½ to 4 feet.	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches.	Slight
OfC	Moderate: seasonal high water table below a depth of about 2½ to 4 feet; slope.	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches.	Moderate: slope
OnB	Moderate: seasonal high water table below a depth of about 2½ to 4 feet.	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches.	Slight
OnC	Moderate: seasonal high water table below a depth of about 2½ to 4 feet; slope.	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches.	Moderate: slope
OnC3	Moderate: seasonal high water table below a depth of about 2½ to 4 feet; slope.	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches.	Moderate: slope
OnD3	Severe: slope	Slight	Severe: moderately slow or moderate permeability below a depth of about 25 inches; slope.	Severe: slope
OnF	Severe: slope	Severe: slope	Severe: moderately slow or moderate permeability below a depth of about 25 inches; slope.	Severe: slope
OpC	Moderate: variable permeability; slope; possible pollution hazard.	Moderate: slope	Moderate: variable permeability; slope; possible pollution hazard.	Moderate: slope
OpD	Severe: slope; possible pollution hazard.	Moderate: slope	Severe: slope; possible pollution hazard.	Severe: slope
OpF	Severe: slope; possible pollution hazard.	Severe: slope	Severe: slope; possible pollution hazard.	Severe: slope
Ovid:				
Ov	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: moderately slow or slow permeability below a depth of about 16 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Ow	Severe: seasonal high water table ½ to 1 foot below surface; hard bedrock 3½ to 6 feet below surface.	Moderate: seasonal high water table ½ to 1 foot below surface; hard bedrock 3½ to 6 feet below surface.	Severe: moderately slow or slow permeability below a dept of about 16 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Palmyra:				
PaA	Severe: rapidly permeable below a depth of 30 inches; pollution hazard.	Moderate: loose sand and gravel below a depth of about 30 inches subject to sloughing.	Slight: severe pollution hazard.	Slight

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and faiway
Moderate: slope	Slight	Moderate: slope; gravelly material below a depth of about 25 inches.	Slight	Slight	Slight.
Severe: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Moderate: slope	Slight	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Moderate: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Moderate: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Moderate: slope	Slight	Severe: eroded.
Severe: slope	Severe: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Moderate: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope; gravelly material below a depth of about 25 inches.	Severe: slope	Severe: slope	Severe: slope.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 24 inches.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 24 inches.	Severe: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Slight	Slight	Severe: gravelly surface layer.	Moderate: gravelly surface layer.	Slight	Moderate: gravelly surface layer.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Palmyra—Continued				
PaB	Severe: rapidly permeable below a depth of 30 inches; pollution hazard.	Moderate: loose sand and gravel below a depth of about 30 inches subject to sloughing.	Slight: severe pollution hazard.	Slight
PaC	Severe: rapidly permeable below a depth of 30 inches; pollution hazard.	Moderate: loose sand and gravel below a depth of about 30 inches subject to sloughing.	Moderate: slope; severe pollution hazard.	Moderate: slope
PaD	Severe: rapidly permeable below a depth of 30 inches; pollution hazard; slope.	Moderate: loose sand and gravel below a depth of about 30 inches subject to sloughing; slope.	Severe: slope; severe pollution hazard.	Severe: slope
PaF	Severe: rapidly permeable below a depth of 30 inches; pollution hazard; slope.	Severe: slope	Severe: slope; severe pollution hazard.	Severe: slope
PgB	Severe: rapidly permeable below a depth of about 30 inches; pollution hazard.	Moderate: loose sand and gravel below a depth of about 30 inches subject to sloughing.	Slight: severe pollution hazard.	Slight
Phelps:				
PhA	Severe: rapidly permeable; pollution hazard.	Moderate: loose sand and gravel below a depth of about 32 inches subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet below surface.
PhB	Severe: rapidly permeable; pollution hazard.	Moderate: loose sand and gravel below a depth of about 32 inches subject to sloughing.	Moderate: seasonal high water table 1½ to 2 feet below surface; severe pollution hazard.	Moderate: seasonal high water table 1½ to 2 feet belowsurface.
Pits and Quarries: Pu. Estimates are not given, because the soil material is variable.				
Rhinebeck: Rb	Severe: seasonal high water table ½ to 1 foot below surface; silty clay or clay subsoil material.	Moderate: seasonal high water table ½ to 1 foot below surface; unstable silt and clay.	Severe: slow permeability below a depth of about 12 inches; seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface.
Riga: RgB	Severe: clay subsoil material; soft shale bedrock 1½ to 3½ feet below surface.	Moderate: soft shale bedrock 1½ to 3½ feet below surface.	Severe: slow permeability below a depth of 8 inches; soft shale bedrock 1½ to 3½ feet below surface.	Moderate: seasonal high water table 1½ to 2 feet below surface; soft shale bedrock 1½ to 3½ feet below surface.
Rock land: Ro	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.
Schoharie:				
SeA	Severe: silty clay and clay material.	Moderate: unstable silt and clay.	Severe: slow permeability below a depth of about 11 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.
SeB	Severe: silty clay and clay material.	Moderate: unstable silt and clay.	Severe: slow permeability below a depth of about 11 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Moderate: slope	Slight	Severe: slope; gravelly surface layer and subsoil.	Moderate: gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Severe: slope	Moderate: slope	Severe: slope; gravelly surface layer and subsoil.	Moderate: gravelly surface layer.	Slight	Moderate: gravelly surface layer; slope.
Severe: slope	Severe: slope	Severe: slope; gravelly surface layer and subsoil.	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope; gravelly surface layer and subsoil.	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope	Slight	Severe: slope; gravelly surface layer and subsoil.	Moderate: gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: gravelly surface layer.	Moderate: seasonal high water table 1½ to 2 feet below surface; gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Moderate: seasonal high water table 1½ to 2 feet below surface; slope.	Slight	Severe: slope; gravelly surface layer and subsoil.	Moderate: seasonal high water table 1½ to 2 feet below surface; gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 12 inches.	Severe: seasonal high water table ½ to 1 foot below surface; slow permeability below a depth of about 12 inches.	Moderate: seasonal high water table ½ to 1 foot below surface.	Moderate: seasonal high water table ½ to 1 foot below surface.
Moderate: seasonal high water table 1½ to 2 feet below surface; soft shale bedrock 1½ to 3½ feet below surface.	Slight	Severe: slow permeability below a depth of 8 inches.	Severe: slow permeability below a depth of 8 inches.	Slight	Moderate: soft shale bedrock 1½ to 3½ feet below surface.
Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.	Severe: bedrock at or near surface.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: slow permeability below a depth of about 11 inches.	Severe: slow permeability below a depth of about 11 inches.	Slight	Slight.
Moderate: seasonal high water table 1½ to 2 feet below surface.	Slight	Severe: slow permeability; silty clay subsoil below a depth of about 11 inches.	Severe: slow permeability below a depth of about 11 inches.	Slight	Slight.

TABLE 9.—*Estimated degree and kind of*

Series name and map symbols	Sanitary land fill	Underground public utilities	Disposal of septic tank effluent	Homesites
Schoharie—Continued				
ShC3	Severe: silty clay or clay material.	Moderate: unstable silt and clay.	Severe: slow permeability below a depth of about 11 inches.	Moderate: seasonal high water table 1½ to 2 feet below surface; slope.
ShD3	Severe: silty clay or clay material; slope.	Moderate: unstable silt and clay.	Severe: slow permeability below a depth of about 11 inches; slope.	Severe: slope
ShF	Severe: silty clay or clay material; slope.	Severe: slope	Severe: slow permeability below a depth of about 11 inches; slope.	Severe: slope
Sodus: SoB	Moderate: seasonal high water table 1½ to 2½ feet below surface.	Slight	Severe: slow permeability below a depth of about 19 inches.	Moderate: seasonal high water table 1½ to 2½ feet below surface.
Sun:				
Ss	Severe: prolonged high water table; ponding.	Moderate: prolonged high water table.	Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding.
St	Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.	Severe: hard bedrock 1½ to 3½ feet below surface.	Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.	Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.
Urban land: Ub. Estimates are not given, because the soil material is variable.				
Wampsville:				
WcA	Severe: rapidly permeable below a depth of about 30 inches; pollution hazard.	Moderate: loose gravel and sand below a depth of about 30 inches subject to sloughing.	Slight: severe pollution hazard.	Slight
WcB	Severe: rapidly permeable below a depth of about 30 inches; pollution hazard.	Moderate: loose gravel and sand below a depth of about 30 inches subject to sloughing.	Slight: severe pollution hazard.	Slight
WcC	Severe: rapidly permeable below a depth of about 30 inches; pollution hazard.	Moderate: loose gravel and sand below a depth of about 30 inches subject to sloughing.	Moderate: slope; severe pollution hazard.	Moderate: slope
Wassaic: WfA	Severe: hard bedrock 1½ to 3½ feet below surface; possible pollution hazard.	Severe: hard bedrock 1½ to 3½ feet below surface.	Severe: hard bedrock 1½ to 3½ feet below surface; possible pollution hazard.	Severe: hard bedrock 1½ to 3½ feet below surface.
Wayland: Wg	Severe: prolonged high water table; flooding; bedrock at a depth of 20 to 40 inches in places.	Moderate: prolonged high water table; flooding; severe where bedrock is at a depth of 20 to 40 inches.	Severe: prolonged high water table; flooding; moderately slow permeability below a depth of about 8 inches; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; flooding; bedrock at a depth of 20 to 40 inches in places.

limitations for selected nonfarm uses—Continued

Streets and parking lots	Picnic and extensive play areas	Athletic fields and intensive play areas	Campsites	Hiking and riding trails	Lawns and fairways
Severe: slope	Moderate: slope; silty clay loam surface layer.	Severe: slope; silty clay and clay subsoil; slow permeability below a depth of about 11 inches.	Severe: slow permeability below a depth of about 11 inches.	Moderate: silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.
Severe: slope	Severe: slope	Severe: slope; silty clay and clay subsoil; slow permeability below a depth of about 11 inches.	Severe: slow permeability below a depth of about 11 inches; slope.	Moderate: silty clay loam surface layer; slope.	Severe: slope.
Severe: slope	Severe: slope	Severe: slope; silty clay and clay subsoil; slow permeability below a depth of about 11 inches.	Severe: slow permeability below a depth of about 11 inches; slope.	Severe: slope	Severe: slope.
Moderate: slope; seasonal high water table 1½ to 2½ feet below surface.	Slight	Severe: slope; gravelly surface layer and subsurface material.	Moderate: gravelly surface layer.	Slight	Moderate: gravelly surface layer.
Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.	Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.	Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding.	Severe: prolonged high water table; ponding. Severe: prolonged high water table; ponding; hard bedrock 1½ to 3½ feet below surface.
Slight	Severe: cobbly surface layer.	Severe: cobbly surface layer.	Severe: cobbly surface layer.	Moderate: cobbly surface layer.	Severe: cobbly surface layer.
Moderate: slope	Severe: cobbly surface layer.	Severe: slope; cobbly and gravelly surface and subsurface layers.	Severe: cobbly surface layer.	Moderate: cobbly surface layer.	Severe: cobbly surface layer.
Severe: slope	Severe: cobbly surface layer.	Severe: slope; cobbly and gravelly surface and subsurface layers.	Severe: cobbly surface layer.	Moderate: cobbly surface layer.	Severe: cobbly surface layer.
Severe: hard bedrock 1½ to 3½ feet below surface.	Slight	Severe: hard bedrock 1½ to 3½ feet below surface.	Slight	Slight	Moderate: hard bedrock 1½ to 3½ feet below surface.
Severe: prolonged high water table; flooding; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding; bedrock at a depth of 20 to 40 inches in places.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.	Severe: prolonged high water table; flooding.

seasonal or prolonged high water table, slope, depth to bedrock, stoniness, and the hazard of flooding (fig. 8). For buildings without basements, the depth to bedrock and the water table are less restrictive. Slope is considered also, primarily for subdivision development. It is less restrictive for isolated buildings. Specific location of buildings usually requires onsite investigation. Problems of sewage disposal, water supply, stabilizing or maintaining vegetative cover, or access roads, were not considered in the rating.

STREETS AND PARKING LOTS.—Soil requirements for streets and parking lots are similar to those for highways. The main features considered were the depth to a seasonal or prolonged high water table, slope, depth to bedrock, stoniness, and the hazard of flooding.

PICNIC AND EXTENSIVE PLAY AREAS.—The soils are rated for play areas to be used mainly by children and for picnic areas that have provision for tables and fireplaces for large numbers of people. These areas are left essentially in their natural state. Problems of water supply and sewage disposal were not considered in the ratings. The main soil features considered were depth to a seasonal high water table, slope, depth to bedrock, surface stoniness, surface texture, and the hazard of flooding during periods of heavy use.

ATHLETIC FIELDS AND INTENSIVE PLAY AREAS.—The soils are rated for development of areas for intensive use for baseball, football, tennis, and similar sports. Areas selected for these uses must be nearly level, have good drainage, and have a favorable surface texture. Importation of fill material or topsoil was not considered in the ratings.

CAMPSITES.—The soils are rated for use as tent or trailer campsites for large numbers of people. Frequent use during the camping season, which involves heavy foot and vehicular traffic, is assumed. Problems of sewage disposal, water supply, and access roads were not considered in making the ratings. The main soil properties considered were depth to seasonal high water table, permeability, slope, stoniness, surface texture, and the hazard of flooding or ponding during the period of heavy use.

HIKING AND RIDING TRAILS.—The soils are rated for hiking and riding trails. The areas are left essentially in their natural state. The main features considered were depth to a seasonal or prolonged high water table, slope, surface texture, stoniness or rockiness, and hazard of flooding or ponding.

LAWNS AND FAIRWAYS.—The main properties that determine the suitability of soils for lawns and golf fairways are depth to a seasonal or prolonged high water table, slope, depth to bedrock, surface texture, stoniness, and hazard of flooding. Importation of fill or topsoil was not considered in the ratings, and traps or roughs were not considered as part of the fairway. Deep, well drained or moderately well drained soils that have a medium-textured or moderately coarse textured surface layer and are no more than moderately sloping are well suited to these uses.

Figure 8.—**Residential development ponded early in spring. Even though the houses are above the water level, the basements are below the water level and are flooded. Septic tanks do not function during this period.**

Descriptions of the Soils

This section describes the soil series and mapping units of Monroe County. The approximate acreage and proportionate extent of the soils are given in table 10.

In the pages that follow, a general description of each soil series is given. Each series description has a short narrative description of a representative profile and a much more detailed description of the same profile, from which highly technical interpretations can be made. Following the profile is a brief statement of the range in characteristics of the soils in the series, as mapped in this county. Color names and color symbols given are for a moist soil, unless otherwise indicated.

Following the series description, each mapping unit in the series is described individually. For full information on any one mapping unit, it is necessary to read the description of the soil series, as well as the description of the mapping unit. Miscellaneous land types, such as Rock land, are described in alphabetic order along with other mapping units.

After the name of each mapping unit there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. At the end of the description of each mapping unit are listed the capability unit and woodland suitability group in which the mapping unit has been placed. The pages where these groups are described can be readily learned by referring to the "Guide to Mapping Units."

TABLE 10.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Alluvial land	1, 743	0. 4	Galen very fine sandy loam, 0 to 2 percent slopes	3, 344	0. 8
Alton gravelly sandy loam, 0 to 3 percent slopes	1, 126	. 3	Galen very fine sandy loam, 2 to 6 percent slopes	4, 245	1. 0
Alton gravelly sandy loam, 3 to 8 percent slopes	3, 274	. 8	Genesee silt loam	2, 440	. 6
Alton gravelly loam, 3 to 8 percent slopes	1, 811	. 4	Halsey gravelly loam	1, 764	. 4
Alton gravelly loam, 8 to 15 percent slopes	528	. 1	Hamlin silt loam	3, 149	. 7
Appleton loam, 0 to 3 percent slopes	10, 150	2. 4	Hilton fine sandy loam, 0 to 3 percent slopes	1, 388	. 3
Arkport very fine sandy loam, 0 to 6 percent slopes	3, 373	. 8	Hilton fine sandy loam, 3 to 8 percent slopes	2, 466	. 6
Arkport very fine sandy loam, 6 to 12 percent slopes	828	. 2	Hilton loam, 0 to 3 percent slopes	13, 510	3. 3
Arkport very fine sandy loam, 12 to 20 percent slopes	358	. 1	Hilton loam, 3 to 8 percent slopes	24, 110	5. 5
Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes	498	. 1	Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes	377	. 1
Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes	993	. 2	Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes	746	. 2
Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded	7, 401	1. 7	Honeoye silt loam, 3 to 8 percent slopes	3, 942	. 9
Benson channery loam, 0 to 8 percent slopes	2, 175	. 5	Honeoye silt loam, 8 to 15 percent slopes	550	. 1
Brockport silty clay loam, 0 to 2 percent slopes	1, 875	. 4	Honeoye silt loam, limestone substratum, 0 to 3 percent slopes	984	. 2
Canandaigua silt loam	9, 584	2. 2	Honeoye silt loam, limestone substratum, 3 to 8 percent slopes	2, 772	. 7
Cayuga silt loam, 0 to 2 percent slopes	2, 872	. 6	Hudson silt loam, 2 to 6 percent slopes	2, 210	. 5
Cayuga silt loam, 2 to 6 percent slopes	6, 917	1. 6	Ira gravelly fine sandy loam, 0 to 6 percent slopes	338	. 1
Cazenovia gravelly loam, 0 to 3 percent slopes	4, 791	1. 1	Lairdsville silt loam, 2 to 6 percent slopes	2, 010	. 5
Cazenovia gravelly loam, 3 to 8 percent slopes	3, 150	. 7	Lake beaches	390	. 1
Churchville silt loam, 0 to 2 percent slopes	6, 327	1. 5	Lakemont silt loam	5, 607	1. 3
Churchville silt loam, 2 to 6 percent slopes	910	. 2	Lakemont silt loam, loamy subsoil variant	1, 139	. 3
Claverack loamy fine sand, 0 to 2 percent slopes	4, 128	1. 0	Lamson very fine sandy loam	3, 810	. 9
Claverack loamy fine sand, 2 to 6 percent slopes	6, 870	1. 6	Lima silt loam, 0 to 3 percent slopes	1, 282	. 3
Claverack loamy fine sand, 6 to 12 percent slopes	455	. 1	Lima silt loam, 3 to 8 percent slopes	2, 073	. 5
Collamer silt loam, 0 to 2 percent slopes	9, 925	2. 3	Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes	4, 985	1. 1
Collamer silt loam, 2 to 6 percent slopes	13, 780	3. 2	Lockport silty clay loam	7, 353	1. 7
Collamer silt loam, 6 to 12 percent slopes	709	. 2	Lyons silt loam	1, 411	. 3
Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes	1, 145	. 3	Madalin silty clay loam	1, 189	. 3
Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes	1, 524	. 4	Made land	1, 986	. 5
Colonie loamy fine sand, 0 to 6 percent slopes	10, 330	2. 4	Madrid fine sandy loam, 0 to 3 percent slopes	3, 439	. 8
Colonie loamy fine sand, 6 to 12 percent slopes	1, 700	. 4	Madrid fine sandy loam, 3 to 8 percent slopes	8, 481	2. 0
Colonie loamy fine sand, 12 to 20 percent slopes, eroded	467	. 1	Madrid fine sandy loam, 8 to 15 percent slopes	670	. 2
Cosad loamy fine sand	3, 778	. 9	Madrid very stony fine sandy loam, 3 to 8 percent slopes	1, 933	. 4
Cut and fill land	645	. 1	Massena fine sandy loam	4, 110	. 9
Dunkirk silt loam, 2 to 6 percent slopes	1, 055	. 2	Minoa very fine sandy loam	5, 956	1. 4
Dunkirk silt loam, 6 to 12 percent slopes, eroded	473	. 1	Muck, deep	1, 690	. 4
Dunkirk silt loam, 12 to 20 percent slopes, eroded	242	. 1	Muck, shallow	3, 016	. 7
Edwards muck	1, 460	. 3	Niagara silt loam	16, 193	3. 8
Eel silt loam	6, 245	1. 4	Niagara silt loam, loamy subsoil variant	1, 213	. 3
Elnora loamy fine sand, 0 to 2 percent slopes	4, 240	1. 0	Odessa silt loam, 0 to 2 percent slopes	9, 855	2. 2
Elnora loamy fine sand, 2 to 6 percent slopes	2, 970	. 7	Odessa silt loam, 2 to 6 percent slopes	538	. 1
Fresh water marsh	2, 858	. 7	Ontario fine sandy loam, 3 to 8 percent slopes	5, 780	1. 3
			Ontario fine sandy loam, 8 to 15 percent slopes	1, 609	. 4
			Ontario loam, 3 to 8 percent slopes	21, 823	5. 1

TABLE 10.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Ontario loam, 8 to 15 percent slopes	7, 857	1. 8	Pits and Quarries	2, 094	0. 5
Ontario loam, 8 to 15 percent slopes, eroded	384	. 1	Rhinebeck silt loam	2, 563	. 6
Ontario loam, 15 to 25 percent slopes, eroded	2, 167	. 5	Riga silt loam, 2 to 8 percent slopes	2, 648	. 6
Ontario loam, 25 to 60 percent slopes	1, 805	. 4	Rock land	2, 059	. 5
Ontario-Palmyra-Arkport complex, rolling	790	. 2	Schoharie silt loam, 0 to 2 percent slopes	3, 597	. 8
Ontario-Palmyra-Arkport complex, hilly	728	. 2	Schoharie silt loam, 2 to 6 percent slopes	6, 201	1. 4
Ontario-Palmyra-Arkport complex, steep	1, 015	. 2	Schoharie silty clay loam, 6 to 12 percent slopes, eroded	561	. 1
Ovid silt loam	1, 851	. 4	Schoharie silty clay loam, 12 to 20 percent slopes, eroded	368	. 1
Ovid and Appleton silt loams, limestone substratum	2, 133	. 5	Schoharie silty clay loam, 20 to 60 percent slopes	381	. 1
Palmyra gravelly fine sandy loam, 0 to 3 percent slopes	685	. 2	Sodus gravelly fine sandy loam, 2 to 8 percent slopes	718	. 2
Palmyra gravelly fine sandy loam, 3 to 8 percent slopes	2, 334	. 5	Sun fine sandy loam	676	. 2
Palmyra gravelly fine sandy loam, 8 to 15 percent slopes	1, 443	. 3	Sun loam, moderately shallow variant	2, 400	. 6
Palmyra gravelly fine sandy loam, 15 to 25 percent slopes	630	. 1	Urban land	29, 326	6. 8
Palmyra gravelly fine sandy loam, 25 to 60 percent slopes	875	. 2	Wampsville cobbly loam, 0 to 3 percent slopes	1, 390	. 3
Palmyra gravelly loam, 3 to 8 percent slopes	2, 031	. 5	Wampsville cobbly loam, 3 to 8 percent slopes	2, 710	. 6
Phelps gravelly fine sandy loam, 0 to 3 percent slopes	2, 212	. 5	Wampsville cobbly loam, 8 to 15 percent slopes	476	. 1
Phelps gravelly fine sandy loam, 3 to 8 percent slopes	821	. 2	Wassaic fine sandy loam, 0 to 4 percent slopes	2, 901	. 7
			Wayland silt loam	6, 331	1. 4
			Total	430, 720	100. 0

For more general information about the soils, the reader can refer to the section "General Soil Map," in which the broad patterns of soils are described. Many of the terms used in the soil descriptions and other parts of the survey are defined in the Glossary.

Alluvial Land

Alluvial land (Al) consists of nearly level, recent, unconsolidated deposits on flood plains. Areas are mainly along the smaller streams in the county and are subject to frequent change through overflow. The deposits, generally stratified, range in texture from gravel and sand to clay. Drainage ranges from excessive to very poor but is generally poor or very poor.

This land type is flooded frequently and generally is not suited to farm crops. Some areas provide limited pasture, and others are idle. (Capability unit and woodland suitability group not assigned)

Alton Series

In the Alton series are deep, well-drained to somewhat excessively drained, medium-textured and moderately coarse textured soils. These soils formed in glacial outwash or lake beach material dominated by red Medina sandstone and Queenston Shale. They are level to strongly sloping and generally have convex slopes. They occur mainly in a belt that ranges from 200 to 300 yards to more than a mile wide and that parallels and includes U.S. Route 104 (Ridge Road).

A representative nearly level Alton soil in an idle area has a surface layer, about 8 inches thick, of dark grayish-brown, medium acid gravelly sandy loam that contains about 30 percent fine gravel. The subsoil, about 24 inches thick, is medium acid and very friable. In the upper 16 inches, the subsoil is dark-brown gravelly fine sandy loam that contains approximately 30 percent gravel. This is underlain by reddish-brown very gravelly loam that contains 40 to 50 percent gravel. The substratum, beginning at a depth of 32 inches, is dark reddish-brown, poorly sorted, loose gravel and sand that consists mainly of 60 to 80 percent fine gravel. A few weathered shale fragments are present. The substratum is slightly acid in the upper part and becomes calcareous within a depth of 5 feet.

The Alton soils have a seasonal high water table that rarely rises to within 4 feet of the surface. Permeability is moderately rapid in the surface layer and subsoil and rapid in the gravelly substratum. The depth of soil available for rooting is mainly 30 inches, with few roots extending to a greater depth. Available water capacity in the root zone is low to moderate. Droughtiness is one of the major limitations to use of these soils for farming.

Representative profile of Alton gravelly sandy loam, 0 to 3 percent slopes, in an idle area (gravel pit), located approximately one-half mile northwest of the junction of Long Pond Road and Ridgeway Avenue, town of Greece:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly sandy loam, dark brown (10YR 4/3) when crushed; moderate, fine, granular structure; very friable, soft when dry; many roots; 30 percent fine gravel; medium acid; abrupt, smooth boundary.

B21—8 to 16 inches, dark-brown (7.5 YR 4/4) gravelly fine sandy loam; weak, medium, granular structure; very friable; brown (7.5YR 5/4) ped coats; many roots; 30 percent gravel; tongues of Ap horizon along root channels; medium acid; clear, wavy boundary.

B22—16 to 32 inches, reddish-brown (5YR 4/4) very gravelly loam; weak, medium and coarse, subangular blocky structure; very friable; few roots; thin, discontinuous clay films on vertical ped faces and on upper surfaces of pebbles; 40 to 50 percent gravel with fine pebbles dominant; medium acid; clear, wavy boundary.

C—32 to 60 inches, dark reddish-brown (5YR 3/3), poorly sorted gravel and sand; 60 to 80 percent gravel with

fine gravel dominant; single grain; loose; few roots; some weathered shale; slightly acid; calcareous within a depth of 60 inches.

The solum ranges from 30 to 48 inches in thickness. On the average, more than 35 percent of the upper 10 to 40 inches consists of coarse fragments, mainly gravel. Depth to calcareous material ranges from 40 to 60 inches. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3) in color and is gravelly sandy loam or gravelly loam in texture.

The B horizon ranges in color from dark reddish brown (2.5YR 3/4) to strong brown (7.5YR 5/6). The texture of the soil material ranges from sandy loam to loam, with less than 17 percent clay. Discontinuous bands, or lenses, of gravelly loamy sand or gravelly sandy clay loam are present in some places. These bands are generally darker or redder in color than the matrix material and range from one-fourth inch to three-fourths inch thick, with a total thickness of 6 inches or less. Clay films are not always present. Reaction of this horizon ranges from medium acid to neutral.

The C horizon ranges in color from dark reddish brown (2.5YR 3/4, 5YR 3/3) to light brown (7.5YR 6/4). Sand and gravel are well sorted or poorly sorted to a depth of 60 inches and generally well stratified below this depth. Reaction of this horizon ranges from slightly acid to moderately alkaline in the upper part.

The Alton soils in this county are less acid than those in other areas and are therefore slightly more productive for farming. For other uses, there is a negligible difference.

The Alton soils are closely associated with the moderately well drained Phelps soils. They are similar to the Palmyra and Wampsville soils, but the Alton soils have a coarser textured B horizon. All of these soils formed in similar material. Bordering the Alton soils are soils developed in glacial till, such as Cazenovia and Madrid, and soils developed in lacustrine deposits, such as Arkport, Colonie, and Dunkirk.

Alton gravelly sandy loam, 0 to 3 percent slopes (AnA).—This soil has the profile described as representative of the series. It is level to nearly level and occupies the tops of small outwash terraces near minor streams and some foot slopes. There is some runoff from the adjacent uplands, but water is not retained on the surface or within the soil for any significant period. Individual areas are irregular in shape and range from 3 to 25 acres in size.

Commonly included in mapping with this soil are areas of the moderately well drained Phelps soils in small depressions or along the upper end of narrow drainageways. Also included are areas having a gravelly loam surface layer.

This soil is moderately suited to most crops, pasture, and woodland. It is well suited to specialized fruit crops, such as cherries. Irrigation is sometimes necessary for good crop yields. Because nutrients are rapidly leached from this soil, they should be applied in small quantities at frequent intervals during the growing season. Management should include regular additions of large quantities of organic matter. (Capability unit IIs–1; woodland suitability group 3o1)

Alton gravelly sandy loam, 3 to 8 percent slopes (AnB).—Where this gently sloping soil occupies the side slopes of small flat terraces and the beach ridge, individual areas are long and narrow in shape and range from 3 to 15 acres in size. Where the soil is on slopes of large terraces, individual areas are roughly oblong and range from 15 to more than 50 acres in size, with one area exceeding 100 acres.

Commonly included with this soil in mapping are areas of moderately well drained Phelps soils along drainageways and in depressions. Also included are small spots where the surface layer is gravelly loam.

This soil is suited to most crops, pasture, and woodland. It is well suited to specialized fruit crops, such as cherries. Because of a slight hazard of erosion, tillage of row crops or clean-cultivated crops should be on the contour as much as possible. Irrigation is necessary to improve suitability for crops. Because nutrients are rapidly leached from this soil, they should be applied in small quantities at frequent intervals during the growing season. Management should include regular additions of large quantities of organic matter. (Capability unit IIs–1; woodland suitability group 3o1)

Alton gravelly loam, 3 to 8 percent slopes (AoB).—The profile of this gently sloping soil has a finer textured surface layer than that described as representative of the series. This soil occupies the same position on the landscape as Alton gravelly sandy loam, 3 to 8 percent slopes, and both soils are commonly adjacent to or near each other. Individual areas of both soils are similar in their size and shape.

Commonly included with this soil in mapping are the moderately well drained, level areas of Phelps soils along drainageways. Also included are small areas that have a gravelly sandy loam surface layer.

This soil is suited to most crops, pasture, and woodland. It is well suited to specialized fruit crops, such as cherries. Tillage of row crops or clean-cultivated crops should be on the contour as much as possible to conserve moisture and control erosion. Available water capacity is slightly higher than in the other Alton soils, but irrigation is necessary to improve suitability for crops. (Capability unit IIe–2; woodland suitability group 3o1)

Alton gravelly loam, 8 to 15 percent slopes (AoC).—The profile of this moderately sloping to strongly sloping soil has a finer textured surface layer than that described as representative of the series. This soil occupies the perimeter slopes of the larger outwash terraces and the steeper side slopes of the beach ridge. Individual areas are generally long and narrow and range from 2 to 25 acres in size.

Commonly included in mapping are a few small areas of moderately well drained Phelps soils, which surround seep spots. Also included are areas that are severely eroded, areas that are moderately steep, and areas that have a gravelly sandy loam surface layer.

This soil is moderately well suited to most crops and well suited to pasture and woodland. Where it is cultivated and not protected, there is a hazard of erosion. Row and orchard crops should be tilled on the contour, and cover crops should be planted. Irrigation is generally needed to improve suitability for crops. (Capability unit IIIe–2; woodland suitability group 3o1)

Appleton Series

The Appleton series is made up of deep, medium-textured soils that formed in calcareous glacial till. The till was derived mainly from local sandstone and limestone. These somewhat poorly drained soils are in nearly level areas where runoff is slow, or in slight depressions that receive runoff.

A representative Appleton soil in a cultivated area has a slightly acid to neutral surface layer, about 12 inches thick, of grayish-brown loam. This is underlain by a slightly acid to neutral, leached subsurface layer of dark-brown, friable fine sandy loam. The subsurface layer is

distinctly mottled with gray colors and faintly mottled with shades of brown. The subsoil begins at a depth of 19 inches. It is neutral, sticky, brown loam that is distinctly mottled. At a depth of approximately 30 inches is the substratum, a mottled brown, calcareous, dense, compact loam that restricts water and air movement.

In spring and during wet periods, the water table is perched on the slowly or moderately slowly permeable substratum. The water table is at a depth of 6 to 12 inches if the Appleton soils are undrained, and during dry periods it falls to a depth below 20 inches. The depth of soil available for rooting is related to the height of the water table. In spring, rooting is confined to the upper 8 to 10 inches, but as the season progresses, it extends to a depth of 15 to 24 inches. A few roots extend below a depth of 24 inches. Available water capacity is moderate to high. These soils have slow runoff, and they receive considerable moisture from adjacent soils. Seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Appleton loam, 0 to 3 percent slopes, in an idle area, located approximately one-third mile northwest of the junction of Bloomfield and Smith Roads, town of Mendon:

Ap—0 to 12 inches, very dark grayish-brown (10YR 3/2) loam; moderate, medium, granular structure, but tends toward platy structure in lower part; very friable; many roots; slightly acid to neutral; abrupt, smooth boundary.

A2—12 to 19 inches, dark-brown (7.5YR 4/4) fine sandy loam; many, medium, distinct mottles of pinkish gray (7.5YR 7/2) and faint mottles of strong brown (7.5YR 5/6), light yellowish brown (10YR 6/4), and very pale brown (10YR 7/3); weak, fine and medium, subangular blocky structure; friable; tongues of soil material from Ap horizon along root channels; many roots; slightly acid to neutral; clear, wavy boundary.

B2t—19 to 30 inches, brown (10YR 5/3) heavy loam; many, medium, distinct mottles of dark brown (7.5YR 4/4) and yellowish brown (10YR 5/6); moderate, coarse, subangular blocky structure; sticky, pinkish-gray (7.5YR 7/2) ped coats; brown (10YR 5/3) ped interiors; thin, patchy clay films on surfaces and in pores; common roots; neutral; abrupt, smooth boundary.

C—30 to 50 inches, brown (10YR 5/3) loam; many, medium, distinct mottles of yellowish brown (10YR 5/6) and pinkish gray (7.5YR 7/2); strong, medium, platy structure; dense and compact in place, friable when removed; few roots along vertical fracture faces; calcareous.

The depth to carbonates ranges from 30 to 40 inches but is generally less than 36 inches. The reaction in the solum is slightly acid or neutral but is more commonly neutral. Lime content increases with depth. Coarse fragments less than 3 inches in diameter range from 0 to 15 percent in the solum. Large stones occur throughout the profile. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3). The A2 horizon ranges from brown or dark brown (7.5 YR 4/2) to light yellowish brown (10YR 6/4). Chroma of the mottles in the A2 horizon is 2 or higher. The texture of this horizon is fine sandy loam or loam, and the structure is weak or moderate, medium or fine, subangular blocky.

The B2t horizon ranges from dark grayish brown (10YR 4/2) to light brown (7.5YR 6/4). A chroma of 2 is dominant on ped coats in this horizon, and mottles are distinct or prominent. The texture of this horizon is loam or sandy clay loam, and the clay content ranges from 18 to 27 percent. Structure is moderate or strong, fine to coarse, subangular or angular blocky. The reaction of the B2t horizon is slightly acid or neutral.

The C horizon ranges from dark grayish brown (10YR 4/2) to light brown (7.5YR 6/4). Mottling is absent in places. In some places clay films are along vertical cracks in the upper part of this horizon. The C horizon has moderate or strong, thin or medium, platy structure.

The Appleton soils are commonly associated with the Lima, Hilton, and Lyons soils. All of these soils formed in similar material. The Appleton soils have a higher seasonal high water table than either the Lima or Hilton soils. They are better drained than the Lyons soils. The Appleton soils are also associated with the Niagara and Canandaigua soils but differ in having formed in dense till rather than lake-laid deposits of silt and very fine sand. Appleton soils are similar in drainage to the Niagara soils but are better drained than the Canandaigua.

Appleton loam, 0 to 3 percent slopes (ApA).—This level or nearly level soil occupies foot slopes and depressions and is in areas that are generally less than 20 acres in size. Some areas receive runoff from the adjacent better drained soils; other irregularly shaped areas closely associated witn lake-laid soils have slow runoff.

Included in mapping, on the till plains, are spots of better drained Hilton and Lima soils on slight rises or knolls. Wetter Lyons soils are included in low areas and along drainageways. Where this soil is associated with soils of the lake plains, spots of Niagara and Canandaigua soils are included. In the western part of the county, where this soil is mapped in association with Honeoye and Lima soils, some inclusions have a higher silt content and a thinner subsoil layer that is less contrasting in texture than in the profile described as representative of the series. These siltier inclusions occupy up to 25 percent of some mapped areas and have free lime at or near the surface.

This soil is suited to most crops, pasture, or woodland. In undrained areas, wetness restricts the choice of crops. Where drainage is adequate, the soil is well suited to most crops grown in the county, including vegetable crops. (Capability unit IIIw–2; woodland suitability group 3w2)

Arkport Series

The Arkport series consists of deep, well-drained, medium-textured soils. These are nearly level to very steep soils; the slopes are both simple and complex and dominantly convex in shape. The soils formed in deltaic, glacial lake deposits of very fine sand and fine sand that occur primarily east of the Genesee River and are associated with the Irondequoit Creek and Fairport Channel drainage areas.

A representative Arkport soil has a surface layer of grayish-brown very fine sandy loam that is about 4 inches thick. The subsurface layer is brownish-yellow very fine sandy loam about 8 inches thick. Both layers have yellowish-red root stains and are neutral in reaction. At a depth of 12 inches is a light yellowish-brown, very friable, neutral, loamy very fine sand subsoil. The subsoil is 32 inches thick and contains bands of yellowish-red, friable very fine sandy loam that are generally parallel and horizontal. The substratum is at a depth of 44 inches. It is light yellowish-brown, very friable, calcareous loamy fine sand with yellowish-red, very friable very fine sandy loam bands that vary from ½ inch to 3 inches in thickness. The profile of this soil is stone free.

A seasonal high water table is rarely shallower than 48 inches below the surface, but water percolating through the soil is impeded for very short periods by the bands in the subsoil. Permeability of the surface and subsurface layers is moderately rapid. In the subsoil and substratum the

permeability of the bands, or lamellae, is moderate, and that of the interlamellae areas, moderately rapid or rapid. The depth of soil available for rooting is at least 30 inches and extends to the depth where calcareous material begins. The available water capacity is moderate. The major limitations to the use of these soils for farming are water erosion and soil blowing when areas are left unprotected.

Representative profile of Arkport very fine sandy loam, 12 to 20 percent slopes, in an idle area, located one-fourth mile north of Klem and Drumm Roads, town of Webster:

Ap—0 to 4 inches, grayish-brown (10YR 5/2) very fine sandy loam; weak, fine, granular structure; very friable; yellowish-red (5YR 5/6) root stains; neutral; clear, wavy boundary.

A2—4 to 12 inches, brownish-yellow (10YR 6/6) very fine sandy loam; weak, fine, granular structure; very friable; yellowish-red (5YR 5/6) root stains; neutral; clear, wavy boundary.

B2t—12 to 44 inches, light yellowish-brown (10YR 6/4) loamy very fine sand; horizontal reddish-brown (5YR 5/4) very fine sandy loam lamellae, ½ inch to 2 inches thick and aggregating 8 inches in thickness; moderate, medium, subangular blocky structure, but tends toward very weak, thick, platy in the lamellae; very weak, fine, granular structure, but tends toward very weak, thick, platy in the interlamellae areas; lamellae have clay bridges and coats, are friable when removed, but firm in place; interlamellae areas are very friable; neutral; clear, wavy boundary.

C—44 to 60 inches, light yellowish-brown (10YR 6/4) loamy fine sand; horizontal reddish-brown (5YR 5/4) very fine sandy loam lamellae ½ inch to 3 inches thick; very weak, fine, granular structure, but tends toward very weak, thick, platy; very friable; calcareous.

The solum ranges from 42 to 66 inches in thickness. It consists of 30 to 80 percent very fine sand, 15 percent or more fine sand, 15 to 30 percent silt and clay, and less than 10 percent clay. The Ap horizon ranges from dark reddish brown (5YR 3/2) to brown (10YR 5/3) in color and from medium acid to neutral in reaction. The A2 horizon ranges from reddish brown (5YR 5/4) to brownish yellow (10YR 6/6) and from loamy fine sand to very fine sandy loam.

Lamellae make up one-fourth to one-third of the B horizon and range in thickness from ¼ inch to 2 inches. The interlamellae areas are thicker than the lamellae. The lamellae range from dark reddish brown (5YR 3/2) to yellowish brown (10YR 5/4) in color, from loamy very fine sand to very fine sandy loam in texture, and from weak to moderate, medium, subangular blocky in structure. The interlamellae range from dark reddish gray (5YR 4/2) to light yellowish brown (10YR 6/4) in color, from loamy fine sand to very fine sandy loam in texture, although dominantly loamy very fine sand, and from weak or very weak, platy structure to structureless. Reaction of the B horizon ranges from medium acid to neutral.

In the C horizon the color, texture, and thickness of the lamellae and interlamellae areas are similar to those in the B horizon, but color values are higher in some of the lamellae. The lamellae may coalesce into one band. The upper part of this horizon is weakly calcareous in places, and carbonates increase with depth.

The Arkport soils formed in the same kind of material as the Galen, Minoa, and Colonie soils. They are better drained than the Galen and Minoa soils and are finer textured and contain more bands with a higher content of silt and clay than the Colonie. They are associated with the well-drained Dunkirk soils and the moderately well drained Collamer, which formed in lacustrine silt deposits.

Arkport very fine sandy loam, 0 to 6 percent slopes (ArB).—The profile of this soil is similar to the one described as representative of the series, but the surface layer is thicker. Some faint mottling is in the lower subsoil and substratum. The soil is nearly level to gently undulating and generally occurs in areas larger than 10 acres in size.

Commonly included in mapping are areas of the coarser textured Colonie soils and finer textured Dunkirk soils. Also included are small areas of the wetter Galen and Minoa soils in depressions and a few areas of Collamer soils.

This soil is suited to the commonly cultivated row crops, pasture, and woodland. If the soil is cultivated and not protected, it is subject to water erosion and soil blowing. Under proper management this is a very productive soil. (Capability unit IIe–3; woodland suitability group 2o1)

Arkport very fine sandy loam, 6 to 12 percent slopes (ArC).—The profile of this soil is similar to the one described as representative of the series, but the surface layer is slightly thicker. The soil is undulating to rolling and has short slopes. The areas are generally small, less than 10 acres in size.

Commonly included in mapping are areas of the sandier Colonie soils and finer textured Dunkirk. Also included are small eroded areas.

This soil is suited to the commonly cultivated field crops, pasture, and woodland. If the soil is cropped, practices are needed for controlling erosion. (Capability unit IIIe–3; woodland suitability group 2o1)

Arkport very fine sandy loam, 12 to 20 percent slopes (ArD).—This soil has the profile described as representative of the series. It is rolling to hilly or occupies escarpments. Areas are generally less than 10 acres in size.

Commonly included in mapping are spots of sandier Colonie soils and finer textured Dunkirk soils. Also included are eroded areas.

This soil is suited to limited cropping, pasture, and woodland. Where areas are not covered, they are subject to severe water erosion and soil blowing. (Capability unit IVe–2; woodland suitability group 2r2)

Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes (AsC).—The soils that make up this complex occur in such intricate patterns that they were not mapped separately. About 60 percent of the mapping unit is Arkport very fine sandy loam, and 40 percent is Dunkirk very fine sandy loam. The profiles of these soils are similar to those described as representative of their series, except for the surface layer texture of the Dunkirk soil. Slopes are generally complex.

This mapping unit is suited to crops, pasture, and woodland. If these soils are cultivated and not protected, they are subject to severe erosion. In many places erosion control measures are difficult to apply because of the complex slopes, and sod crops should be grown in rotation. Many areas are used for high-density housing development and for recreation purposes. (Capability unit IIIe–3; woodland suitability group 2o1)

Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes (AsD).—The soils that make up this complex occur in such intricate patterns that they were not mapped separately. About 60 percent of the mapping unit is Arkport very fine sandy loam, and 40 percent is Dunkirk very fine sandy loam. The profiles of these soils are similar to those described for their respective series, except the Dunkirk soil has a very fine sandy loam surface layer. Slopes are moderately steep and generally complex.

Cultivation should be limited to that needed for reseeding hay or pasture. These soils are subject to severe erosion. Erosion control measures are difficult to apply. (Capability unit IVe–2; woodland group 2r2)

Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded (AtF3).—About half of this mapping unit consists of Arkport soils, but Arkport, Dunkirk, or Colonie or a combination of any of these soils may occur in areas designated as this mapping unit. These soils have profiles similar to those described as representative of their respective series. The texture of the surface layer ranges from silt loam to loamy fine sand. All or nearly all of the original surface soil has been removed through erosion on approximately 75 percent of this mapping unit, and there are several gullied areas. The rest of the mapping unit has had little or no erosion. These steep and very steep soils have complex slopes. They are principally in the Irondequoit Creek and Irondequoit Bay drainage areas. Included in mapping are small areas of the less steep Arkport, Dunkirk, and Colonie soils.

Limitations to all uses of this mapping unit are severe. Where undisturbed, this mapping unit should remain in its natural state. The vegetative cover should be restored if it has been removed. Steep slopes make this mapping unit highly susceptible to continued erosion. (Capability unit VIIe–1; woodland suitability group 2r5)

Benson Series

In the Benson series are medium-textured, nearly level or gently sloping soils that are somewhat excessively drained or excessively drained. These shallow soils formed in glacial till dominated by limestone and have bedrock within 20 inches of the surface. They occur principally within two major east-west belts that correspond to the location of the Onondaga and Lockport Limestone Formations.

A representative Benson soil in an idle area has a surface layer, about 8 inches thick, of dark-gray, neutral channery loam. This is underlain by a subsoil, about 10 inches thick, of dark-brown to brown, friable channery loam that is mildly alkaline and calcareous. The surface layer and subsoil contain a large quantity of flat stone fragments. Gray to light-gray hard limestone is at a depth of 18 inches. The upper part of the rock is generally fractured, and soil material fills the cracks.

The depth of soil available for rooting is restricted mainly to the 10 to 20 inches of soil over bedrock. Permeability is moderate throughout the profile. Because available water capacity is very low to moderate, the soils are droughty.

Representative profile of Benson channery loam, 0 to 8 percent slopes, in an idle area, located in Garbutt, 1,000 feet west of the junction of Union Street and Mumford Road in a trench on the south side of Mumford Road, town of Wheatland:

Ap—0 to 8 inches, dark-gray (10YR 4/1) channery loam, grayish brown (10YR 5/2) when crushed; moderate, fine and medium, granular structure; friable; 30 percent channery fragments; neutral; abrupt, smooth boundary.

B1—8 to 16 inches, dark-brown (10YR 3/3) channery loam; dark yellowish brown (10YR 4/4) when crushed; moderate, thin and medium, platy structure breaking to moderate, fine and medium, granular structure; friable; 30 percent channery fragments; mildly alkaline; clear, smooth boundary.

B2—16 to 18 inches, brown to dark-brown (7.5YR 4/4) channery loam, strong brown (7.5YR 5/6) when crushed; moderate, fine, angular blocky structure; friable; 30 percent channery fragments; calcareous; abrupt, smooth boundary.

R—18 inches, gray to light-gray (5YR 6/1) hard limestone; fractures in the upper 8 to 10 inches are filled with loamy material and some roots.

The solum ranges in thickness from 10 to 20 inches. Coarse fragment content in the solum ranges from 15 to 35 percent and includes at least 15 percent flat stone fragments. The Ap horizon ranges from dark gray (10YR 4/1) to brown (7.5YR 5/2) in color and from slightly acid to mildly alkaline in reaction.

The texture of the B horizon ranges from channery loam to channery silt loam. The B1 horizon ranges from dark reddish brown (5YR 3/3) to yellowish brown (10YR 5/6) in color and from weak or moderate, thin to medium, platy in structure. Reaction of this horizon is neutral to moderately alkaline. Free carbonates are present in some places. The B2 horizon ranges from reddish brown (5YR 4/4) to brownish yellow (10YR 6/6) in color and is weak or moderate, fine or medium, subangular blocky or angular blocky in structure. Reaction is dominantly moderately alkaline but ranges to neutral. Free carbonates are generally present. Calcic and dolomitic limestone are the main kinds of underlying rock, although shale and sandstone are also present.

The Benson soils formed in the same kind of material and are associated with the Wassaic soils and with the limestone substratum mapping units of Honeoye silt loam and of Lima and Cazenovia silt loams. Benson soils are shallower to bedrock and have less clay in the B horizon than these associated soils.

Benson channery loam, 0 to 8 percent slopes (BcB).—This level to gently sloping soil occupies areas on the till plains where the bedrock is near the surface. Individual areas vary in shape and range from 3 to 100 acres in size.

Included with this soil in mapping are areas that have a loam surface layer with less than 15 percent coarse fragments and areas that have a channery silt loam surface layer. In the southern part of the county, where the underlying limestone is the Onondaga Formation, areas of the limestone substratum phase of Honeoye soils are a dominant inclusion. In the central part of the county, where the underlying limestone is the Lockport Formation, Wassaic soils are the main inclusion. Because of their limited extent, small areas with a loamy sand or sandy loam texture are included. In the nearly level areas of Benson soils, some depressional inclusions have faint mottling in the subsoil. In areas where bedrock outcrops frequently, Rock land is commonly included.

This soil is suited to crops, pasture, or woodland. The major limitation to use of this shallow soil is droughtiness. In the more sloping areas the soil is subject to a slight hazard of erosion. Crops that mature early or that tolerate dryness for long periods should be grown. (Capability unit IIIs–2; woodland suitability group 5d1)

Brockport Series

The Brockport series is made up of nearly level or level, moderately deep, somewhat poorly drained soils that have a fine-textured subsoil. These soils formed in highly alkaline shale till or residuum or both. Locally the Rochester and Vernon-Camillus Shale Formations are the dominant sources of parent material.

A representative Brockport soil in an idle area has a surface layer, about 9 inches thick, of very dark grayish-brown silty clay loam. The subsoil is neutral, very firm, light brownish-gray clay that has many, prominent, brownish-yellow and yellowish-brown mottles. The subsoil

extends to a depth of 23 inches. The calcareous substratum is very firm, light brownish-gray clay that has white streaks of precipitated lime and many, prominent, brownish-yellow and yellowish-brown mottles. At a depth below 30 inches is calcareous, olive-colored shale bedrock. It is weathered in the upper part, and the shale fragments have dark-gray coats.

A seasonal high water table is approximately 6 to 12 inches below the surface. The subsoil is very slowly permeable, and much of the water is removed through evaporation or transpiration. Surface runoff is slow. The depth of soil available for rooting is mainly in the upper 15 to 24 inches and is related to the height of the water table. Roots can extend into the weathered upper part of the shale as the water table recedes. Brockport soils have a low to moderate available water capacity, but normally there is sufficient moisture for plant growth. Maintenance of tilth is a constant problem. Most areas require surface drainage.

Representative profile of Brockport silty clay loam, 0 to 2 percent slopes, in an idle area, located one-fourth mile northwest of the junction of U.S. Route 104 and Five Mile Line Road:

Ap—0 to 9 inches, very dark grayish-brown (2.5Y 3/2) silty clay loam; strong, very fine, angular blocky structure; firm; neutral; abrupt, smooth boundary.

B2t—9 to 23 inches, light brownish-gray (2.5Y 6/2) clay; many, medium, prominent, brownish-yellow (10YR 6/6) and yellowish-brown (10YR 5/6) mottles; mottled colors make up 40 to 60 percent of matrix; strong, coarse, prismatic structure, breaking to strong, medium and coarse, angular blocky structure; very firm; gray (N 6/0) clay films along vertical and horizontal faces of peds; neutral; abrupt, smooth boundary.

C—23 to 30 inches, light brownish-gray (2.5Y 6/2) clay; many, fine, prominent, brownish-yellow (10YR 6/6) and yellowish-brown (10YR 5/6) mottles; moderate, medium, platy structure; very firm; white (N 8/0) lime streaks; calcareous; abrupt, smooth boundary.

R—30 inches, olive (5Y 5/3) partly weathered shale; dark-gray (N 4/0) coats on shale fragments; shale fragments are horizontally oriented; calcareous.

The solum thickness ranges from 20 to 28 inches. The solum is neutral or moderately alkaline and has free carbonates in some areas. Depth to the underlying shale bedrock ranges from 20 to 40 inches. The bedrock is partly weathered at a depth ranging from a few inches to several feet. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to olive (5Y 5/3). Its structure is moderate or strong, fine, granular or angular blocky. An A2 horizon, which is present in some areas, is up to 4 inches thick. This horizon ranges in color from dark grayish brown (10YR 4/2) to light olive gray (5Y 6/2) and in texture from silt loam to light silty clay loam.

The B2t horizon ranges in color from light brownish gray (2.5Y 6/2) and dark grayish brown (2.5Y 4/2) to gray (5Y 6/1). Ped coats have a chroma of 0 and 1. Texture of the B2t horizon is silty clay or clay.

The C horizon ranges in color from dark grayish brown (2.5Y 4/2) to pale olive (5Y 6/4). Carbonate accumulations are evident as white streaks. In some areas where this horizon is absent, the B horizon is underlain by bedrock. The shale bedrock ranges from dark gray (N 4/0) to olive (5Y 5/4) in color.

Brockport soils are commonly associated with the Riga, Rhinebeck, and Lockport soils. They differ from the Riga in being more poorly drained and from the Rhinebeck in being shallower to bedrock and generally grayer in color. The Brockport soils, which have gray color, are similar in depth and drainage to the reddish Lockport soils.

Brockport silty clay loam, 0 to 2 percent slopes (BrA).—This level or nearly level soil generally occupies large, flat areas or slight depressions. Individual areas average 20 to 30 acres in size, and a few areas range from 40 to 95 acres. A few areas that are on the foot slopes of adjacent better drained soils are generally less than 10 acres in size.

Commonly included are spots of the better drained Riga soils on slight rises or knolls and small areas of a poorly drained soil that occupies drainageways and deeper depressions. These poorly drained areas are shown on the map with a wet spot symbol. Where the underlying shale is at a depth greater than 40 inches, the deep Rhinebeck soils are inclusions. Other inclusions are areas with medium and fine surface texture.

This soil is suited to most of the commonly cultivated crops, pasture, and woodland. Suitability for these uses is below average if adequate drainage is not provided and good tilth not maintained. (Capability unit IIIw-3; woodland suitability group 3w1)

Canandaigua Series

The Canandaigua series consists of deep, poorly drained, medium-textured soils that formed in lacustrine deposits of silt, very fine sand, and some clay. These level or nearly level soils occupy depressions that receive runoff. They are ponded or have very slow runoff.

A representative Canandaigua soil in pasture has a surface layer, about 8 inches thick, of black silt loam. The subsoil is about 22 inches thick. The upper 5 inches of the subsoil is olive-gray, firm, neutral silty clay loam. Below this, the subsoil is grayish-brown, friable, neutral silt loam. The substratum begins at a depth of about 30 inches. It consists of mottled, reddish-brown layers of friable silt and very fine sand. It has a neutral reaction in the upper part and becomes calcareous with depth.

A seasonal high water table is at the surface for extended periods in spring. After a wet period, water remains at or near the surface for a week or more if the soil is not artificially drained. Permeability is moderate in the surface layer and subsoil and variable in the substratum. The depth of soil available for rooting, mainly between 10 to 20 inches, is related to the height of the water table. As the water table recedes, roots can extend to greater depths. The available water capacity in the rooting zone is moderate to high. Poor drainage is the main limitation to use of these soils for farming.

Representative profile of Canandaigua silt loam in pasture, located 1,200 feet east and 125 feet south of the junction of Morgan and Reed Roads, town of Chili:

Ap—0 to 8 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

B2—8 to 13 inches, olive-gray (5Y 5/2) coarse silty clay loam; many, medium, prominent mottles of dark brown (7.5YR 4/4) and yellowish brown (10YR 5/6); moderate, medium, prismatic structure breaking to moderate, medium and coarse, angular blocky structure; firm; gray (5Y 5/1) ped coats; few thin clay flows in pores and on vertical ped faces; neutral; gradual, smooth boundary.

B3—13 to 30 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/6–5/8), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8); moderate, medium, prismatic struc-

ture to weak, coarse, subangular blocky structure; friable; greenish-gray (5GY 5/1) ped coats; neutral; gradual, wavy boundary.

C—30 to 50 inches, reddish-brown (2.5YR 5/4) layers of silt and very fine sand with thin lenses of clay; common, medium, prominent mottles of yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and pale red (2.5YR 6/2); friable; neutral in the upper part; calcareous with depth.

The solum thickness ranges from 20 to 40 inches. Depth to carbonates ranges from 18 to 60 inches. The Ap horizon ranges from black (10YR 2/1) to dark brown (7.5YR 3/2). In some undisturbed areas, the surface has a few inches of muck. In other areas, a thin A2 horizon is present and has a 2-chroma color.

The B horizon ranges from dark gray (5YR 4/1) to light olive gray (5Y 6/2) in color and from loam to coarse silty clay loam in texture. The average clay content in the B horizon is 20 to 25 percent and ranges from 18 to 35 percent. Strata of clay occur but are generally less than 4 inches thick and do not increase the overall clay content beyond 35 percent. Clay films, if present, are thin and are confined to the pores and small patches on vertical faces. The B3 horizon is absent in some places. The C horizon is neutral or calcareous in the upper 12 to 18 inches and calcareous below a depth of 4 feet.

The Canandaigua soils are commonly geographically associated with the somewhat poorly drained Niagara soils and the moderately well drained Collamer soils that formed in similar material. They are also near the poorly drained to very poorly drained Lyons, Lamson, and Madalin soils. The Lyons soils formed in glacial till, the Lamson soils formed in lacustrine sand and silt, and the Madalin soils, in clayey lacustrine sediments.

Canandaigua silt loam (Ca).—This level or nearly level soil has slopes of 0 to 3 percent and occurs in the low depressions. Areas are mainly in old, shallow glacial lakebeds where they are up to several hundred acres in size. A few areas are on the till plains where the individual areas are much smaller and range from 2 or 3 acres in size to approximately 20 acres. Areas on the till plains receive runoff and are ponded for extensive periods.

Commonly included with this soil in mapping are spots of the somewhat poorly drained Niagara soils on slight rises or knolls; areas of both shallow and deep phases of Muck in deeper depressions; and, at comparable elevations, areas of the sandier Lamson and the more clayey Madalin soils. On the till plains, a common inclusion is a soil similar to the Canandaigua but underlain by glacial till to a depth of 20 to 40 inches. Where the Canandaigua soils are subject to seasonal flooding, some of them have a capping of alluvium that is up to 4 inches thick. These areas extend approximately 4 miles west from the confluence of Black Creek and the Genesee River, with a small area on the east bank of the Genesee River.

If adequately drained, the soil is especially well suited to all vegetable or row crops. If undrained, the soil can be used for pasture at a high level of management, can rarely be used for other crops, but is suited to water-tolerant trees. (Capability unit IIIw–5; woodland suitability group 4w1)

Cayuga Series

In the Cayuga series are deep, well drained and moderately well drained soils that have a medium-textured surface layer and a fine textured to moderately fine textured subsoil. These soils formed in lacustrine silt and clay underlain by loamy, calcareous glacial till. The soils are nearly level or have gentle convex slopes and occur adjacent to or in old glacial lakebeds. Areas are mapped throughout the county but are mostly south of the Lockport escarpment.

A representative gently sloping Cayuga soil in a cultivated area has a surface layer, about 7 inches thick, of dark grayish-brown silt loam. The subsoil extends to a depth of 37 inches. The upper 15 inches of the subsoil is extremely firm, reddish-brown clay that has a few, distinct mottles in shades of brown. The lower part of the subsoil begins at a depth of 22 inches and is firm, dark yellowish-brown silty clay loam. Mottling increases with depth. A few pebbles and cobbles are present. The subsoil is neutral in the upper part and weakly calcareous in the lower. The substratum is firm, brown, calcareous gravelly loam glacial till.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched above the moderately slowly to slowly permeable subsoil and underlying till. The depth of soil available for rooting is mainly 18 to 24 inches and corresponds to the height of the water table. A few roots extend to a greater depth as the growing season progresses. The root zone has a moderate to high available water capacity. Because of the relatively high clay content, care is needed to maintain good tilth in these soils. If the soils are plowed when too wet, they become compact and cloddy.

Representative profile of Cayuga silt loam, 2 to 6 percent slopes, in a cultivated area, located approximately 1¾ miles south of Adams Basin, town of Ogden:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam, brown to dark brown (10YR 4/3) when crushed; weak, fine, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary.

B2t—7 to 22 inches, reddish-brown (2.5YR 4/4) clay; few, medium, distinct mottles of reddish brown (5YR 4/4), dark brown (7.5YR 4/4), and strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; extremely firm; reddish-brown (5YR 5/3) silty ped coats in the upper 5 inches are dominantly on vertical faces; a few clay films on some ped faces and in root and worm channels in the lower part of the horizon; common to few roots; neutral; clear, wavy boundary.

B3—22 to 37 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine and medium, distinct mottles of dark brown (7.5YR 4/4) and olive brown (2.5Y 4/4); weak, thick, platy structure breaking to weak, fine and medium, subangular blocky structure; firm; few roots; few, thick clay films on ped faces; few pebbles and cobbles; neutral, becoming weakly calcareous in lower part; clear, wavy boundary.

IIC—37 to 50 inches, brown (10YR 5/3) gravelly loam glacial till; common, medium, distinct mottles of pale brown (10YR 6/3) and dark brown (7.5YR 4/4); moderate, thick and medium, platy structure; firm in place; friable when removed; calcareous.

The solum ranges from 20 to 38 inches in thickness. Depth to carbonates ranges from 18 to 38 inches. The Ap horizon ranges from dark reddish gray (5YR 4/2) to light olive brown (2.5Y 5/4) in color and from slightly acid to neutral in reaction. Where present, an A2 horizon is up to 4 inches in thickness and has a texture of loam to silt loam. This horizon ranges from reddish brown (5YR 5/3) to light yellowish brown (2.5Y 6/4) in color and has a few, fine, faint mottles of a high chroma in some profiles. The reaction is slightly acid or neutral.

The B2t horizon ranges from dark reddish brown (2.5 YR 3/4) to olive (5Y 4/3) in color. Mottles in this horizon have color values of 4 and 5, and chromas range from 4 to 8. Clay films have a chroma 1 unit lower than that of the matrix. Texture of the B2t horizon ranges from clay loam to clay, with a clay content up to 60 percent but generally less than 50 percent. The B3 horizon, where present, contains 5 to 10 percent less clay than the B2t horizon. Some coarse fragments are generally present. Reaction is neutral in the B3 horizon or ranges from neutral in the upper part to mildly alkaline.

The color and texture of the IIC horizon are influenced by the source of the parent material. The colors are the same as those in the B2t horizon. Texture is dominantly loam but ranges from sandy loam to coarse clay loam and may be gravelly or nongravelly. Content of coarse fragments averages less than 35 percent.

Cayuga soils formed in the same kind of material as the somewhat poorly drained Churchville soils. The Cayuga soils are similar to and, in places, are near the Cazenovia soils, which differ in having a coarser textured subsoil and no lacustrine cap. The Hudson and Schoharie soils are geographically associated with and are very similar to the Cayuga soils but formed in deeper clayey lacustrine deposits.

Cayuga silt loam, 0 to 2 percent slopes (CeA).—This soil is wetter than the soil described as representative of the series. It is nearly level and occurs at the base of slopes and above areas of deep, clay soils. Because of its slow permeability, it retains little of the runoff it receives from adjacent slopes. Areas range from 3 to more than 80 acres in size and have no regular pattern of distribution or shape.

Most commonly included with this soil in mapping are the somewhat poorly drained Churchville soils that occupy small depressions or drainageways. In areas where the clay cap is thicker, spots of the deep Schoharie or Hudson soils are included.

This soil is well suited to all close-growing crops and moderately well suited to intertilled crops. It is moderately well suited to pasture under a high level of management. Some drainage is needed to improve suitability of this soil. (Capability unit IIw–2; woodland suitability group 201)

Cayuga silt loam, 2 to 6 percent slopes (CeB).—This soil has the profile described as representative of the series. It occupies gentle slopes in the glacial till deposits adjacent to the old glacial lakebeds. This soil contributes to the runoff received by the deep clay deposits that are in the old lakebeds. Areas range from 3 to more than 60 acres in size and have no regular pattern of distribution or shape.

Included with this soil in mapping are spots of the well drained and moderately well drained Cazenovia soils, which occur at slightly higher elevations. Inclusions of the somewhat poorly drained Churchville soils are in small depressions and in drainageways. Along the perimeter of this soil are small included areas where the slope exceeds 6 percent, but these are minor and generally are 3 acres or less in size.

This soil is well suited to all close-growing crops and moderately well suited to intertilled crops. It is susceptible to water erosion and to compaction and clodding. Some areas of this soil need drainage. (Capability unit IIe–7; woodland suitability group 2o1)

Cazenovia Series

The Cazenovia series is made up of deep, well drained and moderately well drained soils that have a medium-textured surface layer and moderately fine textured subsoil. These soils formed in loamy, calcareous glacial till that has been partly influenced by reworked lacustrine clay. Areas of these nearly level to gently sloping soils occur along the perimeter of and within old glacial lakebeds. The principal areas are in the western part of the county where the Queenston Shale Formation is dominant.

A representative nearly level Cazenovia soil in a cultivated area has a surface layer, about 10 inches thick, of dark yellowish-brown gravelly loam. This is underlain by a 2-inch transitional layer of reddish-brown, friable gravelly silt loam. Most of the subsoil is neutral, firm and very firm, gravelly silty clay loam that has some pale-green shale fragments. The upper 10 inches of the subsoil is reddish brown. Below a depth of 22 inches, the subsoil is dark reddish brown and contains a few reddish-brown and yellowish-red mottles. The substratum, beginning at a depth of 36 inches, is firm, dark reddish-brown gravelly silty clay loam that has the characteristic platy structure of glacial till. It is neutral, becoming calcareous at a depth of 46 inches.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched above the moderately slowly to slowly permeable subsoil and underlying glacial till. The depth of soil available for rooting is mainly 18 to 24 inches and is related to the height of the water table. As the growing season progresses and the water table recedes, roots extend into the upper, neutral part of the underlying till. Available water capacity in the root zone is moderate to high. A slight seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Cazenovia gravelly loam, 0 to 3 percent slopes, in a meadow, located 1.1 miles southwest of the junction of Ridge Road (U.S. Route 104) and Monroe-Orleans County Line Road, town of Clarkson:

Ap—0 to 10 inches, dark yellowish-brown (10YR 3/4) gravelly loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

B&A—10 to 12 inches, reddish-brown (5YR 4/4) gravelly silt loam; weak, fine, subangular blocky structure breaking to weak, fine, granular structure; friable; brown (7.5YR 5/2) ped coats; medium acid; abrupt, broken boundary.

B21t—12 to 22 inches, reddish-brown (2.5YR 4/4) gravelly silty clay loam; weak, medium, subangular blocky structure; firm; dark reddish-brown (5YR 3/4) ped coats; few, thin clay films slightly darker than the ped coats and pale-green (5G 6/2) small shale fragments; neutral; clear, smooth boundary.

B22t—22 to 36 inches, dark reddish-brown (2.5YR 3/4) gravelly silty clay loam; few, fine, distinct, reddish-brown (5YR 4/4) and yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure; very firm; dark reddish-brown (5YR 3/4) ped coats; common, prominent clay films on vertical and horizontal ped surfaces; pale-green (5G 6/2) small shale fragments in ped interiors; neutral; clear, smooth boundary.

C—36 to 50 inches, dark reddish-brown (2.5YR 3/4) gravelly silty clay loam; weak, thin and medium, platy structure; firm; neutral, becoming calcareous at a depth of 46 inches.

Both the solum thickness and depth to carbonates range from 20 to 40 inches. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown or dark brown (7.5YR 4/4). The texture is dominantly loam but ranges to silt loam. It is gravelly or stony and has a coarse fragment content ranging from 15 to 35 percent. Reaction of the Ap horizon ranges from strongly acid to neutral. In some cultivated areas the B&A horizon is absent. Where present, this horizon is generally darker in color than the underlying B horizon and consists either of a mixture of or an intermediate color between the colors of the two horizons.

The B horizon ranges from dark reddish brown (2.5YR 3/4) to brown (7.5YR 5/4) and may have some green colors because of the local shale. Mottled colors, where present, range from red to light olive brown. The texture of the B horizon is silty clay loam or clay loam, with the clay percentage ranging from 28 to 35 percent. Structure is weak or moderate,

fine or medium, subangular blocky. Reaction of this horizon ranges from medium acid to neutral.

The hues, values, and chromas of the C horizon colors are comparable to those of the B horizon. The texture ranges from gravelly loam to gravelly silty clay loam. Mottling, if present, is in the upper 10 to 12 inches of the horizon. The C horizon is neutral or mildly alkaline in the upper part and calcareous within a depth of 48 inches.

The Cazenovia soils formed in the same kind of material as the somewhat poorly drained to moderately well drained Ovid soils. Cazenovia soils generally are near the similar Honeoye, Ontario, Lima, and Hilton soils, which have a coarser textured B horizon. The Cayuga and Churchville soils are similar to the Cazenovia soils, but they contain more clay in the B horizon.

Cazenovia gravelly loam, 0 to 3 percent slopes (CgA).—This level to nearly level soil has the profile described as representative of the series. It occupies foot slopes on the till plains, the tops of islandlike knobs or ridges of till within old glacial lakebeds. Individual areas are roughly oblong in shape and range from 2 or 3 acres in size to more than 100 acres.

Included in mapping with this soil in depressions and drainageways are small areas of somewhat poorly drained to moderately well drained Ovid soils or somewhat poorly drained Churchville soils. In some areas a coarser textured soil that is more acid and contains a discontinuous fragipan is also an inclusion.

This soil is suited to most of the commonly cultivated crops and is well suited to pasture or woodland. It is generally well suited to most fruit and vegetable crops. Where the soil lies on foot slopes of the surrounding uplands, artificial drainage is generally needed to remove water received as runoff. In places the surface layer tends to compact easily and clod badly if worked when too wet. (Capability unit IIw–4; woodland suitability group 2o1)

Cazenovia gravelly loam, 3 to 8 percent slopes (CgB).—This gently sloping soil differs from that described as representative of the series in that the transitional layer is generally thinner or is not present. Some areas lack the distinct mottling in the B horizon that is associated with the wetter, nearly level soil. This soil occupies the lower slopes or the side slopes of the knobs or ridges on the till plains and in many places is adjacent to or in lake plain areas. Individual areas are roughly oblong in shape and range from 2 or 3 acres in size to more than 100 acres.

Most commonly included with this soil in mapping are small areas, at slightly higher elevations, of the coarser textured, well-drained Honeoye or Ontario soils or the moderately well drained Lima or Hilton soils. At slightly lower elevations are some inclusions of the finer textured, well drained and moderately well drained Cayuga soils. Inclusions in drainageways and depressions too small to delineate are generally occupied by the somewhat poorly drained to moderately well drained Ovid soils or the somewhat poorly drained Churchville soils. Also included are small areas of a more sloping Cazenovia soil and a coarser textured, more acid soil that contains a discontinuous fragipan.

This soil is well suited to most of the commonly cultivated crops, hay, pasture, or woodland. Generally, it is well suited to most fruit crops. The soil is erodible. Erosion control measures are needed in cropped areas to check erosion. Random drainage is generally required in the wetter, more nearly level or depressed areas. In places the surface layer compacts easily and will clod badly if worked when too wet. (Capability unit IIe–5; woodland suitability group 2o1)

Churchville Series

The Churchville series consists of deep, level to gently sloping, somewhat poorly drained soils that have a fine textured to moderately fine textured subsoil. These soils formed in lacustrine silt and clay underlain by loamy, calcareous glacial till. Areas are adjacent to or in old glacial lakebeds, primarily south of the Lockport escarpment.

A representative nearly level Churchville soil in cropland has a surface layer, about 8 inches thick, of dark reddish-brown silt loam. This is underlain by a subsoil that is 30 inches thick. It is dark reddish-brown, mottled silty clay that becomes mottled, reddish-brown clay at a depth below 17 inches. The subsoil has a neutral reaction in the upper part and becomes mildly alkaline with depth. Pinkish-gray streaks of lime are common in the lower part. The substratum is dark reddish-gray, firm, calcareous gravelly loam glacial till that has some dark-brown mottles in the upper part.

A seasonal high water table rises to within 6 to 12 inches of the surface and is perched above the slowly to moderately slowly permeable clayey subsoil and till substratum. The depth of soil available for rooting ranges from 15 to 24 inches. but a few roots reach a greater depth as the water table recedes. The root zone has a moderate to low available water capacity. Because of the relatively high clay content, care must be taken to maintain good tilth in these soils. If the soils are plowed when too wet, they become compact and cloddy.

Representative profile of Churchville silt loam, 0 to 2 percent slopes, in cropland, located approximately 1,500 feet north and 500 feet west of the junction of Bailey Road and John Street, town of Henrietta:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/2) silt loam; few, fine, prominent, strong-brown (7.5YR 5/8) root stains in root channels; strong, fine and medium, angular blocky structure; firm; neutral; abrupt, smooth boundary.

B21t—8 to 17 inches, dark reddish-brown (5YR 3/2) silty clay; few, fine, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium and coarse, subangular blocky structure to strong, coarse, prismatic structure; firm; dark reddish-brown (5YR 3/3) ped coats with many, fine, distinct, brown (7.5YR 4/4) mottles; a few, thick, prominent clay films on vertical and horizontal ped faces and in pores; neutral; clear, smooth boundary.

B22t—17 to 38 inches, reddish-brown (5YR 4/3) clay; many, medium, prominent, dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, subangular blocky structure to strong, coarse, prismatic structure; firm; dark reddish-gray (5YR 4/2) and greenish-gray (5GY 5/1) ped faces mottled with reddish brown; common, pinkish-gray (5YR 7/2) lime streaks in the lower part; neutral in the upper part, grading to mildly alkaline in the lower, with free carbonates present; abrupt, wavy boundary.

IIC—38 to 51 inches, dark reddish-gray (5YR 4/2) gravelly loam glacial till; common, fine, distinct, dark-brown (7.5YR 4/4) mottles in the upper few inches; massive; firm; common green and red shale fragments; calcareous.

The solum ranges from 20 to 38 inches in thickness. Depth to carbonates ranges from 20 to 40 inches. The Ap horizon ranges from dark reddish brown (5YR 3/3) to dark grayish

brown (2.5Y 4/2). Color values are 1 or 2 units higher when the horizon is dry. Reaction is slightly acid to neutral. In undisturbed areas the A2 horizon is 1 to 4 inches thick, but in cultivated areas, this horizon is absent because it is normally incorporated in the Ap horizon. The A2 horizon ranges from reddish brown (5YR 4/3) to light yellowish brown (2.5Y 6/4) in color. Mottles are common to many and distinct or prominent. A few mottles have a chroma of 1 or 2. Texture of the A2 horizon is silt loam or silty clay loam that is slightly sandier than the horizon above. Reaction is slightly acid or neutral.

The B21t horizon color ranges from dusky red (2.5YR 3/2) to light yellowish brown (2.5Y 6/4). Mottles have a color value ranging from 4 to 6 and a chroma ranging from 4 to 8. In the wetter areas, ped coats have a few mottles with a chroma of 2 or 1. The texture of the B21t horizon ranges from clay to silty clay loam. The clay content ranges from 35 to 60 percent. Reaction is slightly acid or neutral. The color of the B22t horizon ranges from dusky red (2.5YR 3/2) to light yellowish brown (2.5Y 6/4). Streaks are present that have a 5GY hue, a value of 4 to 5, and a chroma of 1 or 2. Texture of this horizon ranges from clay to silty clay loam. The sand content is 5 to 10 percent higher than in the B21t horizon. Where clay films are present, they are not as prominent as in the B21t horizon. Reaction is neutral or mildly alkaline throughout or neutral in the upper part to mildly alkaline in the lower part. Free carbonates are present.

The IIC horizon color ranges from very dusky red (2.5YR 2/2) to light yellowish brown (2.5Y 6/4). The texture ranges from sandy loam to coarse clay loam and is gravelly or nongravelly. In places, mottles are absent in the upper part. Structure may be thick, platy.

The Churchville soils formed in material similar to that giving rise to the well drained and moderately well drained Cayuga soils and the poorly drained to very poorly drained loamy subsoil variant of Lakemont soils. Churchville soils are similar to and generally near the Appleton, Ovid, and Niagara soils, but they have a finer textured B horizon than those soils. They are geographically associated with the Odessa and Rhinebeck soils, which are similar in texture but formed in deeper, clayey lacustrine deposits.

Churchville silt loam, 0 to 2 percent slopes (ChA).—This level to nearly level soil has the profile described as representative of the series. The soil occurs in the lower drainageways or at the base of the adjacent sloping upland soils from which it receives runoff. Areas range from 3 to more than 50 acres in size. About half of the total acreage of this soil is in areas less than 10 acres in size.

Commonly included with this soil in mapping are the poorly drained to very poorly drained Lakemont soils, loamy subsoil variant, which occur in small depressions that stay ponded for longer periods. Also included are Appleton, Ovid, and Niagara soils, which formed in somewhat coarser material, and areas that have a finer textured surface layer. The Appleton and Niagara soils are somewhat poorly drained and the Ovid soils, somewhat poorly drained to moderately well drained.

This soil is well suited to close-growing crops that tolerate some wetness. It is moderately well suited to intertilled crops and pasture where adequately drained. Its use for pasture must be at a high management level. If undrained, this soil stays wet and cold too long for planting most field crops. (Capability unit IIIw–3; woodland suitability group 5w1)

Churchville silt loam, 2 to 6 percent slopes (ChB).—This gently sloping soil lies on the lower foot slopes of the adjacent upland soils and contributes to the runoff received by the bordering level soils. Areas range from 2 to 50 acres in size, with approximately half of the total acreage in areas less than 10 acres in size.

Most commonly included with this soil in mapping are the well drained and moderately well drained Cayuga soils on the higher knolls. Cayuga soils formed in similar material, and the somewhat poorly drained to moderately well drained Ovid soils formed in somewhat coarser material. Areas that have a finer textured surface layer are also included.

This soil is well suited to close-growing crops that tolerate some wetness. It is moderately well suited to intertilled crops and pasture. Artificial drainage is needed to lower the seasonal high water table as rapidly as possible. Where intertilled crops are grown, some measures are needed for controlling erosion. Use of this soil for pasture should be at a high management level. (Capability unit IIIw–4; woodland suitability group 3w1)

Claverack Series

In the Claverack series are deep, moderately well drained, coarse-textured soils that border or occur in old glacial lakebeds. These soils formed in sandy deposits underlain by lacustrine high-lime clay at a depth of 20 to 40 inches. The soils are nearly level or have gentle convex slopes.

A representative gently sloping Claverack soil in a cultivated area has a surface layer, about 11 inches thick, of dark grayish-brown loamy fine sand. The subsoil is loose, brown to dark-brown loamy fine sand about 21 inches thick. It has a few, faint, yellowish-brown and strong-brown mottles. Reaction is strongly acid in the upper part and medium acid in the lower part. The substratum begins at a depth of 32 inches. The upper 13 inches is very firm, reddish-brown clay that contains some dark yellowish-brown areas. It is slightly acid in the upper part and becomes calcareous with depth. Below a depth of 45 inches, the substratum is composed of clay and silt layers that are various shades of brown.

A seasonal high water table is approximately 18 to 24 inches below the surface and is perched above the slowly permeable substratum. The high water table does not persist for long periods. Permeability of the sandy surface layer and subsoil are moderately rapid to rapid. Generally, the depth of soil available for rooting is 20 to 24 inches. The root zone extends into the upper part of the underlying clay, where some weathering has taken place. The sandy upper part of the profile has low to moderate available water capacity, but the slightly weathered zone in the underlying clay has some water available to deep-rooted crops. Seasonal wetness and dryness are among the major problems in the use of these soils for farming.

Representative profile of Claverack loamy fine sand, 2 to 6 percent slopes, in a cultivated area, located approximately 1¼ miles southwest of the junction of Golah and East River Roads, town of Rush:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) loamy fine sand; very weak, fine, granular structure; very friable; common, fine and medium roots; strongly acid; abrupt, smooth boundary.

B2—11 to 25 inches, brown (10YR 5/3) loamy fine sand; salt and pepper appearance; very few, fine, faint, yellowish-brown (10YR 5/6) mottles in the lower part of the horizon; very weak, fine and medium, subangular blocky structure; loose; few fine and medium roots; strongly acid; abrupt, smooth boundary.

B3—25 to 32 inches, brown to dark-brown (7.5YR 4/4) loamy fine sand; few, faint, strong-brown (7.5YR 5/8) mottles; single grain; loose; medium acid; abrupt, smooth boundary.

IIC1—32 to 45 inches, reddish-brown (2.5YR 4/4, 5YR 4/3) clay; common, dark yellowish-brown (10YR 4/4) areas; massive to very weak, coarse, subangular blocky structure; very firm; dark reddish-gray (5YR 4/2) and weak-red (2.5YR 4/2) ped coats; few thin clay films on some vertical ped faces; slightly acid; clear, wavy boundary.

IIC2—45 to 50 inches, reddish-brown (5YR 4/3), brown to dark-brown (7.5YR 4/4), dark yellowish-brown (10YR 4/4), and olive-brown (2.5YR 4/4) laminated clay and silt; moderate and strong, thin and medium, platy structure; very firm; calcareous.

The solum ranges in thickness from 20 to 40 inches. When not limed, its reaction ranges from strongly acid to medium acid. Depth to carbonates ranges from 35 to 48 inches. The Ap horizon ranges from dark brown to brown (7.5YR 3/2 to 10YR 4/3). The B2 horizon ranges from reddish brown (5YR 4/3) to light olive brown (2.5YR 5/6). The texture ranges from loamy fine sand to fine sand, and, in less than 30 percent of this horizon, to very fine sand. The B3 horizon ranges from reddish yellow (7.5YR 6/6) to brown or dark brown (10YR 4/3).

The IIC1 horizon ranges from weak red (2.5YR 4/2) to light olive brown (2.5YR 5/6) in color, from clay to silty clay in texture, and from slightly acid to neutral in reaction. In places there are a few mottles. The IIC2 horizon consists of varied silt and clay with a few lenses of fine sand. The color is highly variable, but mottles are rare. This horizon is highly calcareous; a few grayish streaks of precipitated lime are present in some places.

Claverack soils formed in the same kind of material as the somewhat poorly drained Cosad soils. The very similar, moderately well drained Elnora and Galen soils lack the clayey substratum of the Claverack soils.

Claverack loamy fine sand, 0 to 2 percent slopes (CkA).—This soil differs from that described as representative of the series because it is generally wetter and mottles are nearer the surface. It occupies nearly level areas at the base of gently sloping soils and receives runoff from the surrounding soils. Most areas are larger than 10 acres in size and are irregularly shaped.

Commonly included with this soil in mapping are spots of the somewhat poorly drained Cosad soils. Inclusions of Elnora or Galen soils are in areas where the sandy deposit is thicker. In some local areas, the sandy deposit is underlain by compact glacial till rather than by clay, but these inclusions are minor and require similar management for most farming purposes.

The soil is suited to most crops. Where the climate is favorable, the soil is particularly well suited to fruit crops. Random tile drainage is normally required. During dry periods the hazard of soil blowing is severe. After 7 to 10 days without normal precipitation, this soil becomes droughty and generally needs supplemental irrigation. Because of the sandy texture of the solum, several applications of lime and fertilizer during the growing season are preferable to one large application at planting. (Capability unit IIw–1; woodland suitability group 3s1)

Claverack loamy fine sand, 2 to 6 percent slopes (CkB).—This soil has the profile described as representative of the series. It occupies the more sloping areas surrounding or bordering the glacial lake basins and provides surface runoff and subsurface seepage to the lower, and more nearly level areas of the lake plain. Many areas of this soil are larger than 10 acres in size and are irregular in shape. The smaller areas are generally oblong in shape and border the nearly level areas.

Included in mapping are areas where the sandy deposit is underlain by glacial till rather than by clay. Also included are areas of the somewhat poorly drained Cosad soils in depressions, and seep spots where the underlying clay is nearer to the surface. Inclusions of Elnora or Galen soils are in some areas where the sandy deposit is thicker. Also included are a few spots of similar but well-drained soils.

This soil is suited to most crops grown in the county. Where the climate is favorable, the soil is especially well suited to fruit crops. Random tile drainage is normally required, but to a lesser extent than on Claverack loamy fine sand, 0 to 2 percent slopes. Some measures for controlling erosion are needed on the more sloping areas. The main limitations to the use of this soil are droughtiness and susceptibility to soil blowing if the soil is dry. Droughtiness occurs 2 to 3 days earlier than in the nearly level Claverack soils, and supplemental irrigation is necessary despite wetness in spring. Because of the sandy texture, several applications of lime and fertilizer during the growing season are preferable to one large application at planting. (Capability unit IIw–5; woodland suitability group 3s1)

Claverack loamy fine sand, 6 to 12 percent slopes (CkC).—This soil has a profile similar to the one described as representative of the series, but the subsoil is thinner in places. The soil occupies the escarpments of the gently sloping areas and contributes to the runoff received by the more nearly level areas. Most areas are less than 10 acres in size and are oblong in shape.

Included in mapping are areas in which the sandy deposit is underlain by glacial till rather than by clay. Where the sandy deposit is thinner, there are inclusions of Schoharie or Hudson soils. Also included are a few spots of similar but well-drained soils.

This soil is moderately well suited to most crops grown in the county. Where the climate is favorable, it is well suited to fruit crops. Random tile drainage is not normally required, but measures are needed for controlling erosion. The major limitations to the use of this soil are droughtiness and susceptibility to soil blowing if the soil is dry. Supplemental irrigation is necessary. Lime and fertilizer applications should be made several times during the growing season rather than in one large application at planting. (Capability unit IIIe–4; woodland suitability group 3s1)

Collamer Series

The Collamer series is made up of deep, moderately well drained, medium-textured soils that occur primarily in old glacial lakebeds. These soils formed in lacustrine deposits that are mainly very fine sand and silt with some clay. They are nearly level to moderately sloping and have both simple and complex slopes that are dominantly convex.

A representative level Collamer soil in a cultivated area is essentially free of stone and gravel. The plow layer is dark-brown silt loam about 9 inches thick. The subsurface layer is friable, brown to dark-brown very fine sandy loam that is about 5 inches thick and contains dark yellowish-brown mottles. Both the surface and subsurface layers are medium acid. The subsoil is 16 inches thick. It is neutral, mottled, dark-brown, very firm silt loam and contains more clay than the A and C horizons. The calcareous substratum begins at a depth of 30 inches. The upper 11 inches of the substratum is mottled, dark grayish-brown, very firm silt loam. Below a depth of 41 inches are friable to slightly firm, olive-brown bands, or layers, of fine sand and silt with a few thin layers of clay.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched on the moderately slowly or slowly permeable subsoil and substratum. The depth of soil available for rooting early in the growing season is about 18 to 24 inches and is related to the height of the water table. As the growing season progresses and the water table drops, roots extend to a greater depth. Available water capacity is high. Seasonal wetness is one of the major limitations to use of these soils for farming. The soils respond well to fertilizer and lime.

Representative profile of Collamer silt loam, 0 to 2 percent slopes, in an idle area, located approximately 3½ miles northwest of the village of Webster:

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam; moderate, fine and medium, granular structure; friable; many roots; medium acid; abrupt, smooth boundary.

A2—9 to 14 inches, brown to dark-brown (10YR 4/3) very fine sandy loam; common, fine, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, thin, platy structure; friable; common roots; medium acid; abrupt, broken boundary.

B2t—14 to 30 inches, dark-brown (10YR 3/3) silt loam; common, medium, prominent, brown to dark-brown (7.5YR 4/4) mottles; moderate, fine, angular blocky structure within moderate, coarse prisms; very firm; grayish-brown (10YR 5/2) coats along vertical faces of peds appear to be silt; very dark grayish-brown (10YR 3/2) clay films on horizontal ped faces and in pores; common to few roots; neutral; clear, wavy boundary.

C1—30 to 41 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, prominent mottles of light olive brown (2.5Y 5/4), brown (7.5YR 5/2), and strong brown (7.5YR 5/6); strong, medium and thick, platy structure; very firm; few roots; calcareous; abrupt, wavy boundary.

IIC2—41 to 55 inches, olive-brown (2.5Y 4/4) stratified layers of very fine sand and silt with lenses of clay and sand; moderate to strong, medium, platy structure; friable but slightly firm in place; no roots; calcareous.

The solum ranges from 24 to 40 inches in thickness. Depth to carbonates ranges from 30 to 60 inches and is dominantly 30 to 40 inches. Reaction ranges from strongly acid to neutral in the upper part of the solum. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 5/3). The A2 horizon ranges from dark reddish gray (5YR 4/2) to light yellowish brown (2.5Y 6/4) in color and from silt loam to very fine sandy loam in texture. This horizon is coarser than the Ap horizon. Common or few, fine, faint or distinct mottles are in the lower part of the A2 horizon.

The B2t horizon ranges from dark reddish brown (5YR 3/3) to olive brown (2.5Y 4/4). Mottles range from faint to prominent and have color values that are 1 to 2 units higher than the color values of the matrix. Chroma of the mottles is 3 or greater, with some 2-chroma mottles present in the lower part. Ped coats with a high color value generally are in the upper part. The texture of the B2t horizon ranges from silt loam to silty clay loam, and the structure, from weak to moderate, fine to coarse, subangular blocky. The clay content ranges from 18 to 35 percent, and clay films generally are on vertical and horizontal ped faces as well as in pores.

Colors of the C horizon are more variable than those of the B horizon and the chroma may be lower. Generally, silt and very fine sand are the dominant textures. There is a high proportion of silt. Thin lenses of coarser sand or bands of clay are in some places. Laminations are generally present. The upper part of the C horizon is dominantly calcareous but may be neutral.

The Collamer soils formed in the same kind of material as the well-drained Dunkirk soils, the somewhat poorly drained Niagara soils, and the poorly drained Canandaigua soils. These Collamer soils differ from the Collamer soils, loamy subsoil variant, in having formed in thicker silt deposits. The Collamer soils are near the Hilton soils, which formed in firm glacial till, and the Galen soils, which formed in coarser textured lacustrine deposits.

Collamer silt loam, 0 to 2 percent slopes (CIA).—This soil has the profile described as representative of the series. Areas are generally 10 acres or more in size, but some are less than 10 acres.

Commonly included with this soil in mapping is Niagara silt loam, which is in depressions and remains wet for longer periods. Other inclusions are the Galen and Hilton soils and Collamer soils, loamy subsoil variant. In some areas north of the beach ridge, included spots have a coarser subsoil that has some characteristics of a fragipan. Because of their small extent, some areas of very fine sandy loam are included. These sandier inclusions dry out more quickly in spring and can be worked earlier than the silt loam areas. Also included are spots where a small quantity of gravel is in the surface layer.

This soil is suited to the commonly cultivated crops, pasture, and woodland. It is well suited to vegetable crops. Where drainage is adequate and erosion is controlled, farming can be intensive. Drainage is generally accomplished by using random tile. (Capability unit IIw–1; woodland suitability group 2o1)

Collamer silt loam, 2 to 6 percent slopes (CIB).—Except for its thinner subsurface layer, this soil has a profile similar to the one described as representative of the series. The soil occupies knolls on the higher landscapes. Most areas are 10 acres or more in size.

The Niagara, Hilton, and Galen soils and Collamer soils loamy subsoil variant, are the most common inclusions in mapping. The included Niagara soils are in depressions, remain wet longer, and need drainage. The included Galen soils differ from the Collamer in being sandier, having lower available water capacity, having a lower supply of nutrients, and becoming droughty sooner. The included Collamer soils, loamy subsoil variant, are underlain by glacial till, which is moderately slowly to slowly permeable and restricts root penetration. In the northern part of the county, north of U.S. Route 104, included areas have a coarser subsoil that has some characteristics of a fragipan. Because of their small extent, some areas have been included that have a very fine sandy loam surface layer. These sandier areas dry out more quickly and can be worked earlier in spring than the areas of Collamer silt loam. Small areas are also included where a small quantity of gravel is in the surface layer.

This soil is suited to the commonly grown crops, pasture, and woodland. Practices for controlling erosion are needed for intensive farming. In some included wetter spots, random tile drainage is required. (Capability unit IIe–6; woodland suitability group 2o1)

Collamer silt loam, 6 to 12 percent slopes (CIC).—The profile of this soil differs from that described as representative of the series because it has a thinner subsurface layer. Areas of this soil are generally less than 10 acres in size and occupy the steeper slopes surrounding gently sloping areas.

Commonly included in mapping are areas of the well-drained Dunkirk soils, which are at higher elevations. Because of small extent, some severely eroded areas are included where part of the subsoil is mixed into the plow layer.

This soil is suited to crops, pasture, or woodland. If the soil is cultivated and not protected, it is subject to a severe hazard of erosion. (Capability unit IIIe–5; woodland suitability group 2r1)

Collamer Series, Loamy Subsoil Variant

In the Collamer series, loamy subsoil variant, are deep, moderately well drained, medium-textured soils. The soils formed in lacustrine very fine sand and silt with some clay and are underlain by calcareous loam glacial till. These level to gently sloping soils occupy an intermediate position between the deeper glacial lake deposits and the upland glacial till deposits, or they are on the crest of low knolls that have a moderately shallow lacustrine cap.

A representative level Collamer soil, loamy subsoil variant, has a surface layer of brown to dark-brown silt loam about 9 inches thick. The subsurface layer, about 5 inches thick, is mottled, light yellowish-brown, friable, strongly acid silt loam. Both the surface and subsurface layers contain a small quantity of stone and gravel. The firm, brown to dark-brown subsoil begins at a depth of 14 inches and contains a small quantity of stone and gravel. The upper 7 inches is medium acid silt loam that has some yellowish-brown mottles. The lower 11 inches is slightly acid silty clay loam that contains strong-brown and yellowish-brown mottles. The firm substratum begins at a depth of 32 inches and extends to a depth of 4 feet or more. It is reddish-brown, calcareous gravelly loam glacial till.

A seasonal high water table rises to within 18 to 24 inches of the surface but does not persist for a significant length of time. The water table is perched on the moderately slowly or slowly permeable subsoil and underlying glacial till. The depth of soil available for rooting is dominantly 18 to 24 inches and is related to the height of the water table. Available water capacity is high. Seasonal wetness is a major limitation to use of these soils for farming. The soils respond well to fertilizer and lime.

Representative profile of Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes, in an idle area, located 400 feet north and 50 feet east of the junction of Embury and Scribner Roads, town of Penfield:

Ap—0 to 9 inches, brown to dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; less than 5 percent coarse fragments; medium acid; clear, smooth boundary.

A2—9 to 14 inches, light yellowish-brown (10YR 6/4) silt loam; few, medium, faint mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable; less than 5 percent coarse fragments; strongly acid; clear, wavy boundary.

B21t—14 to 21 inches, brown to dark-brown (7.5YR 4/4) silt loam; common, fine, prominent mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; firm; less than 5 percent coarse fragments; light yellowish-brown (10YR 6/4) ped coats in more than 15 percent of the areas; dark-brown (10YR 3/3) clay films on some ped faces and in pores; medium acid; clear, wavy boundary.

B22t—21 to 32 inches, brown to dark-brown (10YR 4/3) silty clay loam; many, fine and medium, distinct and prominent mottles of yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; firm; less than 5 percent coarse fragments; thick, dark-brown (10YR 3/3) clay films; slightly acid; abrupt, wavy boundary.

IIC—32 to 48 inches, reddish-brown (5YR 4/3) gravelly loam glacial till; weak, medium and thick, platy structure; firm; 15 to 35 percent coarse fragments; calcareous.

The solum ranges from 20 to 40 inches in thickness and corresponds to the depth to the underlying till. The solum is dominantly 30 to 36 inches thick. Depth to calcareous material is generally the same as the depth to the underlying till but may be as much as 2 inches less. Coarse fragment content in the A horizon ranges from 0 to less than 15 percent. The Ap horizon ranges from dark brown (10YR 3/3) to brown (10YR 4/3) in color and from strongly acid to neutral in reaction. The A2 horizon ranges from reddish brown (5YR 5/3) to light yellowish brown (2.5Y 6/4) in color and from strongly acid to slightly acid in reaction. Its texture is very fine sandy loam or silt loam with less clay than in the Ap or B21t horizons. In some places mottles are present. Where the solum is at the thinnest end of its range, the A2 horizon is absent in some profiles.

The B21t horizon ranges from reddish brown (5YR 4/3) to light olive brown (2.5Y 5/4). Mottles have color values ranging from 3 to 6 and chromas ranging from 2 to 6. The texture ranges from silt loam to silty clay loam, and the coarse fragment content is from 0 to 5 percent. Reaction is medium or slightly acid. The B22t horizon ranges from dark reddish brown (5YR 3/3) to olive yellow (2.5Y 6/6) in color. Mottled colors are similar to those in the B21t horizon, but the quantity of mottling is greater in the B22t horizon. The texture is fine silt loam or silty clay loam. The clay content ranges from 18 to 35 percent and is somewhat higher than in the B21t horizon. Coarse fragment content ranges from 0 to 5 percent. Reaction is slightly acid or neutral, and, in some of the shallower profiles, the lower 1 or 2 inches is weakly calcareous.

A B3 horizon, present in some of the deeper profiles, is dominantly 3 or 4 inches thick and rarely exceeds 6 inches in thickness. Colors are similar to those of the B22t horizon. The texture ranges from silt loam to sandy clay loam. The clay content is more than 18 percent but is less than in the B22t horizon. Coarse fragment content ranges from 0 to as much as 35 percent. Reaction ranges from slightly acid to mildly alkaline and is dominantly neutral or mildly alkaline with free carbonates present.

The IIC horizon ranges from reddish brown (5YR 4/3) to brown (7.5YR 5/4). The texture is gravelly fine sandy loam or gravelly loam, with a clay content rarely exceeding 17 percent. Coarse fragment content ranges from 15 to 35 percent and includes some stones.

Collamer soils, loamy subsoil variant, formed in the same kind of material as the loamy subsoil variant of the somewhat poorly drained Niagara soils. These soils are very similar to the deeper Collamer soils, which lack a till subsoil or substratum. The variant soils formed in material similar to that giving rise to the poorly drained Canandaigua soils, which formed in deeper silty deposits. They are near the moderately well drained Hilton soils and the well-drained Madrid soils which formed in glacial till and lack the lacustrine cap.

Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes (CmA).—This level to nearly level soil has the profile described as representative of the series. Some areas are on the tops of old low glacial till ridges that were covered by moderately shallow water of postglacial lakes. Other areas are at the base of existing, higher glacial till ridges within old glacial lakebeds and are on the till plains bordering the lakebeds. Individual areas are irregular in shape and range from 3 to 100 acres in size, with most areas being larger than 10 acres in size.

Commonly included with this soil in mapping is the somewhat poorly drained Niagara soil, loamy subsoil variant, which occupies small depressions or narrow drainageways that normally remain wet longer.

This soil is suited to most of the commonly cultivated crops, pasture, and woodland. Intensive cropping can be practiced where drainage is adequate. Normally, random tiling provides adequate drainage. (Capability unit IIw–1; woodland suitability group 2o1)

Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes (CmB).—The profile of this gently sloping soil differs from that described as representative of the series because it is normally 2 or 3 inches thinner and has mottles generally at a greater depth. Some areas are on the side slopes of old, low glacial till ridges that were covered

by moderately shallow water of postglacial lakes. Other areas are on the lower foot slopes of existing higher glacial till ridges within old glacial lakebeds and are in the till plains bordering the lakebeds. Individual areas are generally long and fairly narrow and range from 3 to 100 acres in size; most areas are larger than 10 acres.

Most commonly included with this soil in mapping are the moderately well drained Hilton soils or the well drained Madrid soils that formed in glacial till. These inclusions normally contain coarse fragments that interfere somewhat with tillage. Small areas that are more sloping and have a limited total acreage are also included. Other inclusions are small areas of the poorly drained, loamy subsoil variant of Niagara soils and the wetter seeps in low areas.

This soil is suited to most of the commonly cultivated crops, pasture, and woodland. If the soil is cultivated and not protected, it is subject to severe erosion. Intensive cropping can be practiced where measures for controlling erosion are provided. Drainage is needed only in the few included seep spots. (Capability unit IIe–6; woodland suitability group 2o1)

Colonie Series

The Colonie series consists of deep, well-drained to excessively drained, coarse-textured soils. These soils formed in water-laid or windblown deposits of fine sand on beaches, sandbars, or deltaic positions in association with old postglacial lakebeds or outflow channels of the lakes. The soils are level to moderately steep and have convex slopes. In the western part of the town of Webster and in areas along the old Lake Iroquois beach ridge (U.S. Route 104), the Colonie soils are underlain by gravel deposits at a depth below 6 to 8 feet.

A representative level to gently sloping Colonie soil has a surface layer, about 7 inches thick, of dark grayish-brown loamy fine sand. The subsoil is 44 inches thick. The upper 20 inches is very friable to friable, strongly acid, yellowish-brown loamy fine sand. In the lower two-thirds of the upper part of the subsoil are thin dark-brown bands (fig. 9). The lower 24 inches of the subsoil is very friable, medium acid, brown fine sand. Thin dark-brown bands are present, some of which are discontinuous. The substratum begins at a depth of 51 inches. It is loose, slightly acid, brown fine sand that contains a few yellowish-brown mottles.

A seasonal high water table rarely rises to within 4 feet of the surface and is normally much deeper. Permeability is rapid to a depth of 6 feet or more. The depth of soil available for rooting is mainly in the upper 30 inches, although there are few restrictions in the rooting zone. The available water capacity is low to a depth of 24 inches and moderate from 24 to 30 inches. When the Colonie soils are left exposed, soil blowing is a serious hazard. Soil blowing and lack of moisture during the growing season are among the major limitations to use of these soils for farming.

Representative profile of Colonie loamy fine sand, 0 to 6 percent slopes, in an idle area, located 2,500 feet west and 500 feet south of the junction of Jefferson Road and John Street, town of Henrietta:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, very fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

Figure 9.—**Profile of a Colonie soil, showing thin, dark-brown bands.**

B21—7 to 14 inches, yellowish-brown (10YR 5/6) loamy fine sand; weak, fine, granular structure; very friable, soft; strongly acid; clear, smooth boundary.

B22—14 to 27 inches, yellowish-brown (10YR 5/6) loamy fine sand; single grain that tends to weak, medium, platy structure in the upper part; friable, slightly hard; dark-brown (7.5YR 4/4) lamellae ⅛ inch to 1 inch thick (3 complete bands and a few discontinuous bands); strongly acid; abrupt, wavy boundary.

B3—27 to 51 inches, brown (10YR 5/3) fine sand; dark-brown (7.5YR 4/4) fine sand lamellae ⅛ inch to 1 inch thick with some lamellae discontinuous; single grain; friable, slightly hard in lamellae and very friable, soft in interlamellae areas; area between lamellae has salt and pepper appearance; medium acid; clear, wavy boundary.

C—51 to 57 inches, brown (10YR 5/3) fine sand; few, fine, faint, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) mottles; single grain; loose; few, dark-brown (7.5YR 4/4), irregularly shaped nodules; slightly acid.

The solum thickness ranges from 48 to 72 inches. Depth to carbonates ranges from 6 to 10 feet or more. When unlimed, reaction in the solum is strongly acid to medium acid in the upper part and gradually increases to medium acid or slightly acid in the lower part. The Ap horizon ranges from dark brown to brown (7.5YR 3/2 to 10YR 4/3) in color and from weak, fine, granular structure to single grain.

The B horizon color ranges from reddish brown (5YR 5/3) to brownish yellow (10YR 6/6). The B horizon may be of either loamy fine sand or fine sand texture. Lamellae vary from none or few in the lower part of the B horizon to one-third or one-half of the total depth of the B horizon. The color value of the lamellae ranges from 3 to 5, and the chroma is 3 or 4. A few lamellae have a distinct increase in clay content, but where present, the lamellae aggregate less than 6 inches in total thickness.

The C horizon color ranges from dark brown (7.5YR 4/4 to brown (10YR 5/3, 7.5YR 4/4). Fine sand extends to a depth of 4 to 6 feet or more, but contrasting layers of clay, silt, gravel, or glacial till may be present at lower depths. Faint mottling is present in places in the upper part of the C horizon, but it is generally present at greater depths.

The Colonie soils are most commonly associated geographically with the moderately well drained Elnora soils that formed in similar material, the well-drained Arkport soils that formed in material with a higher proportion of very fine sand and silt, and the moderately well drained Claverack soils that formed in moderately deep sand deposits over clay. The Colonie soils are near the Dunkirk soils, which are well drained and formed in silty lacustrine sediments. They are also near Alton soils, which formed in gravelly beach and sandbar deposits.

Colonie loamy fine sand, 0 to 6 percent slopes (CoB).—This level to gently sloping soil is the dominant Colonie soil in the county and has the profile described as representative of the series. It occupies the beach and sandbar areas associated with old glacial lakes and the tops of the deltaic deposits associated with the outflow channels of these lakes. Most areas exceed 10 acres in size and generally are irregularly oblong in shape. Several individual areas are larger than 100 acres in size.

This soil normally contains few inclusions of other soils. The finer textured Arkport soils, which are more erodible and have a higher available water capacity, are common inclusions in the deltaic landscape. A deep sandy soil, dominantly of medium sand, is also a common inclusion. The moderately well drained Elnora or somewhat poorly drained Minoa soils are included in slight depressions. Where this soil is adjacent to fine lacustrine deposits, the moderately well drained Claverack soils are included in spots where the sand deposit is less than 40 inches thick. Also included are small areas having short, complex, gentle slopes.

This soil is suited to crops, pasture, and woodland. It is suitable for specific fruit crops. Lack of moisture is the major limitation to the use of this soil. Measures to control soil blowing are generally needed if the soil is cropped intensively. (Capability unit IIIs–1; woodland suitability group 4s1)

Colonie loamy fine sand, 6 to 12 percent slopes (CoC).—This soil occupies the more sloping areas and some of the side slopes of the deltaic and sandbar deposits. Individual areas are generally greater than 10 acres in size, but few areas are as large as 100 acres.

This soil normally contains comparatively few inclusions of other soils. The finer textured Arkport soils, which are more erodible and have a higher available water capacity, are commonly included in the deltaic landscape. An unnamed deep sandy soil, dominantly of medium sand, is another common inclusion. In the town of Webster, a few small areas of gravelly Alton soils are included. A few small eroded areas of Colonie soil and dunelike areas of gently sloping and sloping Colonie soils in a complex arrangement are included with this soil because of their small total acreage.

This soil is poorly suited to most crops and moderately suited to specific fruit crops. Droughtiness, susceptibility to soil blowing, and slope limit the use of this soil for crops. (Capability unit IVs–1; woodland suitability group 4s1)

Colonie loamy fine sand, 12 to 20 percent slopes, eroded (CoD3).—The profile of this soil differs from that described as representative of the series because the original surface layer is generally thinner or absent. This moderately steep soil occupies dunelike areas, the steeper side slopes of the deltaic deposits, and the slopes of areas where water erosion has caused extensive dissection. Shallow gullies are numerous. Individual areas are generally about 10 acres in size. There are no large areas.

The dominant inclusions with this soil in mapping are Arkport soils on comparable slopes. Included are common spots of both wind- and water-deposited material accumulated from eroded areas. Areas having complex topography with slopes ranging from gentle to steep are included because of their small total acreage. Some small areas that are underlain by gravel deposits at a depth of 3 to 4 feet are minor inclusions.

This soil is not suited to crops but can be used for some trees. Slope, droughtiness, and the hazard of continuing erosion limit use of this soil. (Capability unit VIIs–1; woodland suitability group 4s2)

Cosad Series

The Cosad series is made up of deep, somewhat poorly drained, coarse-textured, level soils. These soils formed in sandy deltaic or lacustrine deposits that are underlain by high-lime lacustrine clay. They occur in depressions in old glacial lakebeds or bordering the lakebeds.

A representative Cosad soil has a surface layer, about 8 inches thick, of very dark gray loamy fine sand. Underlying this is a very friable, slightly acid subsurface layer that extends to a depth of 13 inches. This layer is light yellowish-brown loamy fine sand that is mottled with olive yellow and brownish yellow. The subsoil is slightly acid and 17 inches thick. It is pale-brown loamy fine sand that is highly mottled with yellowish brown, pale yellow, grayish brown, and light gray. The calcareous substratum begins at a depth of 30 inches. It is pale-olive silty clay with a few yellowish-brown and brown mottles. A few thin bands of silty material that are lighter in color than the clay are present in the substratum. These silt bands have no definite arrangement and increase in number at a depth below 40 inches.

A seasonal high water table is within 6 to 12 inches of the surface and is perched above the slowly permeable substratum. Permeability of the surface layer and subsoil is rapid. The depth of soil available for rooting is mainly 15 to 24 inches. The root zone corresponds to the height of the seasonal high water table early in the growing season and to the depth to the calcareous substratum as the water table recedes. The available water capacity is very low to moderate in the sandy upper part of the profile but is generally more than sufficient for plant growth. Somewhat poor drainage is one of the major limitations to the use of these soils for farming.

Representative profile of Cosad loamy fine sand in a drained and cultivated area, located 3,000 feet east of East River Road and 2,500 feet south of Erie Station Road (State Route 253), town of Henrietta:

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

A2—8 to 13 inches, light yellowish-brown (2.5Y 6/4) loamy fine sand; common, medium, distinct and prominent mottles of olive yellow (2.5Y 6/8) and brownish yellow (10YR 6/8); very weak, medium, subangular blocky structure; very friable; slightly acid; gradual, wavy boundary.

B2—13 to 30 inches, pale-brown (10YR 6/3) loamy fine sand; common, fine and medium, distinct and prominent mottles of olive yellow (2.5Y 6/8) and brownish yellow (2.5Y 7/4), light gray (10YR 7/2), and grayish brown (2.5Y 5/2); weak, medium, subangular blocky structure, grading to weak, platy structure with depth; friable; slightly acid; gradual, wavy boundary.

IIC—30 to 52 inches, pale-olive (5Y 6/4) silty clay; few, fine and medium, prominent mottles of yellowish brown (10YR 5/4) and brown (7.5YR 5/2); a few, thin silt lenses that are lighter in color and one-eighth inch to one-half inch thick; strong, medium and thick, platy structure caused by depositional varving; firm; calcareous.

The solum ranges in thickness from 20 to 36 inches. Depth to carbonates ranges from 30 to 44 inches. The texture is dominantly fine sand, with medium sand constituting less than 10 percent. The Ap horizon ranges from dark brown (7.5YR 3/2) to very dark grayish brown (2.5Y 3/2) and includes very dark gray (10YR 3/1) and dark brown (10YR 3/3). The A2 horizon ranges from brown (7.5YR 5/2) to pale yellow (2.5Y 7/4) in color, from dominantly loamy fine sand to loamy very fine sand in texture, and from medium acid to slightly acid in reaction.

The B horizon ranges from brown or dark brown (7.5YR 4/4) to light yellowish brown (2.5Y 6/4) and includes pale brown (10YR 6/3). The reaction of the B horizon is slightly acid or neutral, and the texture is loamy fine sand or fine sand. In some profiles a thin transitional zone with a sandy clay loam texture overlies the C horizon.

The IIC horizon ranges from weak red (2.5YR 4/2) to pale olive (5Y 6/4) in color and from silty clay to clay in texture. A 2- to 4-inch thick band of silty clay loam at the top of the C horizon is common. Bands or lenses of silt and fine sand and very fine sand are in this horizon. Gray or white streaks of precipitated lime are present in some areas. The C horizon is generally calcareous, but in some areas the reaction of the upper 2 to 4 inches is neutral.

The Cosad soils are most closely associated geographically with the moderately well drained Claverack soils that formed in similar material. Where the sandy cap is thin, Cosad soils are associated with the somewhat poorly drained Odessa and Rhinebeck soils, which formed in clay. Cosad soils are also associated with the moderately well drained Elnora and Galen soils, the somewhat poorly drained Minoa soils, and the poorly drained and very poorly drained Lamson soils, all of which formed in similar sandy material but lack the clayey substratum of the Cosad.

Cosad loamy fine sand (Cu).—This level or nearly level soil occupies basal areas adjacent to the slightly higher Claverack soils and receives runoff from those soils. The size of individual areas varies, but about half the total acreage is in areas larger than 10 acres in size. Areas range in shape from roughly square at the base of slopes to oblong in the well-defined, broad drainageways.

Commonly included with this soil in mapping are moderately well drained Claverack soils on small knobs at a slightly higher elevation. Where the sand deposit is deep enough, Minoa soils are included; where the Cosad soils have a high proportion of very fine sand and silt, Niagara soils are included; and where the sand deposit is less than 20 inches thick, small areas of clayey Odessa or Rhinebeck soils are included. Small inclusions of a poorly drained or very poorly drained soil that formed in material similar to that giving rise to the Cosad soils are subject to ponding during wet periods. Because of their limited acreage, some areas of a gently sloping Cosad soil are included. In a few included areas, this soil is underlain by compact, impermeable glacial till rather than by clay.

This soil is moderately suited to most of the commonly cultivated crops and to pasture and woodland. Drainage is the major management problem. Use of the soil for some deep-rooted crops and fruit trees is restricted by the shallow seasonal high water table and the moderately shallow root zone. (Capability unit IIIw–2; woodland suitability group 4w1)

Cut and Fill Land

Cut and fill land (Cw) consists of nearly level to very steep areas where at least the upper 3 feet of soil material has been removed and used as fill material for construction projects. The exposed material remaining is dominantly loamy, mostly with little or no profile development. Most areas are adjacent to the New York State Thruway or along the interstate highway system, or adjacent to large urban developments.

Included in this mapping unit are some areas that have a clayey texture. These inclusions may present problems if the land is developed for farming.

Because these areas are generally calcareous on the surface, establishing a vegetative cover can be a problem. In places, if adequately treated, the areas can be used for some kinds of farming or for nonfarming uses. Most areas should have onsite investigation to determine the feasibility of proposed uses. (Capability unit and woodland suitability group not assigned)

Dunkirk Series

In the Dunkirk series are deep, well-drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. The soils formed in medium- to high-lime, lacustrine very fine sand and silt with some clay. They occupy areas in old glacial lakebeds that were covered with moderately shallow water and are associated primarily with the Genesee River and Irondequoit Creek drainage areas. These gently sloping to steep soils have both simple and complex slopes that are dominantly convex.

A representative gently sloping Dunkirk soil has a surface layer, about 6 inches thick, of very dark grayish-brown silt loam. It is underlain by a medium acid, brown silt loam subsurface layer that extends to a depth of 12 inches. The subsurface layer is firm in place and friable when removed. The firm, medium acid subsoil is 19 inches thick. The upper 5 inches is brown silt loam, and the lower 14 inches is brown to dark-brown silty clay loam. The substratum begins at a depth of 31 inches and consists of layers of silt and clay that are very pale brown, reddish brown, and dark reddish brown. The substratum is medium acid in the upper part and becomes calcareous with depth.

A seasonal high water table is generally deeper than 48 inches. The depth of soil available for rooting is 30 to 36 inches. Available water capacity is high. Permeability is moderate in the surface layer and upper part of the subsoil, moderately slow in the lower part of the subsoil, and variable in the substratum. These soils are among the most erodible in the county, and extensive measures for controlling erosion are needed even on the gentle slopes.

Representative profile of Dunkirk silt loam, 2 to 6 percent slopes, in a cultivated area, located 200 feet south and 800 feet west of the junction of State Route 31 and Mitchell Road, town of Pittsford:

Ap—0 to 6 inches, very dark grayish-brown (10 YR 3/2) silt loam; weak, fine, granular structure, but tends to-

ward platy structure; friable; medium acid; abrupt, smooth boundary.

A2—6 to 12 inches, brown (10YR 5/3) silt loam; weak, thick, platy structure breaking to moderate, fine, granular structure; firm in place, friable when removed; many wormholes and root channels; medium acid; clear, smooth boundary.

B&A—12 to 17 inches, brown (7.5YR 5/4) silt loam; moderate, fine and medium, subangular blocky structure, but tends toward weak, thick, platy structure; firm; brown (10YR 5/3) ped coats; the few clay films evident increase with depth; vesicular appearance; medium acid; clear, smooth boundary.

B21t—17 to 24 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; strong, fine and medium, subangular blocky structure; firm; brown to dark-brown (7.5YR 4/2) clay films increase with depth; medium acid; clear, smooth boundary.

B22t—24 to 31 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; strong, coarse, angular blocky structure; firm; reddish-brown (5YR 4/4) to dark reddish-brown (5YR 3/4) clay films; medium acid; abrupt, wavy boundary.

IIC1—31 to 34 inches, very pale brown (10YR 7/3), reddish-brown (5YR 4/3), and dark reddish-brown (5YR 3/4) silt bands; moderate, thin, platy structure; firm; thin clay layers or films on the silt bands; clay films in old tree root channels extend to a depth of 4 feet and are one-half inch to three-fourths of an inch in diameter; vesicular appearance; medium acid; abrupt, wavy boundary.

IIC2—34 to 56 inches, very pale brown (10YR 7/4) laminated silt and clay; weak, very fine, granular structure to massive within the bands; friable; medium acid, becoming calcareous in the lower part.

The solum ranges from 30 to 36 inches in thickness. Reaction ranges from strongly acid to medium acid in the solum and medium acid to mildly alkaline in the parent material. Calcareous material is at a depth of 30 inches in some of the shallower profiles and at a depth of 5 feet in the thicker, more acid profiles. The Ap horizon ranges from dark reddish brown (5YR 3/2) to dark grayish brown (2.5Y 4/2) in color. The color value is 3 or 4, and the chroma is 2. The texture of the Ap horizon is silt loam or very fine sandy loam. The A2 horizon ranges from reddish brown (5YR 4/3) to light olive brown (2.5Y 5/4) in color and from silt loam to very fine sandy loam in texture.

The B horizon ranges from dark reddish brown (5YR 3/3) to light olive brown (2.5Y 5/4). Clay content in the B horizon generally ranges from 18 to 35 percent. Clay films increase in number and prominence with depth and are most evident in the B22 horizon. A few thin bands of sand, not exceeding 15 percent and not affecting the average texture, are slightly coarser textured or finer textured.

The IIC horizon ranges from pale brown (10YR 6/3) to very pale brown (10YR 7/4). Thin lenses of sand or gravel are present in places, and clay bands increase or decrease with depth.

The Dunkirk soils formed in the same kind of material as the moderately well drained Collamer soils, the somewhat poorly drained Niagara soils, and the poorly drained Canandaigua soils. They occur in association with the Arkport, Colonie, Elnora, and Galen soils, all of which formed in sandy lacustrine deposits. In places, the Dunkirk soils are near the Ontario, Hilton, and Madrid soils, which formed in glacial till and are at higher elevations.

Dunkirk silt loam, 2 to 6 percent slopes (DuB).—This gently sloping soil has the profile described as representative of the series and is the most extensive of the Dunkirk soils in Monroe County. Areas are generally 10 acres or more in size, but many smaller areas are scattered throughout the county where the soil occurs in association with minor drainage patterns.

Where this soil is adjacent to the Ontario, Hilton, or Madrid soils, there are inclusions of those soils. Also included are areas of Dunkirk silt loam that are less than 40 inches to glacial till. In some places, particularly north of Ridge Road, are inclusions of Galen soils on comparable slopes.

This soil is suited to intensive farming if measures such as growing cover crops in conjunction with stripcropping or terracing are used. The soil has a severe hazard of erosion. In some places shallow-rooted crops need supplemental irrigation in dry years. (Capability unit IIe–6; woodland suitability group 2o1)

Dunkirk silt loam, 6 to 12 percent slopes, eroded (DuC3).—This soil has a generally thinner profile than that described as representative of the series because it has lost most of the original surface and subsurface layers. Most areas are smaller than 10 acres in size.

The most commonly included soils in mapping are the Collamer soils that formed in similar material and the adjacent Ontario, Hilton, or Madrid soils developed in glacial till material. Minor inclusions are less eroded areas and some areas underlain by glacial till at a depth less than 40 inches.

This soil is suited to woodland. It is poorly suited to intensive farming. Because of the slopes, the soil is subject to a rapid rate of runoff and a severe hazard of continued erosion. If the soil is cropped, diversion ditches are needed where feasible. These ditches should be used in conjunction with a long-term, close-growing vegetative cover. (Capability unit IVe–1; woodland suitability group 2r1)

Dunkirk silt loam, 12 to 20 percent slopes, eroded (DuD3).—Many areas of this soil have lost most of the original surface and subsurface layers through erosion, and therefore the profile is thinner than that described as representative of the series. Areas are rarely larger than 10 acres in size.

The most commonly included soils in mapping are the gently sloping Collamer soils and areas of Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded. Areas of moderately steep, uneroded Dunkirk soils are included because of their limited acreage.

This soil is suited to woodland. Limitations to the use of the soil for cropping, other than pasture renovation, are severe because of the hazard of continuing erosion and the moderately steep slopes. (Capability unit VIe–1; woodland suitability group 2r3)

Edwards Series

The Edwards series is made up of very poorly drained, shallow to moderately deep, organic soils that are underlain by marl within 16 to 40 inches of the surface. These level soils generally occupy depressions in old glacial lakebeds and along some of the major drainageways. Areas are scattered throughout the county.

A representative Edwards soil has a surface layer of black muck that is 12 inches thick and contains highly decomposed plant remains. Underlying this is a 13-inch layer of black muck containing streaks of reddish-brown or dark grayish-brown plant remains. The next layer is a 4-inch dark reddish-brown organic layer. At a depth of 29 inches is grayish-brown marly material that contains numerous small shells.

A seasonal high water table is at or near the surface for long periods of time if the soil is undrained. The thickness of the decomposed organic material restricts the depth of soil available for rooting and limits the expected period

of use of the soil. Available water capacity is variable, depending on the thickness of the layers of decomposed organic material over marl. These layers are rapidly permeable. The soils decompose rapidly upon exposure or if cultivated under unfavorable conditions. They are subject to severe soil blowing if left unprotected.

Representative profile of Edwards muck in a cultivated area, located 1,550 feet south and 1,000 feet east of the junction of Whalen and Dublin Roads:

Oa1—0 to 12 inches, black (10YR 2/1) muck; weak, medium, granular structure, but tends toward weak, medium, subangular blocky structure; very friable; neutral; clear, wavy boundary.

Oa2—12 to 25 inches, black (10YR 2/1) muck; nonsticky; dark grayish-brown (10YR 4/2) and some reddish-brown (5YR 4/4) plant remains; layered effect; neutral; clear, wavy boundary.

Oa3—25 to 29 inches, dark reddish-brown (5YR 3/2), spongy, organic material; structureless; nonsticky; some reddish-brown (5YR 4/4) plant remains and a few white shells; neutral; abrupt, smooth boundary.

Lca—29 to 50 inches, grayish-brown (2.5Y 5/2) marly material; high content of shells; some thin strata of sedimentary peat in the upper few inches; feels silty; calcareous.

The thickness of the solum ranges from 16 to 40 inches and corresponds to the depth to the underlying marl. Reaction of the solum is neutral or mildly alkaline and may vary from one layer to the next. The Oa1 horizon is black (10YR 2/0, 10YR 2/1) and has a highly variable structure and consistence in cultivated areas because of compaction and management practices. The Oa2 horizon is black (N 2/0, 10YR 2/1) and contains a variable quantity of shells from the underlying marl. The quantity of partly decomposed plant remains in the Oa2 horizon is highly variable, and colors are shades of red or brown. The Oa3 layer is not present in some profiles. Where present, it consists of thin layers of peat mixed with other partly decomposed plant remains, which break down when rubbed. The content of shells from the underlying marl is high but variable, ranging up to 35 percent or more in some places. The Lca horizon ranges from very dark grayish brown (10YR 3/2) to grayish brown (2.5Y 5/2). It is calcareous, but the carbonate content is highly variable in individual areas.

Edwards soils are associated with deep and shallow phases of Muck, but differ because they are underlain by marl rather than by bedrock, clay, or loamy till.

Edwards muck (Ed).—This level soil occupies basinlike areas that range from 2 or 3 acres in size to more than 160. Individual areas are generally larger than 10 acres.

Commonly included with this soil in mapping are small areas of both deep and shallow phases of Muck, and muck deposits that are less than 16 inches thick. Because of its small acreage, a soil that has a shallow, mucky, mineral deposit underlain by marl is included. A soil with thin layers of sedimentary peat above the marl is also included.

Most of this soil is in swamps or woods and has not been cleared for cultivated crops. It is only fair for farming because of the limited thickness of the organic material. With good management, areas can be drained and used for vegetable crops. Where sedimentary peat occurs, farming is difficult. (Capability unit IVw–4; woodland suitability group 5w1)

Eel Series

The Eel series consists of deep, medium-textured, level or nearly level soils that are moderately well drained. These soils formed in material that was recently deposited on flood plains. They occur along many of the larger streams in the county, and they regularly receive fresh soil material deposited by floodwater.

A representative Eel soil in a cultivated area has a surface layer, about 20 inches thick, of very dark grayish-brown silt loam. The subsoil is about 11 inches thick and is calcareous. In the upper 3 inches, the subsoil is brown to dark-brown, very friable very fine sandy loam. This is underlain by 8 inches of very dark grayish-brown, friable silt loam that contains a few brown mottles. At a depth of 31 inches is the substratum, a strong-brown and brown, friable, weakly calcareous fine sandy loam that extends to a depth of 46 inches. Below this depth the substratum is friable, gray, mottled silt loam.

The Eel soils are flooded annually in spring and at other times of the year after periods of intensive precipitation. They generally do not remain flooded for longer than 2 or 3 days, but for significant periods a water table persists in the soil at a depth of 18 to 24 inches. The depth of soil available for rooting is 20 to 30 inches and is related to the height of the water table, which is controlled by the adjacent stream. Available water capacity in the root zone is high. The major limitations to use of these soils for farming are the flood hazard and a slight seasonal wetness. The soils respond well to lime and fertilizer.

Representative profile of Eel silt loam in unimproved pasture, located 50 feet west of the Pittsford-West Bloomfield Road and 700 feet south of Bulls Saw Mill Road, town of Mendon:

Ap—0 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium and fine, granular structure; very friable; calcareous; gradual, wavy boundary.

A12—13 to 20 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; very friable; calcareous; gradual, wavy boundary. calcareous; clear, wavy boundary.

B21—20 to 23 inches, brown to dark-brown (10YR 4/3) very fine sandy loam; moderate, medium, subangular blocky structure that tends to be platy; very friable; weakly calcareous; clear, wavy boundary.

B22—23 to 31 inches, very dark grayish-brown (10YR 3/2) silt loam; few, fine and medium, distinct and prominent, dark-brown (10YR 4/3) and strong-brown (7.5YR 5/6) mottles; moderate, medium, platy structure; friable; calcareous; clear, wavy boundary.

IIC1—31 to 40 inches, strong-brown (7.5YR 5/6) and brown (10YR 5/3) fine sandy loam; colors are approximately equal in proportion, and horizon appears mottled; moderate, medium, platy structure; friable; weakly calcareous; clear, wavy boundary.

IIC2—40 to 46 inches, brown (10YR 5/3) fine sandy loam; yellowish-red (5YR 4/6) stains on plate faces; moderate, thin, platy structure; friable; weakly calcareous; clear, smooth boundary.

IIIC3—46 to 48 inches, gray (5YR 5/1) silt loam; few, fine, prominent, olive-brown (2.5Y 4/4) mottles; strong, thin, platy structure; friable; low in clay; weakly calcareous.

The solum ranges from 24 to 40 inches in thickness. It ranges from neutral to moderately alkaline in reaction, and in places it is calcareous. Its clay content is less than 18 percent. The A horizon is very dark grayish brown (10YR 3/2, 2.5Y 3/2).

The B horizon ranges from very dark grayish brown (2.5Y 3/2) to brown (10YR 4/3) and from heavy fine sandy loam to silt loam. Mottles in the B horizon are faint to prominent and have a chroma higher than 2. Structure in this horizon is weak or moderate, fine or medium, and granular, subangular blocky, or platy.

In the C horizon the colors are like those in the B horizon, the texture ranges from silt loam to fine sandy loam, and the horizon is massive or has platy structure, which indicates that the material was deposited by streams. In some places these

soils are underlain by stratified sand and gravel, but such deposits generally are at a depth greater than 4 to 6 feet.

The Eel soils in this county differ from the defined range for the series in being darked colored, coarser textured, and containing free carbonates in the upper part of the solum.

Eel soils formed in the same kind of material as the well-drained Genesee soils and the poorly drained to very poorly drained Wayland soils. They also are similar to the moderately well drained to well drained Hamlin soils, but they are less red throughout the profile.

Eel silt loam (Ee).—This level or nearly level soil occupies flood plains and is in areas that range from 3 to more than 50 acres in size. Some of the areas parallel streams and are long and narrow; others lie in broad, shallow basins.

Included in mapping, in the basinlike areas, are small areas of well-drained Genesee soils, which occupy small knobs or narrow ridges, and of poorly drained to very poorly drained Wayland soils in small depressions. Also included are small areas of a soil in which the texture is fine sandy loam or coarser throughout the profile. In addition, there are inclusions of a soil that is similar to an Eel soil but is shallow or moderately shallow over bedrock.

Eel silt loam is suited to all the common crops, as well as to pasture and woodland. Where artificial drainage is adequate, the soil is particularly well suited to vegetable crops. Because it is subject to flooding and generally is difficult to protect, this soil cannot be safely used for early crops. (Capability unit IIw–3; woodland suitability group 2o2)

Elnora Series

In the Elnora series are deep, moderately well drained, level to gently sloping, sandy soils. These soils formed in water-laid or windblown deposits of fine sand on areas that were formerly deltas, sandbars, or beaches in old glacial lakes.

A representative level Elnora soil has a loamy fine sand texture throughout the profile. The brown surface layer is about 8 inches thick. It is underlain by a 9-inch layer that is yellowish brown, very friable, and strongly acid. Below a depth of 17 inches are brown, friable, strongly acid to medium acid layers that have many mottles of yellowish brown and brown to a depth of 31 inches and a few mottles of light brownish gray and yellowish brown below that depth. At a depth of 44 inches the loamy fine sand is dark brown, friable, and slightly acid.

These soils are droughty in dry periods despite a seasonal high water table that rises to within 18 to 24 inches of the surface. Permeability is rapid throughout the soils. The depth of soil available for rooting is related to the height of the water table and is mainly in the upper 24 to 30 inches. Available water capacity in the rooting zone is low to moderate. The soils are subject to soil blowing if they are without cover. Where irrigated, crop production is good.

Representative profile of Elnora loamy fine sand, 0 to 2 percent slopes, in an orchard, located 1,320 feet north and 1,760 feet west of the junction of State Route 18 (Roosevelt Highway) and Redman Road, town of Hamlin:

Ap—0 to 8 inches, brown to dark-brown (10YR 4/3) loamy fine sand; moderate, fine and medium, granular structure; very friable; strongly acid; abrupt, smooth boundary.

C1—8 to 17 inches, yellowish-brown (10YR 5/4) loamy fine sand; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C2—17 to 31 inches, brown (7.5YR 5/4) loamy fine sand; many, medium and coarse, prominent mottles of yellowish brown (10YR 5/6–5/8) and brown (10YR 5/3); single grain with some weak, fine, subangular blocky structure; friable; dark-brown (7.5YR 4/4) nodules that are ½ inch to 1 inch in diameter; strongly acid.

C3—31 to 44 inches, brown (10YR 4/3) loamy fine sand; few, coarse, distinct mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); weak, fine and medium, subangular blocky structure, with some tendency toward thick, platy structure; friable; small nodules of dark brown (7.5YR 4/4); medium acid; clear, wavy boundary.

C4—44 to 50 inches, dark-brown (7.5YR 4/2) loamy fine sand; single grain; friable; slightly acid.

Depth to calcareous material ranges from 4 to 6 feet. Reaction of the profile is strongly acid or medium acid and becomes slightly acid at a depth greater than 40 inches. Except for the surface layer, texture throughout the profile is loamy fine sand or fine sand. Some of the sand is medium or very fine in size. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4). Where some undisturbed areas have a thin A2 horizon, the color is slightly lighter than the surface layer color, and a few, fine, faint mottles are present in the lower part in places. Color of the C horizon above a depth of 40 inches ranges from yellowish brown (10YR 5/4) or dark brown (10YR 4/3) to brown (7.5YR 5/4). Thin lamellae with reddish colors are present in some C horizons but total less than 6 inches in thickness. Some lamellae are slightly sticky. In places some thin strata of silt or clay are at depths greater than 40 inches.

Elnora soils formed in material similar to that giving rise to the well-drained to excessively drained Colonie soils and the moderately well drained Claverack soils. The Claverack soils are underlain by clay at a depth of 20 to 40 inches. The Elnora soils are similar to the moderately well drained Galen soils and the somewhat poorly drained Minoa soils but are coarser in texture and lack a B horizon.

Elnora loamy fine sand, 0 to 2 percent slopes (ElA).—This level to nearly level soil occupies foot slopes. It has the profile described as representative of the series. Areas are roughly rectangular in shape and are greater than 10 acres in size.

Commonly included with this soil in mapping are Claverack, Galen, and Minoa soils on comparable slopes. The Minoa soils are included where the surface layer color is darker and the landscape depressed, the Claverack soils are included where the Elnora soils are underlain by clayey material at a depth of 20 to 40 inches, and the Galen soils are included in areas that are siltier and have more very fine sand.

This soil is suited to all field and cash crops, pasture, or woodland. It is well suited to specialized vegetable crops or small fruit crops. Generally, random or systematic drainage, coupled with irrigation, is needed. Soil blowing is a hazard if the soil has no cover. (Capability unit IIw–1; woodland suitability group 4s1)

Elnora loamy fine sand, 2 to 6 percent slopes (ElB).—Areas of this soil lie on complex slopes and are generally larger than 10 acres in size.

Commonly included with this soil in mapping are the moderately well drained Claverack and Galen soils, the well-drained to excessively drained Colonie soils, and the somewhat poorly drained Minoa soils. The included Minoa soils occur in the lower depressions and generally require tile drainage. Spots of Colonie inclusions are on the drier knolls. Where clayey material is at a depth of 20 to 40 inches, Claverack soils are included. In the western part

of this county, north of U.S. Route 104 in the Lake Iroquois sand plain area, Claverack soils are a major inclusion.

This soil is suited to crops, pasture, or woodland. In addition to the crops commonly grown in the county, the soil is well suited to specialized vegetable crops or small fruit crops. Because the soil is slightly wet, planting may be delayed briefly in spring. During dry periods, irrigation is needed in places for good crop production. The soil shows droughtiness 3 to 6 days sooner than Elnora loamy fine sand, 0 to 2 percent slopes. If the soil is not protected, there is a serious hazard of soil blowing and a slight hazard of water erosion. (Capability unit IIw–5; woodland suitability group 4s1)

Fresh Water Marsh

Fresh water marsh (Fw) consists of level, wet, periodically flooded areas where water is on or near the surface most of the year. The level of water fluctuates with the adjacent bodies of fresh water. Cattails, rushes, and other water-tolerant herbaceous plants make up the dominant vegetation.

The largest acreage of Fresh water marsh is near Lake Ontario, along some of the larger bays, and in some of the landlocked, low depressions. A large tract occurs in the southern part of Irondequoit Bay. Small areas are scattered throughout the county.

Onsite investigation is needed to determine the feasibility of using specific areas. (Capability unit and woodland suitability group not assigned)

Galen Series

The Galen series is made up of deep, moderately well drained, medium-textured soils. These nearly level to gently sloping soils generally have simple convey or slightly concave slopes. They formed in high-lime or slightly acid, water-deposited fine sand and very fine sand and some silt. Areas are primarily north of Ridge Road in the glacial Lake Iroquois sand plain.

A representative nearly level Galen soil is essentially free of stones throughout the profile. The surface layer, about 7 inches thick, is brown to dark-brown very fine sandy loam. The subsurface layer is medium acid, yellowish-brown, friable loamy very fine sand that extends to a depth of 13 inches. The subsoil is 32 inches thick and is slightly acid. The upper 12 inches is brown to dark-brown, friable very fine sandy loam that has common, distinct, yellowish-red mottles. The lower part of the subsoil consists mainly of alternating layers of brown, dark-brown, dark reddish-brown, and reddish-brown loamy very fine sand, very fine sand, very fine sandy loam, and silt loam. These layers contain yellowish-red and pale-brown mottles. The substratum begins at a depth of 45 inches. The upper 18 inches is neutral, brown, loose very fine sand that has some thin, brown to dark-brown streaks and thin layers of silt. Below a depth of 63 inches, the substratum is firm, dark-brown to brown very fine sandy loam that is neutral in the upper part and becomes calcareous below a depth of 85 inches.

A seasonal high water table rises to within 18 to 24 inches of the surface. The depth of soil available for rooting, approximately 18 inches, is related to the height of the water table early in the growing season. As the growing season progresses and the water table is lowered, roots are restricted by the bands in the subsoil. Very few roots penetrate below a depth of 24 inches. The available water capacity is low to moderate. Permeability is moderate to moderately rapid, depending on the texture of the lamellae and interlamellae layers. A slight seasonal wetness is the major limitation to use of these soils for farming. They respond well to lime and fertilizer.

Representative profile of Galen very fine sandy loam, 0 to 2 percent slopes, in an idle area, located approximately 1.8 miles northwest of the village of Webster:

Ap—0 to 7 inches, brown to dark-brown (10YR 4/3) very fine sandy loam; weak, fine and very fine, granular structure; very friable to loose; abundant fine roots; slightly acid; abrupt, smooth boundary.

A2—7 to 13 inches, yellowish-brown (10YR 5/6) loamy very fine sand; weak, medium and thick, platy structure breaking to weak, very fine, granular structure; friable; common fine roots; medium acid; abrupt, smooth boundary.

B21—13 to 25 inches, brown to dark-brown (7.5YR 4/4) very fine sandy loam; common, fine, distinct or prominent, yellowish-red (5YR 4/6) mottles; moderate to strong, medium, platy structure; friable; few fine roots; slightly acid; abrupt, smooth boundary.

B22t—25 to 45 inches, brown (10YR 5/3) loamy very fine sand; horizontal bands of brown to dark-brown (7.5YR 4/4) very fine sand that are discontinuous and up to 4 inches thick with many, medium, distinct, yellowish-red (5YR 4/6) mottles and bands of dark reddish-brown (5YR 3/4) very fine sandy loam, and of reddish-brown (5YR 4/3) silty clay loam 1/8 inch to 1 inch thick with few, fine, prominent, pale-brown (10YR 6/3) mottles; moderate to strong, very thin to very thick, platy structure; loose in the sandy interlamellae layers to very firm in the clayey lamellae; lamellae have some clay movement laterally in the clayey strata with some clay films evident and aggregate about half of the horizon thickness; many, coarse, prominent, yellowish-red (5YR 4/6) streaks and splotches; slightly acid; abrupt, smooth boundary.

C1—45 to 63 inches, brown (7.5YR 5/4) very fine sand; thin lenses of silt are present; structureless; loose; common, fine, faint to prominent, brown to dark-brown (7.5YR 4/4, 10YR 4/3) streaks one-eighth inch to one-half inch thick; neutral; clear, wavy boundary.

C2—63 to 85 inches, dark-brown to brown (10YR 4/3) very fine sandy loam; strong, medium and thick, platy structure; firm; olive-brown (2.5Y 4/4) coatings between plates; neutral, becoming calcareous at a depth of 85 inches.

The solum ranges in thickness from 36 to 60 inches. Depth to carbonates ranges from 30 to 100 inches. The reaction in the profile ranges from moderately alkaline to strongly acid. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (7.5YR 5/4). The A2 horizon ranges from brown or dark brown (7.5YR 4/4) to brownish yellow (10YR 6/6) and contains a few, faint or distinct mottles in places. Texture of the A2 horizon is dominantly loamy fine sand or loamy very fine sand but ranges to very fine sandy loam. The interlamellae of the B horizon range from reddish brown (5YR 4/3) to light yellowish brown (10YR 6/4). These interlamellae make up two-thirds to three-fourths of the B horizon, and are dominantly loamy fine sand or very fine sand. They may be structureless or have platy structure. Lamellae are very fine sandy loam layers with random silt loam and sandy clay loam or clay lenses present. The lamellae range in thickness from 1/16 inch to 3 inches. The C horizon ranges from brown (7.5YR 5/4) to olive brown (2.5Y 4/4).

Galen soils formed in the same kind of material as the well-drained Arkport, the somewhat poorly drained Minoa, and the poorly drained to very poorly drained Lamson soils. The coarser textured, moderately well drained Elnora soils and the sandy Claverack soils, which are underlain by clay at a depth of 20

to 40 inches, also formed in material similar to that giving rise to the Galen soils.

Galen very fine sandy loam, 0 to 2 percent slopes (GaA).—This level to nearly level soil occurs in old glacial lakebeds adjacent to beach or shore areas. It has the profile described as representative of the series. Individual areas are roughly rectangular in shape and range mainly from 10 to 20 acres in size, although a few areas are smaller than 10 acres and several range in size to 300 acres or more.

Included with this soil in mapping are the somewhat poorly drained Minoa soils, which occupy small depressions or restricted drainageways. A few small areas of the more acid, sandier, droughtier, moderately well drained Elnora soils on comparable slopes are also included.

This soil is suited to all field and cash crops, pasture, or woodland. It is well suited to the production of vegetables and fruits where drainage is adequate. Growing fruit trees should depend on the local climate. (Capability unit IIw–1; woodland suitability group 2o1)

Galen very fine sandy loam, 2 to 6 percent slopes (GaB).—The profile of this gently sloping soil differs from that described as representative of the series mainly in having slightly thinner horizons in places. Some areas occur as long, low, broad ridges within old glacial lakes that are adjacent to beaches. Other areas border Galen very fine sandy loam, 0 to 2 percent slopes. Individual areas dominantly range from 10 to 60 acres or more in size.

Small areas of the well-drained Arkport soils are common inclusions in this soil, as well as the more acid, sandier, droughtier, moderately well drained Elnora soils. Inclusions of the somewhat poorly drained Minoa soils are in the narrow drainageways. Because of their limited acreage, areas of more sloping Galen soils are also included.

This soil is suited to all field and cash crops, pasture, or woodland. It is well suited to production of vegetables and fruits where drainage is adequate. Growing fruit trees should depend on the local climate. Some measures for controlling erosion are necessary on this soil. (Capability unit IIw–5; woodland suitability group 2o1)

Genesee Series

In the Genesee series are deep, medium-textured, level to nearly level soils that are well drained. These soils formed in high-lime, recent alluvium in the town of Rush and extend into the southern part of the town of Henrietta on the flood plains of the Genesee River. Areas adjacent to the Genesee River are dominantly larger than 10 acres in size. Smaller areas, less than 10 acres in size, occur along the major creeks in the county.

A representative Genesee soil is free of stone and gravel. All layers are dark grayish brown in color. The silt loam surface layer is 9 inches thick. The subsoil is 15 inches thick. In the upper 8 inches it is neutral, very friable silt loam. Below this is a very friable very fine sandy loam layer that is 7 inches thick. The substratum, beginning at a depth of 24 inches, is very friable loam and weakly calcareous.

The Genesee soils are flooded during periods of high streamflow, such as early in spring, but they do not remain flooded for any significant length of time. The water table is normally at a depth greater than 3½ feet. Permeability is moderate throughout the profile. The rooting depth has few restrictions. Available water capacity is high. The flood hazard is the main limitation to use of these soils for farming, but flooding rarely occurs during the growing season. The soils are responsive to fertilizer.

Representative profile of Genesee silt loam in an idle area, located 1,200 feet west and 1,000 feet south of the junction of Avon and Honeoye Falls Roads (on the south bank of the Genesee River), town of Rush:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; very friable; neutral; clear, smooth boundary.

B21—9 to 17 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; very friable; neutral, gradual, wavy boundary.

B22—17 to 24 inches, dark grayish-brown (10YR 4/2) very fine sandy loam; moderate, medium, subangular blocky structure, but tends toward medium, platy structure; very friable; neutral; gradual, wavy boundary.

C1—24 to 33 inches, dark grayish-brown (10YR 4/2) loam, grayish brown (2.5Y 5/2) when dry; moderate, fine, subangular blocky structure; very friable; weakly calcareous; gradual, wavy boundary.

C2—33 to 51 inches, dark grayish-brown (10YR 4/2) loam; moderate, thin, platy structure; very friable; weakly calcareous.

The solum ranges from 24 to 40 inches in thickness. It is essentially free of coarse fragments. The Ap horizon color ranges from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4) and its reaction, from slightly acid to mildly alkaline. Structure of this horizon is weak or moderate, fine or medium, granular. The B horizon ranges from dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4) in color and from silt loam to fine sandy loam in texture. Structure is weak or moderate, fine or medium, subangular blocky or granular. Reaction of the B horizon ranges from neutral to mildly alkaline. The C horizon color ranges from brown (7.5YR 4/4) to yellowish brown (10YR 5/4) to dark grayish brown (10YR 4/2). The texture ranges from silt loam to fine sandy loam and has a few thin lenses of silty clay. The content of coarse fragments ranges from 0 to 35 percent. Reaction is mildly alkaline, and free carbonates are present.

The Genesee soils in this county differ from the defined range for the series in containing less clay, but this difference does not alter their use or behavior.

Genesee soils are associated with the moderately well drained Eel soils and the poorly drained and very poorly drained Wayland soils. All of these soils formed in similar material. The moderately well drained to well drained Hamlin soils, which are also on flood plains, are similar to the Genesee but are redder in color.

Genesee silt loam (Ge).—This level to nearly level soil has slopes of 0 to 3 percent. Some areas are on high bluffs about 20 feet or more above the normal level of the Genesee River. These areas do not flood frequently because they are protected by a flood prevention structure at Mount Morris in Livingston County. Prior to the construction of the dam, flooding was annual.

Small areas that have a fine sandy loam surface layer are included with this soil in mapping. Also included in depressions are areas of a moderately well drained Eel soil that are too small to delineate.

This soil is well suited to crops, pasture, or woodland. It can be cropped intensively. The main limitation to use of this soil is local flooding in spring. (Capability unit IIw–3; woodland suitability group 2o2)

Halsey Series

The Halsey series consists of deep, level to nearly level, medium-textured soils that are very poorly drained. These

soils formed in glaciofluvial deposits of high-lime sand and gravel and occur in depressions associated with outwash terraces and some of the major drainageways in the county.

A representative Halsey soil in a cultivated area has a surface layer, about 9 inches thick, of very dark gray gravelly loam. The underlying subsoil is mottled, friable, neutral, and 11 inches thick. The upper part of the subsoil is gray gravelly loam and the lower part, light brownish-gray gravelly very fine sandy loam. A calcareous substratum begins at a depth of about 20 inches. To a depth of about 27 inches it is friable, light brownish-gray gravelly fine sandy loam; below this it consists of loose sand and gravel.

A seasonal high water table is at or near the surface for extended periods of time. Permeability is moderate in the surface layer and upper part of the subsoil and moderately rapid to rapid below. The depth of soil available for rooting is limited to the surface layer early in the growing season. As the season progresses and the water table is lowered, roots extend to a depth of 20 inches or more, depending on the thickness of the soil overlying the calcareous gravel and sand. The available water capacity is moderate but is generally more than adequate for plant growth during normal seasons. The prolonged seasonal high water table is the major limitation to use of these soils for farming. Artificial drainage is necessary if the soils are cultivated.

Representative profile of Halsey gravelly loam in a cultivated area, located approximately 2¾ miles east of the village of Fairport:

Ap—0 to 9 inches, very dark gray (10YR 3/1) gravelly loam; weak, fine, granular structure; very friable; 20 percent gravel; neutral; clear, smooth boundary.

B2g—9 to 15 inches, gray (5Y 5/1) gravelly loam; few, fine, prominent, brownish-yellow (10YR 6/6) mottles; moderate, coarse, prismatic structure, but tends toward weak, thin, platy structure; friable; 20 percent gravel; neutral; clear, wavy boundary.

B3g—15 to 20 inches, light brownish-gray (10YR 6/2) gravelly very fine sandy loam; common, coarse, distinct, brownish-yellow (10YR 6/6–6/8) mottles; structureless to weak, thick, platy structure; friable; 20 percent gravel; neutral; clear, wavy boundary.

C1g—20 to 27 inches, light brownish-gray (10YR 6/2) gravelly fine sandy loam; massive; friable; about 30 percent gravel; few, thin, discontinuous clay films on gravel faces; calcareous; gradual, wavy boundary.

IIC2g—27 to 54 inches, light brownish-gray (10YR 6/2) sand and gravel; single grain; loose; 50 percent gravel and cobbles; calcareous.

Depth to free carbonates ranges from 20 to 40 inches. The solum has a coarse fragment content of 15 to 35 percent and a reaction ranging from medium acid to neutral. The Ap horizon ranges from black (N 2/0) to dark gray (10YR 4/1). The B2g horizon ranges from pinkish gray (7.5YR 6/2) to gray (5Y 5/1) and has prominent mottles of brown and brownish yellow. Texture of the B2g horizon is gravelly loam or gravelly fine sandy loam. The B3g horizon ranges from pinkish gray (7.5YR 6/2) to gray (10YR 5/1) and light brownish gray (10YR 6/2) in color and has gravelly very fine sandy loam to gravelly sandy loam texture. The C1g horizon is absent in some areas. Where present, its texture is sandy loam or fine sandy loam, with up to 35 percent gravel. The C2g horizon consists of various sizes of sand and gravel and has a coarse fragment content of 40 to 60 percent.

Halsey soils are commonly near the well-drained Wampsville soils, the well-drained to excessively drained Palmyra soils, and the moderately well drained Phelps soils, all of which formed in similar glaciofluvial deposits. The poorly drained and very poorly drained Lamson soils differ from the Halsey soils because they contain less gravel and more fine sand and very fine sand.

Halsey gravelly loam (Ha).—This level to nearly level soil has slopes of 0 to 3 percent. Areas are on glacial outwash plains, kames, or eskers. Individual areas have no particular shape and range from 3 or 4 acres in size to 90 acres or more, with about half of the areas being larger than 10 acres in size.

The most commonly included soils in mapping are the moderately well drained Phelps soils on slight rises and the poorly drained and very poorly drained Lamson soils in depressions. Also included are small areas of a similar, somewhat poorly drained soil that does not remain wet for such long periods.

Wetness limits the use of this soil for crops unless adequate drainage outlets sufficiently lower the high water table. Where adequately drained, the soil is suited to most of the crops commonly grown in the county. Undrained areas are limited mainly to use as pasture or woodland. (Capability unit IIIw–5; woodland suitability group 5w1)

Hamlin Series

In the Hamlin series are deep, medium-textured, level to nearly level soils that are moderately well drained to well drained. These soils formed in alluvial material that was recently deposited on flood plains. The alluvium is reddish colored and medium to high in lime content. The major areas of these soils, generally larger than 10 acres in size, are in the northwestern part of the county where the Queenston Shale and Medina sandstone formations are dominant and contribute to the reddish color. Minor areas, generally smaller than 10 acres in size, are throughout the county. In the southern part of the county, small areas both east and west of the Genesee River are near the Vernon-Camillus Shale formation, which also contributes reddish colors.

A representative Hamlin soil has a surface layer, about 18 inches thick, of dark reddish-brown, neutral silt loam. Underlying this is a reddish-brown, friable, neutral subsoil that is 22 inches thick. The upper 12 inches is silt loam containing strong-brown mottles. The lower 10 inches is very fine sandy loam that is neutral. The substratum, beginning at a depth of 40 inches, is friable, brown to dark-brown, calcareous gravelly fine sandy loam.

These soils are flooded annually, primarily in spring, but flooding is of short duration. The water table is normally at least 18 to 24 inches below the surface. The depth of soil available for rooting is related to the height of the water table, which is controlled by the adjacent stream. Available water capacity is high. Permeability is moderate to a depth of about 40 inches and variable below this depth. The hazard of flooding is the main problem on these soils.

Representative profile of Hamlin silt loam in a meadow, located two-thirds of a mile east of Lake Road and 100 feet south of Lawrence Road, town of Clarkson:

Ap—0 to 12 inches, dark reddish-brown (5YR 3/2) silt loam; moderate, medium and fine, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

A12—12 to 18 inches, dark reddish-brown (5YR 3/3) silt loam; moderate, fine, subangular blocky structure that parts to moderate, medium, granular structure; friable; many roots; neutral; diffuse, irregular boundary.

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B2—18 to 30 inches, reddish-brown (5YR 4/3) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak prisms that are 2 to 4 inches across and part to moderate, coarse, subangular blocky structure; friable; many roots; many fine pores; thin patchy clay films on vertical ped faces and in some pores; neutral; clear, wavy boundary.

B3—30 to 40 inches, reddish-brown (5YR 4/3) very fine sandy loam; very weak, medium and coarse, subangular blocky structure; friable; reddish-gray (5YR 5/2) ped faces; few roots; many fine pores; neutral; discontinuous boundary.

IIC—40 to 50 inches, brown to dark-brown (7.5YR 4/4) gravelly fine sandy loam; massive; friable; no roots; calcareous.

The solum ranges from 20 to 40 inches in thickness, from silt loam to fine sandy loam in texture, and from slightly acid to neutral in reaction. Ap hues range from 5YR to 10YR with a color value of 3 or 4 and a chroma of 2 or 3. The A12 horizon ranges from dark reddish brown to dark yellowish brown (10YR 4/4) in color and from moderate, fine and medium, subangular blocky to medium, granular in structure. The B horizon ranges from reddish brown (5YR 4/3) to yellowish brown (10YR 5/4) in color and from weak or moderate, medium or coarse, prismatic or subangular blocky in structure. When present in the upper 24 inches of the B horizon, strong-brown mottling ranges from faint to prominent. Thin lenses of gravel are present in some profiles. The color and texture of the C horizon are within the same range as those of the B horizon. At a depth greater than 40 inches are layers of gravelly fine sandy loam or stratified gravel and sand. These layers are generally thin but in places are several feet in thickness. Reaction of the C horizon ranges from slightly acid to mildly alkaline. This horizon is calcareous in places.

The Hamlin soils in this county that have a B horizon with a 5YR hue and mottling above a depth of 24 inches are outside the defined range for the series. The mottling indicates a moderately well drained condition that affects use and management slightly.

The Hamlin soils formed on flood plains in material somewhat similar to that giving rise to the well-drained Genesee soils, the moderately well drained Eel soils, and the poorly drained and very poorly drained Wayland soils. Hamlin soils differ from the Genesee, Eel, and Wayland soils primarily in being redder in color throughout the profile.

Hamlin silt loam (Hc).—This level to nearly level soil has slopes of 0 to 3 percent. Individual areas are generally oblong in shape and parallel the adjacent streams.

Small areas of a similar but somewhat poorly drained alluvial soil are included with this soil in mapping. These inclusions are in slight depressions and remain wetter for slightly longer periods. In some few included areas, bedrock is less than 40 inches below the surface.

This soil is suited to all crops , hay, pasture, or woodland. The hazard of flooding is the main restriction to use of this soil. Under intensive cropping, poor tilth can result; consequently measures that maintain good tilth are needed. (Capability unit IIw-3; woodland suitability group 2o2)

Hilton Series

The Hilton series is made up of deep, moderately well drained, medium-textured and moderately coarse textured soils that formed in calcareous glacial till. The till was derived mainly from local sandstone and limestone. These soils are nearly level to gently sloping or gently undulating. They occupy ground moraines and are commonly associated with the drumlin landscapes.

A representative gently sloping Hilton soil in a cultivated area has a brown to dark-brown loam surface layer about 10 inches thick. This is underlain by a subsurface layer of dark grayish-brown fine sandy loam, about 7 inches thick, that is medium acid and hard when dry. Both the surface and the subsurface layers contain a few pebbles. The subsoil begins at a depth of about 17 inches. In the upper part it is firm, mottled, reddish-brown loam that contains some gravel and is slightly acid to neutral. Below a depth of about 30 inches, the subsoil is firm, reddish-brown gravelly loam that is neutral in reaction. The calcareous substratum, at a depth of about 41 inches, is very firm, brown gravelly loam till.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched above the moderately slowly to slowly permeable underlying till. Permeability of the surface and subsurface layers is moderate, and that of the subsoil is moderate to moderately slow. The subsoil stays wet for brief but significant periods of time after prolonged rain. The depth of soil available for rooting is restricted mainly to the upper 15 to 24 inches early in the growing season, but as the water table recedes a few roots extend to greater depths. The available water capacity in this zone is moderate to high. A slight seasonal wetness is one of the limitations that affect use of these soils for farming. The soils respond well to fertilizer and lime.

Representative profile of Hilton loam, 3 to 8 percent slopes, in a cultivated field, located 1⅛ miles south of Methodist Hill and ¼ mile east of West Henrietta Road; road cut along approach to Interstate No. 90, town of Henrietta:

Ap—0 to 10 inches, brown to dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure; hard; 5 to 10 percent gravel; medium acid; abrupt, smooth boundary.

A2—10 to 17 inches, dark grayish-brown (10YR 4/2) fine sandy loam; stained with light yellowish brown (10YR 6/4) along root channels; weak, medium, blocky structure; hard; 10 to 15 percent gravel; medium acid; clear, wavy boundary.

B21t—17 to 30 inches, reddish-brown (5YR 5/3) loam; few, fine, faint, reddish-yellow (7.5YR 6/6) mottles; moderate, medium, subangular blocky structure; firm; sandy coats of dark grayish brown (10YR 4/2) on ped faces in upper part of horizon; numerous clay films along root channels and on ped faces; 10 to 15 percent gravel; slightly acid, becoming neutral with depth; clear, wavy boundary.

B22t—30 to 41 inches, reddish-brown (5YR 5/3) gravelly loam; moderate, medium, subangular blocky structure; firm; clay films along root channels and on ped faces; 15 to 20 percent gravel; neutral; clear, wavy boundary.

C—41 to 50 inches, brown (7.5YR 5/4) gravelly loam till; massive, but tends toward weak, medium, platy structure; very firm; calcareous.

The solum ranges from 30 to 42 inches in thickness. Content of coarse fragments, including stones, ranges from 5 to 25 percent in the upper part of the solum and from 15 to 35 percent in the lower part of the solum and the substratum. The Ap horizon ranges from dark brown (7.5YR 3/2, 10YR 4/3) to brown in color, from fine sandy loam to silt loam in texture, and from medium acid to neutral in reaction. In some cultivated areas, part of the A2 horizon has been incorporated into the Ap horizon. The A2 horizon is dark grayish brown (10YR 4/2) to brown (7.5YR 5/4) and, in some places, is mottled with colors having a chroma higher than 2. Texture of the A2 horizon is fine sandy loam or loam, and reaction is medium acid to neutral.

The B horizon ranges from reddish brown (5YR 4/3) to yellowish brown (10YR 5/4). It contains mottles that have a chroma higher than 2. Texture ranges from loam to clay loam, and the clay content ranges from 18 to 27 percent. In places this horizon is gravelly. The B horizon ranges from medium acid to neutral in the upper part and from slightly acid to

mildly alkaline in the lower part. In some places this horizon is calcareous in the lower part.

The C horizon ranges from brown (7.5YR 5/4) and dark brown (7.5YR 4/2) to reddish brown (5YR 5/4). Its texture is gravelly loam or gravelly fine sandy loam. The horizon is moderately or strongly calcareous.

Hilton soils formed in the same kind of material as the well-drained Ontario soils, the somewhat poorly drained Appleton soils, and the poorly drained and very poorly drained Lyons soils. They also are similar to the Madrid soils in many respects, but they have a finer textured B horizon. The Cazenovia soils are well drained and moderately well drained and contain more clay than the Hilton soils. Hilton soils are similar to the Collamer soils in drainage but contain less silt than those soils.

Hilton fine sandy loam, 0 to 3 percent slopes (HfA).—The profile of this soil is similar to the one described as representative of the series, but the surface layer and subsoil are coarser textured and there is little or no gravel throughout the profile. The soil occupies roughly rectangular or oblong areas at the base or at the top of sloping areas in the till plains and on drumlins. Individual areas range from 3 to 30 acres in size, though most of them are larger than 10 acres.

Commonly included in mapping are small areas of Appleton soils in the wetter depressions and Ontario, Madrid, or Collamer soils in the more sloping areas.

This soil is suited to most field and cash crops, as well as to fruit crops, hay, pasture, trees, and wildlife. Draining the wet spots improves the suitability of this soil for farming. (Capability unit IIw–4; woodland suitability group 2o1)

Hilton fine sandy loam, 3 to 8 percent slopes (HfB).—Except for its coarser textured surface layer and, in places, its coarse textured subsoil, this soil has a profile that is similar to the one described as representative of the series. Little or no gravel is in the surface layer. The soil occupies foot slopes on drumlins and the side slopes of low ridges on till plains. Individual areas are roughly oblong or are long and narrow. In size, they range from 3 to about 100 acres, but most are larger than 10 acres.

Areas mapped as this soil commonly include small areas of Ontario soils on small low knobs and, in the towns of Webster and Penfield, small areas of Madrid soils. In addition, there are small inclusions of Appleton soils in the drainageways and of Collamer soils in the area north of the beach ridge.

This soil is suited to most field and cash crops and to hay crops, pasture, and trees. Where the climate is favorable, the soil also is suited to many kinds of fruit crops. It is susceptible to erosion, however, and needs practices that control soil losses if it is cropped intensively. (Capability unit IIe–5; woodland suitability group 2o1)

Hilton loam, 0 to 3 percent slopes (HlA).—This soil has a profile that is slightly wetter and consequently is more highly mottled than the one described as representative of the series. It occupies roughly oblong areas that lie at the base or on the top of more sloping areas in the till plains and on drumlins. Individual areas range from 2 or 3 to as much as 200 acres in size, but most of them are between 10 and 50 acres in size.

Commonly included in mapping with this soil are small areas of Appleton and Niagara soils in the lower depressions and the Ontario or Madrid soils in the more sloping areas. Also included, north of the old glacial beach ridge in the county, are small areas of Collamer soils that have slopes of 0 to 3 percent.

This soil is suited to most field and cash crops, as well as to fruit crops, hay, pasture, and woodland. Generally, improved drainage is needed. (Capability unit IIw–4; woodland suitability group 2o1)

Hilton loam, 3 to 8 percent slopes (HlB).—This soil has the profile described as representative of the series. The soil occupies foot slopes in drumlin areas and the side slopes of low ridges on till plains. Individual areas are roughly oblong in shape or are long and narrow. They range from 3 acres to as much as 180 acres in size, but most of them are considerably larger than 10 acres.

Included with this soil in mapping are Ontario or Madrid soils in the more sloping spots and Appleton soils in the more nearly level areas or along drainageways. Also included, north of the old glacial beach ridge, are small areas of Collamer soils, which occur in positions similar to those of this Hilton soil, and small areas of Niagara soils in the nearly level or lower areas.

This Hilton soil is suited to most field and cash crops, as well as to hay and pasture crops. Where the climate is favorable, the soil is suited to many kinds of fruit crops. If cropping is intensive, however, practices are needed for controlling erosion. This soil is also suitable as woodland. (Capability unit IIe–5; woodland suitability group 2o1)

Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes (HmA).—The soils that make up this complex occur in such intricate patterns that they were not mapped separately. Generally, the mapping unit is 40 percent Hilton soil, 40 percent Cazenovia soil, and 20 percent included soils. The complex occupies scattered areas at the base of other more sloping soils along the edge of the old glacial lakebeds, mainly in a belt west of the Genesee River and south of the Lockport escarpment. Individual areas vary in shape and are as much as 35 acres in size, though most of them are slightly larger than 10 acres.

The Hilton and Cazenovia soils in this mapping unit contain as much as 1½ cubic yards of stones, 10 to 48 inches in diameter, per acre-foot of soil. In other respects their profiles are similar to those described as representative of their respective series.

Included with these soils in mapping are small areas of the wetter Ovid, Churchville, and Appleton soils in the lower depressions and drainageways and small areas of Cayuga and Schoharie soils having slopes of 0 to 3 percent. In some places just south of the Lockport escarpment, there are small included areas of Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes, and of Ovid and Appleton silt loams, limestone substratum. Also included are small areas of soils that are shallow to limestone.

These soils are suitable for crops, pasture, or woodland. Because the soils are slightly wet, planting may be delayed briefly in spring. Use for cultivated crops is somewhat limited by stones (fig. 10) and boulders that interfere slightly with the use of implements. Also, where a drainage system is needed, the stones make installation difficult. (Capability unit IIw–4; woodland suitability group 2o1)

Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes (HmB).—This complex is on foot slopes or low ridges along the edge of old glacial lakebeds, mainly in a belt west of the Genesee River and south of the Lockport escarpment. It occupies areas of varying shape that are as much as 30 acres in size. Most areas are larger than 10 acres. The

Figure 10.—Area of Hilton-Cazenovia stony silt loam, 0 to 3 percent slopes, where stones are numerous on the surface.

Hilton soil makes up about 40 percent of the complex; the Cazenovia soil, about 40 percent; and included soils, 20 percent.

The Hilton and Cazenovia soils contain as much as 1½ cubic yards of stones, 10 to 48 inches in diameter, per acre-foot of soil. Otherwise, they have profiles that are similar to those described for their respective series.

Areas mapped as this complex include small areas of Ovid and Appleton soils in the more nearly level areas and drainageways, as well as small areas of Cayuga and Schoharie soils on higher knobs near old lakebeds. Just south of the Lockport escarpment, there are small included areas of Ovid and Appleton silt loams, limestone substratum, and of Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes.

These soils are suited to crops, pasture, or trees. If they are cultivated and not protected, the soils are subject to a slight or moderate hazard of erosion. In addition, stones and boulders interfere slightly with the use of implements and, consequently, limit use of the soils for cultivated crops. Stones also make it difficult to install drainage systems where needed. (Capability unit IIe–5; woodland suitability group 2o1)

Honeoye Series

The Honeoye series consists of deep, well-drained, nearly level to strongly sloping, medium-textured soils. These soils formed in high-lime glacial till that is largely derived from gray limestones and shale with a small quantity of red Medina sandstone. These soils are on the glacial till plains, principally west of the Genesee River, south of the Lockport escarpment, and in the southern part of the county, along the Livingston County border in association with the Onondaga limestone escarpment.

A representative gently sloping Honeoye soil has a surface layer, 9 inches thick, of dark grayish-brown silt loam that contains some coarse angular gravel. The subsoil is 17 inches thick. It is dark yellowish-brown, firm and sticky loam that is neutral and contains some gravel. Below a depth of 26 inches is the very firm, brown to dark-brown gravelly loam substratum. The substratum is high in lime, and lime concentrations appear as white dots or streaks. It is neutral in the upper part and becomes calcareous with depth.

A seasonal high water table rarely rises to within 30 inches of the surface. Where the water table exists, it is perched above the moderately slowly or slowly permeable substratum and does not persist for any appreciable length of time. Permeability of the surface and subsoil layers is moderate. The depth of soil available for rooting is related to the depth to the compact glacial till and averages 24 to 30 inches. Available water capacity is high in the root zone. Limitations to use of these soils for farming are few. The soils respond well to fertilizer and lime.

Representative profile of Honeoye silt loam, 3 to 8 percent slopes, in a cultivated area, located approximately 1 mile west of the village of Honeoye Falls, town of Mendon:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; 5 percent gravel; slightly acid; abrupt, smooth boundary.

B2t—9 to 26 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine and medium, angular blocky structure; firm, sticky; ped coats are brown (7.5YR 5/2) in upper part; thin clay films on vertical and horizontal ped faces in lower part and in pores; upper part of horizon shows vesicular appearance and some washed vertical faces; 5 to 10 percent gravel; neutral; gradual, wavy boundary.

C—26 to 52 inches, brown to dark-brown (10YR 4/3) gravelly loam; weak, thick, platy structure; very firm; few dark-brown to brown (7.5YR 4/2) coats along vertical cracks in the upper part; 20 percent gravel; neutral in upper part, becoming calcareous at approximately 36 inches.

The solum ranges in thickness from 18 to 30 inches. Depth to calcareous material ranges from 20 to 40 inches, and depth to bedrock is greater than 42 inches. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 5/3) in color and from medium acid to neutral in reaction. A thin A2 horizon is present in some areas but normally has been mixed with the Ap horizon in cultivated areas. Where present, the A2 horizon is discontinuous, interfingers into the B horizon, and is somewhat coarser in texture than the Ap horizon.

The B horizon color ranges from reddish brown (5YR 4/3) to light olive brown (2.5Y 5/4). Mottles with a high chroma are in the lower part of the B horizon in places. Texture is loam or silt loam, and the horizon is gravelly in places. Clay content ranges from 18 to 28 percent. The coarse fragment content includes some stones and ranges from 5 to 25 percent. Structure is weak or moderate, fine or medium, angular or subangular blocky. Reaction of the B horizon ranges from medium acid to neutral.

The C horizon ranges from dark reddish gray (5YR 4/2) to pale brown (10YR 6/3) in color and is loam or silt loam in texture. This horizon is gravelly and has a coarse fragment content as high as 35 percent. The till material in place is firm or very firm and has weak or moderate, platy structure.

The Honeoye soils are commonly associated with the moderately well drained Lima soils and the somewhat poorly drained Appleton soils that formed in similar material. They are also near the finer textured Cazenovia soils that formed in glacial till material with some lacustrine influence. The limestone substratum mapping units of Honeoye soils are geographically associated with the shallow Benson soil, Rock land, and the moderately well drained Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes.

Honeoye silt loam, 3 to 8 percent slopes (HnB).—This gently sloping soil has the profile described as representative of the series. Areas are on the till plains, mainly on convex slopes or smooth slopes where runoff water does not accumulate. Individual areas have no particular shape and range from 3 to 180 acres in size, with more than half of the areas larger than 10 acres.

Common inclusions with this soil in mapping are the moderately well drained Lima soils on foot slopes and the somewhat poorly drained Appleton soils in depressions and along drainageways. Where the soil is mapped adjacent to limestone escarpments, Honeoye silt loam, limestone substratum, 3 to 8 percent slopes, is one of the major inclusions. Also included are small areas that are level to nearly level and areas that have a gravelly surface.

This soil is well suited to crops, pasture, or woodland.

The coarse fragment content in a few included areas may interfere slightly with tillage. Some measures for controlling erosion and conserving water are needed as the slope increases. (Capability unit IIe–1; woodland suitability group 2o1)

Honeoye silt loam, 8 to 15 percent slopes (HnC).—This soil has a profile like that described as representative of the series except that the subsoil is generally thinner and the depth to carbonates is less. Areas are sloping and are dominantly less than 10 acres in size.

Included with this soil in mapping are small areas of steeper Honeoye soils and a few small areas that are severely eroded.

This soil is suited to crops, pasture, or woodland. The hazard of erosion is severe if the soil is cropped intensively without measures for controlling erosion and conserving water. (Capability unit IIIe–1; woodland suitability group 2o1)

Honeoye silt loam, limestone substratum, 0 to 3 percent slopes (HoA).—This nearly level soil is at the top of the long gentle slopes on the till plains that border the shallow soils associated with the limestone escarpment. Limestone bedrock is at a depth of 42 to 72 inches, but occurs mainly at a depth of 44 to 48 inches. Individual areas of this soil are dominantly larger than 10 acres in size and may be as large as 60 acres.

Because the depth to limestone varies, some inclusions have rock as shallow as 30 inches below the surface. Where there is contact with the limestone, the upper part of the bedrock layer is fractured and weathered between individual rock fragments. The moderately well drained Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes, are inclusions, as well as small areas of the shallow Benson soils.

This soil is well suited to crops, pasture, or woodland. In some places large, flat rock fragments interfere with tillage. (Capability unit I–1; woodland suitability group 2o1)

Honeoye silt loam, limestone substratum, 3 to 8 percent slopes (HoB).—This soil is on long gentle slopes on the till plains that are adjacent to the shallow soils associated with the limestone escarpment. Depth to limestone bedrock is 42 to 72 inches, with the dominant range being 44 to 48 inches. Areas of this soil are as large as 100 acres in size, but more than half of them are smaller than 10 acres.

The main inclusions with this soil are areas where the limestone bedrock is at a depth of less than 42 inches. The shallowness to limestone is caused by the uneven surface of the bedrock. A few, small, steeper areas are included along the boundaries of this soil.

This soil is well suited to crops, pasture, or woodland. Coarse fragment content in some areas interferes slightly with tillage. If the soil is cropped intensively, measures for controlling erosion and conserving water are needed as the slope increases. (Capability unit IIe–1; woodland suitability group 2o1)

Hudson Series

In the Hudson series are deep, moderately well drained, medium-textured soils that have a fine-textured subsoil. These gently sloping soils formed in high-lime, fine-textured clay and silt deposits. They occupy low convex slopes in old dissected glacial lake plains. Areas are principally in the town of Webster, in the northeastern corner bordering Lake Ontario and in the southwestern corner near the junction of Creek Street and Plank Road. Other areas are scattered throughout the county.

A representative gently sloping Hudson soil (fig. 11) has a surface layer, about 10 inches thick, of dark grayish-brown silt loam. Underlying this is a subsurface layer of yellowish-brown silt loam that is friable, medium acid, and 2 inches thick. The subsoil is 22 inches thick. The upper part is very firm, faintly mottled, brown or dark-brown clay that is medium acid in reaction. The lower part of the subsoil is firm, dark yellowish-brown clay that is neutral in reaction. The substratum begins at a depth of about 34 inches and consists of firm, dark yellowish-brown clay with thin lenses of silt. It is neutral to weakly calcareous.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched on the slowly permeable subsoil and substratum. Much of the water that falls on this soil runs off. The depth of soil available for rooting is approximately 20 to 30 inches. Available water capacity is moderate to high in the root zone. The soil clods and puddles easily if tilled when too wet. Slow permeability of the subsoil and the silty texture of the surface layer make the soil very susceptible to erosion.

Representative profile of Hudson silt loam, 2 to 6 percent slopes, in an idle area, located approximately 2¼

Figure 11.—**Profile of Hudson silt loam, 2 to 6 percent slopes.**

miles south of the village of West Webster, town of Penfield:

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

A2—10 to 12 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine and medium, granular structure; friable; medium acid; clear, wavy boundary.

B21t—12 to 26 inches, brown or dark-brown (10YR 4/3) clay; few, fine, faint, pale-brown (10YR 6/3) mottles in lower part of horizon; moderate, fine and medium, subangular blocky structure; very firm; brown (7.5YR 5/4) coats of washed very fine sand or silt on ped surfaces in upper part of horizon; ped surfaces have dark yellowish-brown (10YR 4/4–3/4) thick clay films in lower part of horizon; medium acid; clear, wavy boundary.

B22t—26 to 34 inches, dark yellowish-brown (10YR 4/4) clay; moderate, medium and coarse, subangular blocky structure; firm; clay films on ped faces and along fractures decrease with depth; neutral; abrupt, wavy boundary.

C—34 to 50 inches, dark yellowish-brown (10YR 4/4) clay; thin lenses of silt; moderate to strong, thin to very thick, platy structure; firm; brown to dark-brown (7.5YR 4/4) coats on ped exteriors; neutral to weakly calcareous.

The solum ranges from 24 to 40 inches in thickness and from medium acid to neutral in reaction. Depth to carbonates ranges from 32 to 40 inches. The Ap horizon ranges from brown or dark brown (7.5YR 4/2) to olive (5Y 5/3). The A2 horizon has a color value and chroma that are 1 or 2 units higher than those in the Ap horizon and a texture that is slightly coarser than that of the Ap horizon. In some areas there are faint mottles.

The B2t horizon ranges from brown or dark brown (7.5YR 4/4) to olive (5Y 5/3), and mottle colors have a chroma greater than 2. The texture is clay or silty clay, with a clay content ranging from 35 to 55 percent. Structure of the B2t horizon is moderate or strong, fine to coarse, subangular blocky or angular blocky. In some areas there are remnants of depositional structure in the clay.

The C horizon ranges from dark yellowish brown (10YR 4/4) to olive (5Y 5/3). The texture is dominantly clay, but thin strata of silt or sand are commonly present. Reaction is neutral or moderately alkaline. Till material is sometimes at a depth greater than 48 inches.

The Hudson soils formed in the same kind of material as the somewhat poorly drained Rhinebeck soils and the poorly drained to very poorly drained Madalin soils. The Hudson soils are commonly associated with the Collamer soils, which have similar drainage but contain less clay in the subsoil. The Schoharie soils are very similar to the Hudson but are redder in color throughout the profile.

Hudson silt loam, 2 to 6 percent slopes (HuB).—Individual areas of this gently sloping soil are dominantly between 20 and 50 acres in size, but some areas are larger than 200 acres.

Included with this soil in mapping are the somewhat poorly drained Rhinebeck soils, which are generally in depressions or along drainageways. Bordering this soil are inclusions of long, narrow, generally insignificant areas of Hudson soils with steeper slopes. A few, small, nearly level areas are also included. The siltier Collamer soils are common inclusions in the major Hudson soil areas.

This soil is suited to most field and cash crops, hay, pasture, and woodland. If cultivated and not protected, the soil is subject to erosion. The maintenance of tilth, control of erosion, and reduction of surface runoff are the main management problems. (Capability unit IIe–7; woodland suitability group 2o1)

Ira Series

The Ira series is made up of deep, moderately well drained, nearly level to gently sloping soils that are moderately coarse textured. These soils formed in glacial till derived mainly from red sandstone and shale and some limestone. A firm, dense fragipan is prominent in these soils. Areas are on the till plains, mainly in the town of Webster.

A representative Ira soil has a texture of gravelly fine sandy loam throughout the profile. The dark-brown surface layer is about 8 inches thick. It is underlain by a brown, friable, medium acid upper subsoil layer that is 7 inches thick. Separating the upper and lower parts of the subsoil is a thin, mottled, light yellowish-brown, friable layer. The lower part of the subsoil, beginning at a depth of about 18 inches, is a very firm, dense, reddish-brown fragipan that contains a few mottles in the upper part. Reaction in the lower part of the subsoil is medium acid and becomes neutral with depth. Below a depth of 41 inches is a reddish-brown, firm till substratum that is neutral in the upper part and calcareous at a depth of about 50 inches.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched on the slowly permeable, dense fragipan. It does not persist for a significant length of time. The depth of soil available for rooting is approximately 18 to 24 inches and corresponds to the depth to the fragipan. Available water capacity is low to moderate. The soil contains sufficient coarse fragments, a number of which are flat and up to 15 inches in length, to interfere slightly with tillage. Seasonal wetness and drought are some of the other major limitations to use of these soils for farming.

Representative profile of Ira gravelly fine sandy loam, 0 to 6 percent slopes, in an orchard, located approximately 2⅔ miles northeast of the village of Webster, town of Webster:

Ap—0 to 8 inches, dark-brown (10YR 3/3) gravelly fine sandy loam; moderate, medium, granular structure; very friable; 20 percent gravel; medium acid; clear, smooth boundary.

B2—8 to 15 inches, brown (7.5YR 5/4) gravelly fine sandy loam; few, fine, faint, yellowish-brown mottles; weak, fine and medium, granular structure; friable; 20 percent gravel; medium acid; clear, smooth boundary.

A'2—15 to 18 inches, light yellowish-brown (10YR 6/4) gravelly fine sandy loam; few, fine, faint, brownish-yellow mottles; weak, fine, subangular blocky structure; friable; 20 percent gravel; medium acid; abrupt, wavy boundary.

B'x1—18 to 33 inches, reddish-brown (5YR 4/4) gravelly fine sandy loam; few, fine, prominent mottles of dark reddish brown (2.5YR 3/4) and olive yellow (2.5Y 6/6); strong, coarse, prismatic structure; prism interiors have weak, very thick, platy structure that parts to weak, medium, subangular blocky structure; very firm, brittle; pinkish-gray (7.5YR 7/2) streaks or degraded faces extend downward between prisms; prominent clay films in pores in the interior of the peds; 30 percent gravel; medium acid; gradual, wavy boundary.

B'x2—33 to 41 inches, reddish-brown (5YR 4/3) gravelly fine sandy loam; massive, but some tendency toward weak, thin and medium, platy structure; very firm, brittle; 35 percent gravel; slightly acid in the upper part and neutral in the lower part; abrupt, smooth boundary.

C—41 to 51 inches, reddish-brown (5YR 4/3) gravelly fine sandy loam; massive, but some tendency toward weak, medium, platy structure; firm in place, friable when

removed; 20 to 30 percent gravel; neutral in upper part and calcareous at a depth of 50 inches.

The solum ranges in thickness from 40 to 60 inches. Reaction in the upper part of the solum ranges from very strongly acid to medium acid and in the lower part, from medium acid to neutral. Depth to carbonates ranges from 4 to 6 feet, and depth to rock is greater than 48 inches. Gravel and stone content throughout the profile ranges from 15 to 35 percent. The Ap horizon ranges from dark brown to brown (7.5YR 3/2) to (10YR 4/3).

The B2 horizon ranges from reddish brown (5YR 4/4) to strong brown (7.5YR 5/6). Its texture is gravelly fine sandy loam or gravelly loam. In places mottling is absent.

Depth to the A'2 horizon ranges from 10 to 18 inches. The A'2 horizon ranges from dark reddish gray (5YR 4/2) to very pale brown (10YR 7/4) in color and from loam to sandy loam in texture. It ranges from weak, medium, subangular blocky to weak, thin, platy in structure or is massive.

The B'x horizon ranges from reddish brown (5YR 4/3) to yellowish brown (10YR 5/4) and has distinct to prominent mottling that decreases with depth. Prisms range from 3 to 18 inches in diameter, and within the prisms, structure ranges from platy to blocky. Texture of the B'x horizon ranges from loam to fine sandy loam.

The C horizon ranges from dark reddish gray (5YR 4/2) to yellowish brown (10YR 5/4). Its texture is gravelly or very gravelly fine sandy loam or loam. Reaction ranges from neutral to moderately alkaline. Free carbonates are present in places.

Ira soils formed in the same kind of material as the well-drained Sodus soils. They are very similar to the Hilton soils in drainage but differ in having a fragipan. The associated moderately well drained Collamer soils and somewhat poorly drained Niagara soils lack a fragipan and formed in silty lacustrine sediments.

Ira gravelly fine sandy loam, 0 to 6 percent slopes (IgB).—This level to gently sloping soil occupies convex areas and smooth slopes on the glacial till plains where runoff is slightly restricted. Individual areas are roughly oblong in shape and dominantly range from 10 to 30 acres in size.

Included with this soil in mapping are the well-drained Sodus soils on small knobs and the somewhat poorly drained Niagara soils in drainageways.

This soil is suited to many cash and field crops, hay, pasture, and woodland. The relatively shallow rooting depth and acid reaction somewhat restrict use of the soil for fruit crops. Management practices that conserve moisture are needed. Some random drainage is required for the included wet areas or seep spots. This soil is subject to slight erosion in the more sloping areas. (Capability unit IIe–5; woodland suitability group 3o1)

Lairdsville Series

The Lairdsville series consists of moderately deep, gently sloping, well drained to moderately well drained soils that have a medium-textured surface layer and a fine textured to moderately fine textured subsoil. These soils formed primarily from the underlying residuum of high-lime red shale and are influenced by thin till deposits derived mainly from the shale or by thin, clayey lake deposits. Areas occur principally in association with the red Queenston Shale. They are dominantly just north of the old Lake Iroquois beach ridge (U.S. Route 104) and generally north of the Medina sandstone escarpment. Smaller areas are south of the beach ridge, in the western part of the county, and scattered in the southwestern part of the county in association with the Vernon-Camillus Shale formation.

A representative gently sloping Lairdsville soil has a surface layer, about 8 inches thick, of dark-brown silt loam. The upper part of the subsoil is firm, dark-red clay that is neutral in reaction and contains some pale-green shale fragments. Below a depth of 14 inches, the subsoil is mottled, very firm, neutral, reddish-brown clay. Some pale-green shale fragments are present. At a depth of about 28 inches is partly weathered, weak-red shale bedrock.

A seasonal high water table rises to within 18 to 24 inches of the surface and is perched on the slowly permeable subsoil. The depth of soil available for rooting is approximately 20 to 30 inches and is related to the height of the water table and the depth to unweathered shale. Available water capacity is moderate to high. Surface runoff is moderate because of the slowly permeable subsoil. Maintaining good tilth is generally a problem on these soils.

Representative profile of Lairdsville silt loam, 2 to 6 percent slopes, in a pasture, located 3,800 feet north of the junction of Ridge Road (U.S. Route 104) and Monroe-Orleans County Line Road and 200 feet east of the Monroe-Orleans County line, town of Clarkson:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) silt loam, reddish brown (5YR 4/4) when crushed; strong to moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B21t—8 to 14 inches, dark-red (2.5YR 3/6) clay; moderate, coarse, prismatic structure, parting to strong, coarse, angular blocky structure; firm; reddish-gray (5YR 5/2) silt coats on prism faces; prominent clay films of dark reddish brown (2.5YR 3/4) on blocky ped exteriors and in pores; a few pale-green (5G 6/2) shale fragments; neutral; clear, wavy boundary.

B22t—14 to 28 inches, reddish-brown (2.5YR 4/4) clay; few, fine, prominent mottles of strong brown and dark brown (7.5YR 4/4); strong, coarse and medium, prismatic structure breaking to strong, coarse, angular blocky structure; very firm; prominent, weak-red (2.5YR 4/2) clay flows in upper part decreasing with depth; pale-green shale fragments; some of the platy characteristics of shale material evident in lower part; prisms are 2 to 5 inches in diameter; neutral; clear, wavy boundary.

R—28 inches, weak-red (10R 4/2), partly weathered shale; neutral.

The solum ranges from 20 to 40 inches in thickness, with 24 to 30 inches dominant, and corresponds to the depth to shale bedrock. Some areas have a few glacial erratics on the surface. The Ap horizon ranges from dark reddish gray (5YR 4/2) to yellowish brown (10YR 5/4). Its structure is moderate or strong, fine or medium, granular or, in the lower part, blocky. In undisturbed areas is a slightly coarser textured and generally thin A2 horizon that has a color value 1 or 2 units higher than that of the Ap horizon. Reaction of the A2 horizon ranges from medium acid to slightly acid.

The B horizon ranges from dark reddish brown (2.5YR 3/4) to strong brown (7.5YR 5/6). Prominent, high-chroma mottles are in the lower part of the B horizon in places. Pale-green (5G 6/2) shale fragments are present in places. Texture of the B horizon ranges from silty clay loam to silty clay or clay; the clay content ranges from 35 to 60 percent. Reaction is slightly acid or neutral.

In some areas a thin C horizon of reddish, neutral or calcareous till material lies between the solum and the bedrock. The R horizon is red or weak-red shale with a hue of 10R dominant. Pale-green (5G 6/2) shale streaks are generally evident. The upper part of the bedrock is weathered in most places.

Lairdsville soils formed in the same kind of material as the somewhat poorly drained Lockport soils. They are similar to and associated with the moderately well drained to well drained Riga soils and the somewhat poorly drained Brockport soils, which formed in olive or brown material. The Lairdsville soils are also associated with the Cayuga and Cazenovia soils, which are similar in drainage to the Lairdsville but

formed in deeper deposits of lacustrine material over till or deep till. The B horizon in the Cazenovia soils is coarser than that in the Lairdsville soils.

Lairdsville silt loam, 2 to 6 percent slopes (LaB).—This gently sloping soil is at slight elevations and is influenced by the underlying shale beds. Most areas are roughly oblong in shape. They vary in size from 3 to 100 acres or more, with the dominant size being 20 to 60 acres.

Commonly included in mapping are the somewhat poorly drained Lockport soils in small depressions and drainageways. On small knobs, where sand deposits are thick enough, the sandier Claverack soils are a common inclusion. There are also minor included areas of Cayuga or Cazenovia soils where glacial till deposits are thicker. Because of their small acreage, nearly level and strongly sloping Lairdsville soils are also included. The nearly level areas are generally on the tops of the knobs or ridges, and the strongly sloping areas most generally occupy the perimeters of the depressions or drainageways. In addition, areas are included where the surface layer is moderately fine textured.

This soil is suited to crops, pasture, or woodland. With careful management, it is well suited to many commonly grown crops. If the soil is cultivated and not protected, it is subject to slight to moderate erosion. Management is needed to maintain good tilth and soil structure. The soil is extremely difficult to till when it is dry, and it will clod and puddle easily if tilled when too wet. (Capability unit IIe–7; woodland suitability group 3o1)

Lake Beaches

Lake beaches (Lb) consist of mostly fine or coarse sandy material that has been washed and rewashed by the wave action of Lake Ontario. In some areas gravel is prominent. Areas are on slopes of 0 to 4 percent and extend back from the lake 100 to 500 feet. The major area is west of the Genesee River, and very limited areas are along the shore of Lake Ontario east of Irondequoit Bay.

Lake beaches are not suitable for farming, and very little vegetation exists on undeveloped areas. Much of this mapping unit is used for summer homes along the lake. Areas have some value as a source of sand and gravel. (Capability unit and woodland suitability group not assigned)

Lakemont Series

In the Lakemont series are deep, poorly drained to very poorly drained soils that have a medium-textured surface layer and a fine-textured subsoil. These level to nearly level soils formed in high-lime lacustrine clay and silt. They are in depressions of old glacial lakebeds, mainly glacial Lake Dana, that receive most of the runoff from the surrounding uplands and have somewhat restricted drainage outlets.

A representative nearly level Lakemont soil has a surface layer, about 8 inches thick, of black silt loam. This is underlain by a very firm to extremely firm, neutral, clay subsoil about 28 inches thick. The upper 2 inches of the subsoil is mottled reddish brown, the next 16 inches is mottled dark reddish gray, and the lower 10 inches is weak red. The reaction is neutral. The soil is calcareous just above the substratum, which begins at a depth of about 36 inches. The substratum is mottled, brown or dark-brown, extremely firm, calcareous layers of clay that have thin layers of silt.

A seasonal high water table is at or nearly at the surface and persists for a significant length of time. The water table is perched on the slowly permeable subsoil and substratum. Much runoff comes from the surrounding uplands. Runoff from the Lakemont soils is very slow, and many areas are ponded. The depth of soil available for rooting is related to the height of the water table, but if adequate drainage is provided, roots extend to a depth of about 30 inches. Available water capacity is low to moderate in the upper 10 to 20 inches but is high below a depth of 24 inches. Prolonged wetness is one of the major limitations to use of these soils for farming.

Representative profile of Lakemont silt loam in an idle area, located 700 feet west and 960 feet north of the junction of Paul and Beahan Roads, town of Chili:

Ap—0 to 8 inches, black (5YR 2/1) silt loam; moderate, fine, granular structure but tends toward fine, subangular blocky structure in lower part; firm; neutral; clear, smooth boundary.

B21g—8 to 10 inches, reddish-brown (5YR 5/3) clay; many, medium, prominent mottles of strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and reddish brown (2.5YR 4/4); moderate, fine and medium, subangular blocky structure; very firm; gray (10YR 6/1) to pinkish-gray (7.5YR 6/2) ped faces with many (more than 40 percent) medium, prominent mottles of brownish yellow (10YR 6/6) and strong brown (7.5YR 5/6); neutral; clear, broken boundary.

B22tg—10 to 26 inches, dark reddish-gray (5YR 4/2) clay; few, fine, prominent mottles of strong brown (7.5YR 5/8) and many mottles of pinkish gray (7.5YR 6/2); strong, coarse, prismatic structure that breaks to strong, medium and coarse, subangular blocky structure; extremely firm; dark yellowish-brown (10YR 4/4) clay films on blocky ped faces and a few slickensides; gray (5Y 5/1) and greenish-gray (5G 6/1) prismatic ped faces with common, medium, distinct mottles of olive gray (5Y 5/2) and dark grayish brown (2.5Y 4/2); greenish-gray (5G 6/1) ped colors increase with depth; neutral; gradual, smooth boundary.

B3g—26 to 36 inches, weak-red (2.5YR 4/2) and reddish-brown (5YR 4/4) clay; moderate, coarse, subangular blocky structure with evidence of laminations; extremely firm; gray (5Y 5/1) ped faces and fracture planes; some clay films along vertical fracture planes in upper part of horizon; small pinkish-gray (7.5Y 7/2) lime concretions; neutral in upper part, becoming calcareous with depth; gradual, smooth boundary.

Cg—36 to 60 inches, brown or dark-brown (7.5YR 4/4) laminated clay with some silt; common, medium, prominent mottles of reddish brown (5YR 4/4) and weak red (2.5YR 4/2); extremely firm; gray (5Y 5/1) ped faces decrease with depth; calcareous.

The solum ranges from 24 to 40 inches in thickness and from slightly acid to mildly alkaline in reaction. In places the lower part is calcareous. The Ap horizon ranges from black (5YR 2/1) to very dark gray (10YR 3/1) with a color value of 3 or 4 when dry.

The B21g horizon ranges from weak red (10R 4/2) to light reddish brown (5Y 6/3). Texture of this horizon is silty clay loam, silty clay, or clay. The B22tg horizon ranges from dusky red (10R 3/2) to light reddish brown (5YR 6/4). Colors have a chroma of 2 or less. Texture is clay or silty clay. The B22tg horizon has moderate or strong, medium or coarse, prismatic structure parting to blocky. The B3g horizon ranges from dark reddish brown (5YR 3/2) to light reddish brown (2.5YR 6/4). The texture is principally clay or silty clay, but a few lenses or thin strata of silt are present in some areas.

Hues in the C horizon range mainly from 10R to 7.5YR, but hues of 10YR to 5Y are generally present as thin strata or ped coats. Colors of ped coats have a chroma of 0, 1, or 2 in most places.

These deep Lakemont soils formed in the same kind of or similar material as the moderately well drained to well drained Schoharie soils, the somewhat poorly drained Odessa soils, and the poorly drained to very poorly drained loamy subsoil variant of Lakemont soils. They are associated with the Cayuga, Cazenovia, Churchville, and Ovid soils, all of which are better drained and formed in till or are underlain by till at a depth of 20 to 40 inches. In places Lakemont soils are near the poorly drained Canandaigua soils that formed in siltier lacustrine deposits.

Lakemont silt loam (le).—This level to nearly level soil has slopes of 0 to 2 percent. Areas occupy long, narrow drainageways and the deeper, round or oblong depressions within old glacial lakebeds, which are dominated by fine-textured sediments. Individual areas are generally less than 10 acres in size, but a number of larger ones are in the county.

Commonly included with this soil in mapping are the somewhat poorly drained Odessa soils on small knobs and the poorly drained, silty Canandaigua soils. In some places there are inclusions of a soil that has a thin sandy surface layer, small areas that have a fine-textured surface layer, and areas of Cosad soils that have a sandy solum underlain by clay. In small areas where the till is less than 40 inches deep, the Lakemont soils, loamy subsoil variant, and the somewhat poorly drained Churchville soils are inclusions. These soils have some gravel on the surface or in the solum in places.

Undrained areas of this soil are suited to a limited number of pasture grasses and trees that are tolerant of wetness. If this soil is adequately drained and care is taken to maintain tilth and structure, it is suited to cultivated crops, such as corn, small grain, and hay. (Capability unit IVw–2; woodland suitability group 5w1)

Lakemont Series, Loamy Subsoil Variant

The Lakemont soils, loamy subsoil variant, are deep, poorly drained to very poorly drained soils that have a medium-textured surface layer and a fine-textured subsoil. These soils formed in lacustrine clay and silt and are underlain by calcareous glacial till at a depth of 20 to 40 inches. They are level to nearly level and are in depressions within or bordering old glacial lakebeds. They receive most of the runoff from the surrounding uplands and have limited drainage outlets.

A representative nearly level Lakemont soil, loamy subsoil variant, has a surface layer, about 7 inches thick, of very dark gray silt loam that is mottled in the lower part. It is underlain by a plastic silty clay subsoil that is 21 inches thick. The upper part of the subsoil is mottled, reddish gray, and neutral. The lower part is mottled, yellowish red, and neutral, becoming calcareous just above the substratum. At a depth of about 28 inches is the till substratum, which is mottled, firm, calcareous, pinkish-gray gravelly sandy loam.

A seasonal high water table is at or nearly at the surface and persists for a significant length of time. The water table is perched on the slowly permeable subsoil and the moderately slowly to slowly permeable substratum. Much runoff comes from the surrounding uplands. Runoff is very slow, and many areas are ponded. In undrained areas the depth of soil available for rooting is related to the height of the water table and is mainly in the upper 10 to 20 inches. Available water capacity is very low to low in the upper 10 inches and may range to high below a depth of about 24 inches. Prolonged wetness is one of the main limitations to use of these soils for farming.

Representative profile of Lakemont silt loam, loamy subsoil variant, in an idle area, located one-half mile north and 50 feet west of the junction of LaDue and Redman Roads, town of Clarkson:

Ap—0 to 7 inches, very dark gray (10YR 3/1) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles in lower part; moderate, fine and medium, granular structure; friable; neutral; clear, smooth boundary.

B2tg—7 to 16 inches, reddish-gray (5YR 5/2) silty clay; many (approximately 50 percent) coarse, prominent mottles of strong brown (7.5YR 5/6), reddish brown (5YR 4/4), and pale olive (5Y 6/3); moderate, fine and medium, angular blocky structure; plastic; gray (5YR 5/1) ped and root channel coats in upper part with many (approximately 45 percent) coarse, prominent mottles of greenish gray (5GY 6/1) and strong brown (7.5YR 5/6); clay films on ped faces in lower part and in pores; neutral; abrupt, wavy boundary.

B3g—16 to 28 inches, yellowish-red (5YR 5/6) silty clay; many (approximately 50 percent) coarse, prominent mottles of reddish brown (5YR 5/3), dark reddish brown (2.5YR 3/4), and strong brown (7.5YR 5/6) and common (10 percent) coarse, distinct mottles of light gray (5YR 7/1); moderate, very thick, platy structure breaking to weak, medium, subangular blocky structure; plastic; gray (5Y 5/1–6/1) ped coats with common, coarse, prominent, strong-brown (7.5YR 5/6) mottles; some light-gray (5Y 7/1) lime streaks; neutral, becoming calcareous with depth; abrupt, wavy boundary.

IICg—28 inches to 51 inches, pinkish-gray (7.5YR 6/2) gravelly sandy loam glacial till; many (approximately 50 percent) medium, prominent mottles of yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6); weak, thick, platy structure; firm in place, friable when removed; some greenish-gray (5GY 6/1) coats along fracture planes; calcareous.

The solum ranges in thickness from 20 to 34 inches and in reaction, from slightly acid to mildly alkaline in the lower part of the subsoil. In places it is calcareous. The Ap horizon ranges from black (N 2/0) to very dark gray (10YR 3/1). Color values are 4 or less when the soil is dry. The coarse fragment content may be as great as 15 percent. Where an A2 horizon is present, it generally is less than 3 inches thick, is slightly coarser in texture than the Ap horzoin, and has colors having a chroma less than 2.

The B2tg horizon ranges from dark gray (5YR 4/1) to pale red (2.5YR 6/2), has ped faces with a chroma of 2 or less, and has mottle colors from strong brown to dark reddish brown. The texture ranges from clay loam to clay, and thin lenses of coarser material are in places. The coarse fragment content is as much as 15 percent. The B3g horizon has the same color and texture range as the B2g horizon. The B3g horizon is neutral. It is weakly calcareous in places.

The IICg horizon is dark reddish-gray (5YR 4/2) to olive-yellow (2.5Y 6/6) calcareous till. Lime concretions and streaks are generally prominent. The texture ranges from loam or gravelly loam to sandy loam or gravelly sandy loam. The coarse fragment content ranges from 5 to 35 percent, and a few stones are present in places.

Lakemont soils, loamy subsoil variant, formed in the same kind of materials as the moderately well drained to well drained Cayuga soils and the somewhat poorly drained Churchville soils. These variant soils are associated with the Schoharie, Odessa, and deeper Lakemont soils, all of which formed in thicker lacustrine clay deposits.

Lakemont silt loam, loamy subsoil variant (lk).—This level to nearly level soil has slopes of 0 to 2 percent. Areas occupy long, narrow drainageways and the deeper, round or oblong depressions on till plains adjacent to old glacial lakebeds or on low till ridges or knobs within the lake-

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beds. Individual areas are generally less than 10 acres in size, but a few larger ones are in the county.

Commonly included with this soil in mapping are small areas of somewhat poorly drained Churchville soils that are at slightly higher elevations. Also included are small areas of the deep Lakemont soils where the till is at a depth greater than 40 inches, small areas of a soil similar to the silty Canandaigua soils that are underlain by till at a depth less than 40 inches, and small areas that have a silty clay loam surface texture.

If this soil is undrained, it is suited to a limited number of pasture grasses and trees that are tolerant of wetness. In adequately drained areas, where tilth and structure have been maintained, cultivated crops, such as corn, small grain, and hay are suitable. (Capability unit IVw–2; woodland suitability group 5w1)

Lamson Series

The Lamson series is made up of deep, poorly drained and very poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately coarse textured subsoil. These soils formed in medium- to high-lime, water-sorted material dominated by fine sand and very fine sand. Areas are in the level depressions of old glacial lakes and have restricted outlets for surface runoff.

A representative nearly level Lamson soil has a surface layer, about 8 inches thick, of black very fine sandy loam. It is underlain by a thin, very friable, neutral subsurface layer of light-gray loamy very fine sand. The mottled, friable subsoil is neutral in reaction and is 26 inches thick. The upper part of the subsoil is light-gray to gray fine sandy loam, and the lower part is light reddish-brown very fine sandy loam. The calcareous substratum is at a depth of about 36 inches. It consists of friable to loose layers of reddish-brown very fine sandy loam, mottled light reddish-brown loamy very fine sand, and gray fine sand and silt.

A seasonal high water table is at or nearly at the surface and remains for long periods if these soils are not artificially drained. Generally, some areas are ponded. Because permeability is moderate to moderately rapid in the solum and variable in the substratum, the soils respond well to artificial drainage if outlets can be provided. The rooting depth is related to the height of the water table and is mainly in the upper 10 to 20 inches unless the soils are drained. The available water capacity ranges from very low to moderate in the root zone. Normally, there is ample moisture for plant growth. Prolonged wetness is one of the major limitations to use of these soils for farming.

Representative profile of Lamson very fine sandy loam in a drained and cultivated area, located 3,500 feet west of Coldwater Road and 1,000 feet south of Buffalo Road, town of Gates:

Ap—0 to 8 inches, black (10YR 2/1) very fine sandy loam; moderate, coarse, granular structure; very friable; many fine roots; neutral; abrupt, smooth boundary.

A2g—8 to 10 inches, light-gray (10YR 7/1) loamy very fine sand; single grain to very weak, medium, subangular blocky structure; very friable; neutral; abrupt, smooth boundary.

B21g—10 to 16 inches, light-gray to gray (5YR 6/1) fine sandy loam; many, medium, prominent mottles of reddish yellow (7.5YR 6/6) and strong brown (7.5YR 5/6); a few thin streaks of pinkish gray (7.5YR 6/2); moderate, coarse and medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

B22g—16 to 36 inches, light reddish-brown (5YR 6/4) very fine sandy loam; many, medium, faint, yellowish-red (5YR 5/6) mottles; weak, coarse, angular blocky structure; friable; light-gray (5Y 7/1) ped coats with common, medium, prominent mottles of light reddish brown (5YR 6/3) and reddish brown (5YR 5/3); neutral; abrupt, smooth boundary.

Cg—36 to 54 inches, stratified reddish-brown (5YR 5/3) very fine sandy loam, light reddish-brown (5YR 6/3) loamy very fine sand with common, medium, faint mottles of reddish-brown (5YR 5/4) and gray (10YR 5/1) fine sand and silt; weak, thick, platy structure; loamy strata are friable, silty and sandy strata are loose; strata are ½ inch to 2 inches thick; calcareous.

The solum thickness and depth to carbonates range from 30 to 45 inches. The Ap horizon ranges from black (N 2/0) to very dark gray (10YR 3/1) in color and from medium acid to neutral in reaction. In unplowed areas there is an A1 horizon that is as much as 12 inches thick. The A2g horizon is gray (N 5/0) or light gray (10YR 7/7) and contains few or no mottles. If present, the mottles have a color value of 5 and 6 and a chroma of 6 to 8. Texture of the A2g horizon ranges from loamy fine sand to loam. Reaction ranges from slightly acid to neutral.

The B horizon ranges from gray (5YR 5/1) to light yellowish brown (2.5Y 6/4) in color and has common to many mottles. The texture is dominantly fine sandy loam, but thin lower layers range from very fine sandy loam to loamy very fine sand. Reaction is slightly acid or neutral. The C horizon ranges from gray (5YR 5/1) to pale brown (10YR 6/3). Mottles decrease in number from the B horizon and are distinct or faint. Strata of fine sand or very fine sand and silt, ⅛ inch to 2 inches thick, and very thin lenses of clay are present in places. These layers are pronounced in the upper part of the horizon, but less evident at a depth of 5 to 6 feet. Bedrock is at a depth of 48 inches or more.

Lamson soils formed in the same kind of material as the well-drained Arkport soils, the moderately well drained Galen soils, and the somewhat poorly drained Minoa soils. They are associated with the Niagara and Canandaigua soils, both of which formed in silty lacustrine deposits. In places, Lamson soils are near the similar, poorly drained to very poorly drained Sun soils, which formed in glacial till and contain some coarse fragments.

Lamson very fine sandy loam (Lm).—Areas of this level to nearly level soil are in the long, narrow drainageways and basinlike depressions at moderate elevations in old glacial lakebeds. Slopes are 0 to 2 percent. Individual areas of this soil range in size from 3 to 140 acres; the dominant size is 20 to 60 acres.

Commonly included in mapping are spots of the poorly drained Canandaigua soils that have a higher silt content and areas of Muck, shallow, where the content of organic matter has increased to a depth of 12 inches or more. Where this soil is adjacent to soils formed in glacial till, the poorly drained to very poorly drained Sun soils that have a similar texture but contain coarse fragments are a common inclusion. Stratified gravel and sand are present in some areas at a depth of 60 inches or more.

Undrained areas of this soil can be used for unimproved pasture or woodland. Areas that are adequately drained are suited to vegetable crops and most other farming uses. (Capability unit IIIw–5; woodland suitability group 4w1)

Lima Series

The Lima series consists of deep, moderately well drained, medium-textured soils on the till plains. These soils occupy nearly level to gently sloping or undulating

areas with convex slopes. These soils formed in high-lime glacial till dominated by limestone and shale. Characteristically, they are moderately shallow to firm glacial till. In some areas bedrock is within 42 to 72 inches of the surface.

A representative gently sloping Lima soil in pasture has a surface layer, about 10 inches thick, of very dark grayish-brown silt loam. Underlying this is a layer of friable, brown silt loam that contains some gravel, is slightly acid, and merges with the subsoil at a depth of about 14 inches. The subsoil is firm, mottled, neutral, dark-brown loam that contains some gravel and stones. A calcareous gravelly loam till substratum begins at a depth of about 25 inches. It is firm, mottled, and dark grayish brown, and below a depth of about 33 inches is very firm, mottled, and reddish gray.

A seasonal high water table rises to within 18 to 24 inches of the surface but does not generally persist for any appreciable length of time. The water table is perched above the moderately slowly permeable to slowly permeable underlying till. The depth of soil available for rooting is restricted to the upper 18 inches when the water table is high but may be as much as 30 inches when the water table recedes. Available water capacity is moderate to high in the root zone. A slight seasonal wetness is one of the limitations to use of these soils for farming. Response to fertilizer is good.

Representative profile of Lima silt loam, 3 to 8 percent slopes, in a pasture, located approximately 2 miles southwest of Riga Center, town of Riga:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

A&B—10 to 14 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; dark-brown or brown (10YR 4/3) loam to silt loam ped interiors make up about 25 percent of the mass; 10 percent gravel; slightly acid; clear, wavy boundary.

B2t—14 to 25 inches, dark-brown (10YR 4/3) loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm; brown (10YR 5/3) silt coats on peds in the upper part; clay films in pores and on ped faces in the lower part; 10 percent gravel and stones; neutral; clear, wavy boundary.

C1—25 to 33 inches, dark grayish-brown (10YR 4/2) gravelly loam; common, medium, distinct mottles of yellowish brown and grayish brown; weak, fine and medium, subangular blocky structure, but tends toward platy structure in the lower part; firm; 15 to 20 percent gravel and stones; weakly calcareous; gradual, wavy boundary.

C2—33 to 51 inches, reddish-gray (5YR 5/2) gravelly loam; few, fine, prominent, yellowish-brown mottles in the upper 3 to 4 inches; moderate, thick, platy structure; very firm; 20 to 25 percent gravel and stones; calcareous.

The solum ranges in thickness from 18 to 30 inches, with 24 to 28 inches dominant. Depth to bedrock is greater than 42 inches. Reaction in the solum is slightly acid to neutral. Coarse fragment content in the profile ranges from 5 to 35 percent and increases with depth in most areas. Stones are common on the surface and in the solum in many areas, and in some places the till material contains a high proportion of stones. The Ap horizon ranges from brown (7.5YR 5/2) to dark brown (10YR 3/3). A very thin A2 horizon exists in some unplowed areas but is generally mixed with the Ap horizon in cultivated areas. The A&B horizon ranges from brown (10YR 5/3) to light yellowish brown (10YR 6/4) on the vertical faces of peds, which have interior colors similar to those of the B horizon. The texture of this horizon is loam or silt loam.

The B horizon ranges from brown or dark brown (7.5YR 4/4, 10YR 4/3) to light olive brown (2.5Y 5/4). Ped coats in the upper part have the same range in hue as the matrix but are generally 1 or 2 units higher in value. Mottling increases with depth, and its color has a chroma greater than 2. Texture is loam or silt loam with a clay content ranging from 18 to 28 percent. The lower part of the B horizon is weakly calcareous in some areas.

The C horizon ranges from dark reddish gray (5YR 4/2) to pale brown (10YR 6/3) in color and from sandy loam to silt loam in texture. This horizon is gravelly in places. Reaction is weakly calcareous or calcareous.

The Lima soils formed in the same kind of material as the well-drained Honeoye soils and the somewhat poorly drained Appleton soils. The Lima soils are associated with the well drained and moderately well drained Cayuga and Cazenovia soils, the somewhat poorly drained Churchville soils, and the somewhat poorly drained to moderately well drained Ovid soils. All of these associated soils contain more clay in the B horizon than the Lima soils.

Lima silt loam, 0 to 3 percent slopes (LnA).—Roughly oblong areas of this level to nearly level soil are commonly at the base of foot slopes on the till plains. More than half of the areas are less than 10 acres in size, and the rest range from 10 to 30 acres, with a few as large as 50 acres.

Most commonly included with this soil in mapping are the somewhat poorly drained Appleton soils in small depressions or drainageways. A few small areas of the Cazenovia or Ovid soils, which have a finer textured subsoil, are included. In areas near bedrock escarpments are inclusions of the limestone substratum mapping units containing Appleton, Ovid, and Cazenovia soils. Some inclusions have a gravelly silt loam surface layer.

This soil is well suited to most cash and field crops, as well as to hay, pasture, and woodland. Where the climate is favorable, the soil can be used for fruit crops. A slight wetness may delay planting briefly in spring. Other than establishing adequate drainage, this soil has few special management requirements. (Capability unit IIw–4; woodland suitability group 2o1)

Lima silt loam, 3 to 8 percent slopes (LnB).—This gently sloping soil has the profile described as representative of the series. The soil is on foot slopes of ridges and on the more undulating areas on the till plains. Individual areas are roughly oblong in shape. More than half of the areas are less than 10 acres in size, and the rest are 10 to 20 acres, with a few as large as 65 acres.

Commonly included with this soil in mapping are small, elevated areas of the well-drained Honeoye soils. In some included areas are a few spots of Cazenovia soils, a soil with a gravelly silt loam surface layer, and some minor areas of Appleton or Ovid soils in drainageways or depressions. In areas near bedrock escarpments are inclusions of the limestone substratum mapping units containing the Honeoye and Cazenovia soils.

This soil is well suited to most cash and field crops, hay, pasture, and woodland. Where the climate is favorable, the soil is suited to many fruit crops. If the soil is cultivated and not protected, it is subject to moderate erosion. In addition to measures for controlling erosion, management may include draining the seep spots or wet areas. In some areas coarse fragments interfere slightly with tillage and harvest operations. (Capability unit IIe–5; woodland suitability group 2o1)

Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes (LoB).—Either or both of these nearly level to gently sloping soils may occur in a mapped

area. Each has a profile similar to that described as representative of its respective series, except that limestone bedrock is at a depth ranging from 42 to 72 inches but dominantly 48 to 54 inches. Most individual areas range from 20 to 50 acres in size, a few larger ones are as much as 140 acres, and less than one-third of the areas are smaller than 10 acres. All areas are roughly rectangular in shape.

Commonly included with this soil in mapping are the well-drained Honeoye silt loam soils, limestone substratum, at slightly higher elevations and poorly drained and very poorly drained Sun loam, moderately shallow variant, in the drainageways and depressions. In the more nearly level areas, the somewhat poorly drained Ovid and Appleton silt loams, limestone substratum, are included. In areas adjacent to limestone escarpments, the shallow Benson soils are commonly included. Also included are areas that have a gravelly silt loam surface layer.

These soils are suited to most field and cash crops, hay, pasture, and woodland. Depth to bedrock is generally ample to allow rooting depth for fruit trees. These soils are subject to slight erosion. If they are cultivated, some of the steeper areas with long slopes require measures for controlling erosion. Drainage is difficult in the few seep spots or wet areas, particularly where the depth to bedrock is at the shallower end of its range. In some areas coarse fragments interfere slightly with tillage and harvest operations. (Capability unit IIe–5; woodland suitability group 2o1)

Lockport Series

In the Lockport series are moderately deep, somewhat poorly drained soils that have a moderately fine textured surface layer and a fine textured subsoil. These level to nearly level soils formed in neutral or alkaline, red shale glacial till and residuum. Locally, the Queenston and Vernon-Camillus Shale formations are the dominant sources of parent material. The underlying shale controls the topography of the soils.

A representative level to nearly level Lockport soil in a pasture has a surface layer, about 5 inches thick, of very dark grayish-brown silty clay loam. It is underlain by a subsurface layer, about 3 inches thick, of mottled, grayish-brown silty clay loam that is friable and neutral in reaction. The subsoil, about 18 inches thick, is firm to very firm clay. It is mottled reddish brown in the upper part and dark reddish brown in the lower part. The subsoil is neutral in reaction in the upper part and becomes weakly calcareous just above the bedrock. At a depth of about 26 inches is dark reddish-brown shale bedrock.

A seasonal high water table is within 6 to 12 inches of the surface and is perched on the slowly permeable subsoil. Runoff is slow. The depth of soil available for rooting is restricted mainly to the upper 15 to 24 inches and is related to the height of the water table. A few roots extend into the weathered upper part of the shale as the water table recedes. The available water capacity in the root zone is low to moderate. Maintenance of tilth is a constant problem on these soils, and most areas require surface drainage.

Representative profile of Lockport silty clay loam in a pasture, located 4,000 feet north and 400 feet east of the junction of Ridge Road (U.S. Route 104) and the Monroe-Orleans County Line Road:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—5 to 8 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium, prominent, yellowish-brown mottles; moderate, medium, subangular blocky structure; friable; neutral; clear, smooth boundary; discontinuous in places.

B21t—8 to 14 inches, reddish-brown (5YR 4/4) clay; common, medium, prominent, yellowish-brown mottles; strong, medium and coarse, prismatic structure breaking to strong, medium, angular blocky structure; firm; ped faces are reddish gray (5YR 5/2); thin clay films on ped faces increase in thickness and prominence with depth; neutral; clear, wavy boundary.

B22t—14 to 26 inches, dark reddish-brown (2.5YR 3/4) clay; strong, coarse, prismatic structure (prisms are 2 to 3 inches in diameter), breaking to strong, medium and coarse, angular blocky structure in upper part with moderate, medium, platy structure in lower part; very firm; prominent clay films on ped faces and in pores; ped faces are reddish gray (5YR 5/2); neutral, becoming weakly calcareous in lower part; abrupt, smooth boundary.

R—26 inches +, dark reddish-brown (2.5YR 3/4) shale; thick, fractured plates; upper part of layer can be cut with a spade; calcareous.

The solum ranges in thickness from 20 to 30 inches and is dominantly 26 to 30 inches thick. Reaction of the solum ranges from medium acid to neutral. Depth to rock ranges from 20 to 40 inches. Some shale fragments are present in places, and some areas have glacial erratics scattered on the surface. The Ap horizon ranges from dark brown (7.5YR 3/2) to gray (10YR 5/1). The A2 horizon ranges from light reddish brown (5YR 6/4) to gray (10YR 5/1) in color and has dominant mottles with a chroma less than 2. In deeply plowed areas the A2 horizon is mixed with the Ap horizon.

The B horizon ranges from dusky red (10R 3/4) to yellowish red (5YR 4/6). Some 7.5YR or 10YR hues are in the upper part in places. The texture ranges from heavy clay loam to clay. The silt content is high, and sand is seldom coarser than very fine. In most areas grayish silt coats are on the ped faces in the upper part of the B horizon.

A thin C horizon of reddish glacial till is present in places above the R horizon. The R horizon is calcareous, red to dark reddish-brown Queenston or Vernon-Camillus Shale. Where pale-green, very hard, sandy streaks or layers are in the Queenston Shale, the shale is generally neutral in reaction.

Lockport soils formed in the same kind of material as the well drained to moderately well drained Lairdsville soils. They are closely associated with the Brockport soils, which have similar drainage and are brownish gray or grayish brown rather than reddish brown in the subsoil. Lockport soils are similar to and associated with the Odessa and Rhinebeck soils, both of which formed in deep, clayey deposits and do not have bedrock within a depth of 40 inches.

Lockport silty clay loam (Lp).—This level soil is mainly in large, flat or slightly depressed areas, but a few areas are on foot slopes adjacent to better drained soils. Slopes range from 0 to 3 percent. Except for the areas on foot slopes and several isolated areas that are generally less than 10 acres in size, individual areas are frequently more than 100 acres in size.

Commonly included with this soil in mapping are spots of the better drained Lairdsville soils on slight rises or knolls and somewhat larger areas of a soil similar to the Lakemont soils that is moderately deep, poorly drained, and in drainageways and deeper depressions. Where the underlying shale is deeper than 40 inches, the deep Odessa soils are inclusions. Some included areas have a silt loam surface layer.

This soil is suited to cultivated crops, pasture, and woodland. If the soil is not drained, wetness restricts the choice of crops. Maintaining good tilth is a problem because this

soil clods easily if tilled when too wet. (Capability unit IIIw–3; woodland suitability group 3w1)

Lyons Series

The Lyons series is made up of deep, poorly drained to very poorly drained soils that are level to nearly level. These soils developed in medium-textured, calcareous glacial till derived mainly from limestone and sandstone. Most areas have a thin alluvial deposit. The soils are on the till plains in depressions or along drainageways.

A representative nearly level Lyons soil in a cultivated area has a surface layer, about 8 inches thick, of black silt loam. The subsoil is mottled loam, 12 inches thick, and has an increasing quantity of gravel with depth. The upper part of the subsoil is light gray or gray, firm, and neutral. Below a depth of 14 inches, the subsoil is grayish brown and friable. It is neutral in reaction and becomes calcareous with depth. The till substratum, beginning at a depth of about 20 inches, is very firm, mottled, pinkish-gray, calcareous gravelly fine sandy loam.

A seasonal high water table is at or near the surface and is perched on the slowly to moderately slowly permeable glacial till substratum. These soils are subject to ponding. The depth of soil available for rooting depends on the height of the water table and is generally the upper 10 to 20 inches. The available water capacity in the root zone is low to moderate, but there is normally ample moisture for plant growth. Prolonged wetness is the major limitation to use of these soils for farming.

Representative profile of Lyons silt loam in a cultivated area, located 100 feet east and 50 feet north of the junction of Harris and Plank Roads, town of Penfield:

Ap—0 to 8 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; slightly acid; clear, smooth boundary.

B2g—8 to 14 inches, light-gray or gray (5Y 6/1) loam; few, fine, prominent, reddish-brown and brownish-yellow mottles; moderate, medium and coarse, subangular blocky structure; firm; ped faces are gray (5Y 5/1) to dark gray (5Y 4/1); some clay films are along root and worm channels; 5 percent gravel; neutral; gradual, irregular boundary.

B3g—14 to 20 inches, grayish-brown (10YR 5/2) loam; many, medium, prominent mottles of reddish brown, light olive brown, and light brownish gray; weak, medium to coarse, subangular blocky structure, but tends toward platy structure in the lower part; friable; 10 to 15 percent gravel; neutral, becoming calcareous with depth; gradual, wavy boundary.

IICg—20 to 50 inches, pinkish-gray (7.5YR 6/2) gravelly fine sandy loam; many, coarse, prominent mottles of light olive brown (2.5Y 5/6), yellowish brown (10YR 5/8), and strong brown (7.5YR 5/6); massive, but tends toward weak, subangular blocky structure; very firm and compact in place; 20 to 30 percent gravel; calcareous.

The solum ranges from 20 to 30 inches in thickness and from slightly acid to neutral in reaction. Depth to carbonates corresponds to the solum thickness. The Ap horizon ranges from black (10YR 2/1) to dark brown (7.5YR 3/2). In some uncultivated areas there is a mucky surface layer.

The B horizon ranges from gray or light gray (5Y 6/1) to dark reddish gray (5YR 4/2). Mottles are variable, ranging from few to many, distinct or prominent. The texture of the B horizon is light loam to heavy loam, with a clay content ranging from 18 to 28 percent.

The C horizon is pinkish gray (5YR 6/2, 7.5YR 6/2). Its texture ranges from gravelly fine sand loam to loam. In some aeras, because of local shale influence, colors of the B and C horizons vary according to the color of the local bedrock.

Some of the Lyons soils have a thicker dark-colored surface layer than the defined range for the series, but this difference does not alter their usefulness or behavior.

The Lyons soils are associated with the Appleton, Sun, and Hilton soils, all of which formed in similar material. The Lyons soils are more poorly drained than the Appleton and Hilton soils and have a finer textured solum than the Sun soils. Lyons soils are also associated with the poorly drained to very poorly drained Lamson soils and the poorly drained Canandaigua soils, both of which formed in lacustrine silt and very fine sand, rather than in till.

Lyons silt loam (Ly).—This soil is on the glacial till plains where the slopes are 0 to 3 percent. It is along drainageways or in depressions. Most areas are 10 acres in size or larger.

Included with this soil in mapping are areas of Sun, Canandaigua, and Appleton soils and areas of Lyons soils that have a moderately coarse textured or moderately fine textured surface layer. Also included are areas that are calcareous at or near the surface, some areas that have prominent large stones on the surface, and, where Lyons soils border swamp areas, small spots of organic soils.

This soil is not suited to the crops commonly grown in the county, but if it is drained, it would have fair suitability. Woodland is a suitable use, but the choice of trees is limited. The main management needed is the installation of drainage to lower the seasonal high water table. (Capability unit IVw–3; woodland suitability group 4w1)

Madalin Series

The Madalin series consists of deep, poorly drained to very poorly drained soils that have a moderately fine textured surface layer and a fine textured subsoil. These level soils formed in lacustrine deposits of calcareous clay and silt. They are in the lower depressions in former old glacial lakebeds and in swamps.

A representative nearly level Madalin soil has a surface layer, about 6 inches thick, of very dark brown silty clay loam. This is underlain by a subsurface layer, about 4 inches thick, of mottled, light-gray, slightly acid, firm silty clay loam. The subsoil is about 24 inches thick. It is mottled, dark grayish-brown clay that is very firm and neutral in reaction. At a depth of about 34 inches is a calcareous substratum that consists of thick layers of very firm, mottled, greenish-gray clay and thin layers of silt.

A seasonal high water table is at or near the surface, and the soils are subject to ponding. The subsoil and the substratum are slowly permeable. The depth of soil available for rooting depends upon the height of the water table. The main root zone is in the upper 10 to 20 inches unless the soils have adequate drainage. The available water capacity in the root zone is very low to moderate. Prolonged wetness is one of the major limitations to use of these soils for farming. The texture of the surface layer creates tilth problems in some areas.

Representative profile of Madalin silty clay loam in a wooded area, located 4,300 feet north and 4,750 feet east of the junction of Mumford Road and Union Street:

Ap—0 to 6 inches, very dark brown (10YR 2/2) silty clay loam; weak, fine and medium, subangular blocky structure; friable; medium acid; abrupt, smooth boundary.

A2g—6 to 10 inches, light-gray (2.5Y 7/2) silty clay loam, white (10YR 8/2) when dry; many, medium, promi-

nent mottles of dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B2tg—10 to 34 inches, dark grayish-brown (10YR 4/2) clay; many, medium, distinct and prominent mottles of yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6); strong, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; very firm; light coatings are on ped faces in upper part of horizon; grayish-brown clay films on ped faces and in pores; neutral; clear, smooth boundary.

Cg—34 to 52 inches, greenish-gray (5GY 6/1) clay; common, fine, prominent mottles of yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4); varved, with some silt strata; very firm; calcareous.

The solum ranges from 24 to 40 inches in thickness and from medium acid to neutral in reaction. The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). Dry colors have a value of 3 or 4. In undisturbed areas, an A1 horizon is present and may have an 8-inch overlying organic layer. The A2g horizon ranges from dark gray (10YR 4/1) to white (5Y 8/2) in color and from light silty clay loam to heavy silty clay loam in texture. Mottles have a higher chroma than the matrix and are minor in extent.

The B horizon color ranges from dark grayish brown (10YR 4/2) to light olive gray (5Y 6/2). Mottles have a high chroma. The texture ranges from clay loam to clay, with the clay content greater than 35 percent. The Cg horizon is dominantly clay with thin silt strata and thin lenses of coarser material. Lime streaks and concretions are common.

The Madalin soils formed in the same kind of material as the moderately well drained Hudson soils and the somewhat poorly drained Rhinebeck soils. They are associated with the more silty Canandaigua soils and the more sandy Lamson, which also formed in lacustrine deposits, and with the Ontario, Hilton, and Lyons soils, which formed in glacial till.

Madalin silty clay loam (Ma).—This level soil is on slopes of 0 to 2 percent. Areas are in the lower depressions in old glacial lakebeds and generally are 10 acres in size or larger.

Commonly included with this soil in mapping are spots of poorly drained to very poorly drained mineral soils, such as the Canandaigua and Lamson soils, and small areas of Muck.

Where this soil is not drained, its use is limited to native pasture, woodland, or wildlife habitat. If adequately drained, the soil is fairly well suited to many of the crops commonly grown in the county. Maintenance of tilth is a problem. If the soil is tilled when too wet, it clods and puddles easily. (Capability unit IVw–2; woodland suitability group 5w1)

Made Land

Made land (Mb) consists of areas that have been filled with waste, such as stones, old masonry material, bricks, and tree stumps. Some areas have been covered with a thin mantle of soil material. Dominant slopes are 0 to 3 percent. Where properly filled, compacted, and leveled, this mapping unit can be used for development areas. Large areas are in suburban Rochester. Areas adjacent to the Erie Barge Canal consist of material cleaned periodically from the canal and may include stumps, sediment, trash, masonry material, structural components, and blasted rock.

Most areas of this mapping unit have little value for farming, but can be used in other ways. Made land has a wide range of variability, and onsite investigation is needed to determine the feasibility of a specific use. (Capability unit and woodland suitability group not assigned)

Madrid Series

In the Madrid series are deep, well-drained, moderately coarse textured soils that formed in friable to loose glacial till. These level to strongly sloping soils are mapped throughout the county. Areas are mainly on morainic till deposits and are generally larger than 10 acres in size. The largest area is in the eastern part of the county, in the town of Penfield.

A representative Madrid soil has a surface layer, about 10 inches thick, of dark-brown fine sandy loam. Underlying this is an 11-inch subsurface layer of strong-brown fine sandy loam that is very friable and medium acid in reaction. The neutral, gravelly fine sandy loam subsoil is 23 inches thick. The upper 11 inches is brown to dark yellowish brown and friable. The lower part of the subsoil is brown to dark brown and firm in place, but friable when removed. The substratum, at a depth of 44 inches, consists of brown very gravelly and cobbly fine sandy loam with appreciable quantities of silt and clay. It is friable and mildly alkaline in reaction.

Permeability of the Madrid soils is moderately rapid to rapid. There are few limitations to rooting depth, but most roots are in the upper 20 to 30 inches. The available water capacity is moderate to high in the root zone. These soils are droughty during extended dry periods, but they warm up rapidly in spring.

Representative profile of Madrid fine sandy loam, 0 to 3 percent slopes, in a newly planted cherry orchard, located 1,650 feet west of the junction of Fairport-Ninemile Point Road (State Route 250) and Penfield Center Road, town of Penfield:

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

A2—10 to 21 inches, strong-brown (7.5YR 5/6) fine sandy loam; contains approximately 10 percent more sand than the Ap horizon; weak, medium and fine, granular structure; very friable; common root stains in the upper part; common fine roots; medium acid; abrupt, wavy boundary.

IIA&B—21 to 32 inches, brown to dark-brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4) gravelly fine sandy loam; yellowish-brown (10YR 5/4) ped coats in upper part; moderate, medium and thick, platy structure; friable; few fine roots; neutral; abrupt, wavy boundary.

IIB2t—32 to 44 inches, brown to dark-brown (7.5YR 4/4) gravelly and cobbly fine sandy loam; weak to moderate, thick, platy structure; firm in place, friable when removed, sticky when wet; few fine roots; dark reddish-brown ped coats; clay films are prominent in pores and patchy on horizontal ped surfaces; neutral; clear, wavy boundary.

IIIC—44 to 54 inches, brown (7.5YR 5/4) very gravelly and cobbly fine sandy loam; massive; friable; no roots; mildly alkaline.

The solum ranges in thickness from 30 to 60 inches. Depth to carbonates is 40 inches or more. The Ap horizon ranges from dark brown to brown (7.5YR 3/2 to 10YR 4/3) in color and from medium acid to neutral in reaction. The A2 horizon ranges from brown or dark brown (10YR 4/3) to strong brown (7.5YR 5/6) in color, from fine sandy loam to silt loam in texture, and from medium acid to neutral in reaction.

The IIA&B horizon ranges from brown or dark brown (7.5YR 4/2) to light yellowish brown (10YR 6/4). Texture is dominantly gravelly fine sandy loam but is gravelly very fine sandy loam in places. The gravel content ranges from 15 to 35 percent, and some stones are present. High color values are on the ped coats. Up to 20 percent of the color of the ped

interiors is the same as that of the underlying horizon and occurs as small areas within the peds. The reaction of this horizon is slightly acid or neutral.

The IIB2t horizon ranges from dark brown (7.5YR 3/2) to yellowish brown (10YR 5/4). Texture is dominantly gravelly fine sandy loam or gravelly very fine sandy loam. Small bodies of clay are common in many places, but the clay content is less than 17 percent and generally ranges from 4 to 10 percent. Gravel and cobble content ranges from 15 to 35 percent, and some boulders are present. Reaction of this horizon is neutral or mildly alkaline.

The IIIC horizon is similar in color to the B horizon. Some sand grains with a high color value are present in places, but the quantity is appreciably less than in the B horizon. Coarse fragment content includes some boulders and ranges from 35 to 75 percent. Strong effervescence occurs at a depth of 6 feet or more.

The Madrid soils are associated with the somewhat poorly drained to poorly drained Massena soils and the poorly drained to very poorly drained Sun soils. All of these soils formed in the same kind of material. The closely associated Ontario and Hilton soils also formed in glacial till. The B horizon in the Madrid soils is coarser in texture than that in the Ontario and Hilton soils.

Madrid fine sandy loam, 0 to 3 percent slopes (MdA).—This soil has the profile described as representative of the series. Areas are on the flat ridgetops or in level areas near the base of slopes.

On the nearly level areas, the major inclusion with this soil in mapping are the somewhat poorly drained to poorly drained Massena soils that occur in small depressions. Also included are minor spots of Hilton soils that have a medium-textured surface layer and areas of a moderately well drained soil similar to the Madrid. In the northern part of the county some included areas are redder, sandier, and more acid.

This soil is suited to crops, pasture, or woodland. Tillage can be early in the season, and cropping can be intensive. Measures for conserving moisture are generally beneficial on this soil. In places droughtiness is a hazard during extremely dry periods. No special practices are required for controlling erosion. In some areas, cobbles and stones are a hazard to cultivation. (Capability unit I–1; woodland suitability group 2o1)

Madrid fine sandy loam, 3 to 8 percent slopes (MdB).—Most areas of this gently sloping soil are 10 acres or more in size. Many areas are gently undulating, but the slopes are 100 feet or more in length and generally have uniform aspect.

The major inclusions in this soil in mapping are Ontario and Hilton soils, but these inclusions are generally very limited. Some included areas in the northern part of the county are redder, sandier, and more acid.

This soil is well suited to crops, pasture, or woodland. If the soil is cultivated and not protected, it is subject to slight to moderate erosion. Cobbles and stones are a hazard to cultivation in some areas. Droughtiness is generally a hazard during extremely dry periods. Supplemental water and adequate fertilization are needed for best crop yields. (Capability unit IIe–1; woodland suitability group 2o1)

Madrid fine sandy loam, 8 to 15 percent slopes (MdC).—The profile of this soil is generally thinner than that described as representative of the series. Most areas are long and narrow and border areas of the gently sloping Madrid soils. Areas are less than 10 acres in size.

Minor, moderately steep areas and small areas having pockets of gravel are included with this soil in mapping.

This soil can be used for crops, pasture, or woodland. The hazard of erosion somewhat restricts use for cultivated crops. Because of droughtiness in this soil, practices that conserve moisture and increase infiltration are very beneficial. Coarse fragments in the surface layer are a hazard to cultivation in some areas. (Capability unit IIIe–1; woodland suitability group 2o1)

Madrid very stony fine sandy loam, 3 to 8 percent slopes (MeB).—The profile of this soil differs from that described as representative of the series because the surface layer contains 1½ to 50 cubic yards of stones per acre-foot of soil. Areas are 10 acres in size or larger and occur south of closely associated bedrock outcrop areas.

The most common inclusions in this soil in mapping are Ontario, Hilton, and Wassaic soils. The Wassaic soils have limestone bedrock at a depth of 3½ feet or less.

This soil is too stony for cultivation but can be used for native pasture or woodland. (Capability unit VIs–1; woodland suitability group 2o1)

Massena Series

The Massena series is made up of deep, somewhat poorly drained to poorly drained, level to nearly level soils that are moderately coarse textured. These soils formed in calcareous, partly waterworked glacial till material that has a high content of sandstone and limestone. These soils are principally in morainic till areas between drumlins in the towns of Penfield and Perinton in association with the Madrid and Sun soils. Areas are on the intermediate landscapes in slight depressions or along drainageways.

A representative nearly level Massena soil has a surface layer, about 7 inches thick, of very dark grayish-brown fine sandy loam. The mottled subsoil is 26 inches thick. The upper part of the subsoil is friable, neutral, brown fine sandy loam. Below a depth of 12 inches, the subsoil is friable to firm, neutral, brown gravelly fine sandy loam that becomes grayish brown at a depth of about 24 inches. The calcareous till substratum, beginning at a depth of 33 inches, consists of friable, mottled, yellowish-brown gravelly fine sandy loam.

A seasonal high water table is within 6 to 18 inches of the surface and remains for long periods of time. The depth of soil available for rooting is related to the height of the water table and is mainly in the upper 15 to 20 inches unless the soils are drained. The available water capacity is low to moderate in the root zone. Because the subsoil and substratum of these soils are moderately rapidly to rapidly permeable, drainage is relatively easy where outlets are available. Seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Massena fine sandy loam in an idle area, located 2,700 feet north and 300 feet west of the junction of State Route 441 and Dublin Road:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B21—7 to 12 inches, brown (10YR 5/3) fine sandy loam; common, fine, prominent mottles of strong brown (7.5YR 5/6), light olive brown (2.5Y 5/6), and olive yellow (2.5Y 6/6); weak, fine and medium, subangular blocky structure, but tends toward platy structure; friable; neutral; clear, smooth boundary.

IIB22—12 to 24 inches, brown (7.5YR 5/2) gravelly fine sandy loam; common, fine, prominent mottles of olive yellow (2.5Y 6/6), light olive yellow (2.5Y 5/6), and

yellowish brown (10YR 5/6) ; weak, fine and medium, subangular blocky structure; friable; brown coatings along root channels and fractures; 20 percent gravel and stones; neutral; gradual, wavy boundary.

IIB3—24 to 33 inches, grayish-brown (10YR 5/2) gravelly fine sandy loam; common, medium, prominent mottles of olive yellow (2.5Y 6/6), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6) ; weak, medium, subangular blocky structure; firm in place, friable when removed; 20 to 25 percent gravel and stones; clear, wavy boundary.

IIC—33 to 50 inches, yellowish-brown (10YR 5/4) gravelly fine sandy loam; few, fine, prominent, reddish-brown mottles; massive to weak, medium, subangular blocky structure; friable; 30 to 35 percent gravel and stones; calcareous.

The solum ranges from 20 to 36 inches in thickness and from slightly acid to neutral in reaction. Coarse fragment content ranges from 10 to 35 percent, and some stones are present. The Ap horizon ranges from very dark brown (10YR 2/2) to brown or dark brown (7.5YR 4/2).

The B21 horizon ranges from brown to dark brown (7.5YR 5/4 to 10YR 4/3) in color and from loam to sandy loam in texture. Coats of very dark grayish brown are common along worm and root channels.

The IIB22 horizon ranges from brown or dark brown (7.5YR 4/2) to light brownish gray (10YR 6/2) and contains common, distinct to prominent, high-chroma mottles. The texture ranges from gravelly fine sandy loam to gravelly silt loam. Clay content is less than 18 percent; a few clay films are present in places but are thin and discontinuous. In the upper part of the horizon, coats that are lighter in color are generally evident on ped faces, giving a vesicular appearance that is less evident with depth. Where present, the IIB3 horizon has colors similar to those in the IIB22 horizon and is neutral or weakly calcareous. The texture is gravelly sandy loam or gravelly fine sandy loam and may have less clay than in the IIB22 horizon.

The IIC horizon has the same color range as the IIB horizon. Texture ranges from gravelly sandy loam to gravelly loam. Coarse material larger than 2 millimeters in size, including some stones, increases in this horizon and may exceed 35 percent by volume below a depth of 40 inches.

The Massena soils are associated with the well-drained Madrid soils, the poorly drained to very poorly drained Sun soils, and the well drained and moderately well drained Wassaic soils. All of these soils formed in similar material. The Wassaic soils are 20 to 40 inches thick over limestone bedrock. The Massena soils are more poorly drained than the Hilton soils and are very similar to the Appleton. They contain less clay in the B horizon than the Hilton or Appleton soils. The somewhat poorly drained Minoa and Niagara soils and the poorly drained Canandaigua soils formed in lacustrine sediments and do not have the coarse fragments in the lower part of the B and C horizons that are present in the Massena soils.

Massena fine sandy loam (Mf).—This soil has slopes of 0 to 3 percent and occupies intermediate landscapes that receive runoff or where runoff is restricted. Areas are generally 10 acres or more in size. The largest area is in the town of Penfield, but smaller areas are scattered throughout the northern part of the county.

Commonly included with this soil in mapping are Hilton, Sun, Appleton, and Lamson soils, and both shallow and deep phases of Muck. Small inclusions of the Sun and Lamson, and of Muck are at lower elevations; the finer textured, somewhat poorly drained Appleton inclusions are at comparable elevations; and small included Hilton areas are on slightly elevated knobs. Small spots of Minoa, Niagara, and Canandaigua soils are also included.

This soil is suited to crops, pasture, or woodland. If the soil is undrained, wetness restricts the choice of crops. Where drainage is adequate, the soil is suited to most cultivated crops and small grain and can be cropped intensively. Establishing adequate drainage outlets is a problem in some areas. (Capability unit IIIw–2; woodland suitability group 3w2)

Minoa Series

The Minoa series consists of deep, somewhat poorly drained, medium-textured soils. These nearly level soils formed in lacustrine fine sand, very fine sand, and silt with small quantities of clay. They have slow runoff or occupy depressions that receive runoff.

A representative Minoa soil in an idle area has a surface layer, about 10 inches thick, of dark grayish-brown very fine sandy loam. The mottled subsoil is 24 inches thick. The upper part of the subsoil consists of a thin layer of very friable, medium acid, very pale brown loamy fine sand. This grades to friable, slightly acid, pale-brown loamy very fine sand at a depth of about 13 inches. Underlying this is a 7-inch layer of dark yellowish-brown, firm, neutral very fine sandy loam with ½- to ¾-inch bands of very fine sand, silt, and clay. The next 8 inches of subsoil, transitional to the substratum, is dark yellowish-brown, very friable loamy very fine sand. The substratum begins at a depth of about 34 inches. It consists of very friable, brown to dark-brown loamy very fine sand that has a few mottles and is neutral in reaction.

A seasonal high water table is about 6 to 12 inches below the surface. The depth of soil available for rooting is mainly in the upper 15 to 24 inches and is related to the height of the water table. Permeability is moderate to moderately rapid throughout. The bands in the B horizon impede root development to a very limited extent. The available water capacity is moderate. Seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Minoa very fine sandy loam in an idle area, located 1.1 miles southeast of the junction of Long Pond and English Roads, town of Greece:

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

B1—10 to 13 inches, very pale brown (10YR 7/3) loamy fine sand; common, medium, distinct and prominent mottles of yellowish red (5YR 5/8) and yellowish brown (10YR 5/6) ; weak, fine, granular structure that parts to very weak, fine, subangular blocky structure; very friable; medium acid; clear, smooth boundary.

B21—13 to 19 inches, pale-brown (10YR 6/3) loamy very fine sand; many, coarse, distinct and prominent mottles of yellowish red (5YR 5/8), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2) ; weak, medium and coarse, subangular blocky structure; friable; a few reddish-brown and black iron and manganese concretions up to half an inch in diameter; slightly acid; abrupt, wavy boundary.

B22—19 to 26 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) ; weak, medium and coarse, subangular blocky structure; firm; alternating ½- to ¾-inch bands of very fine sand and silt and a few clay bands aggregate 4 inches; neutral; abrupt, smooth boundary.

B3—26 to 34 inches, dark yellowish-brown (10YR 4/4) loamy very fine sand; common, medium, distinct and prominent mottles of yellowish red (5YR 5/8) and yellowish brown (10YR 5/6) ; weak, medium and coarse, subangular blocky structure; very friable; neutral; clear, smooth boundary.

C—34 to 52 inches, brown to dark-brown (10YR 4/3) loamy very fine sand; few, fine, distinct and prominent, strong-brown (7.5YR 5/8) mottles and a few black

(10YR 2/1) stains; weak, medium and coarse, subangular blocky structure; very friable; neutral.

The solum ranges from 30 to 50 inches in thickness. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown or dark brown (7.5YR 4/2). Its reaction ranges from medium acid to slightly acid.

Where present, the B1 horizon ranges from brown or dark brown (10YR 4/3) to pink (7.5YR 7/4), and its mottle colors range from reddish brown to brownish yellow. The texture ranges from loamy fine sand to very fine sand to very fine sandy loam. Reaction ranges from medium acid to neutral. The B21 horizon ranges from brown (10YR 5/3) to pale yellow (2.5Y 7/4). Mottle colors are reddish gray and brownish yellow (10YR 6/8). The texture ranges from loamy fine sand to very fine sandy loam. In some profiles this horizon has iron and manganese concretions and lenses of gravel coated with clay. Reaction ranges from medium acid to neutral. The B22 horizon ranges from brown or dark brown (10YR 4/3) to light yellowish brown (2.5Y 6/4). Mottle colors range from reddish gray to brownish yellow (10YR 6/8). Where lamellae are present, they do not have an aggregate thickness exceeding 7 inches, or approximately three-fourths of the horizon. A few iron and manganese concretions are present in places. Reaction of this horizon ranges from slightly acid to neutral. The B3 horizon ranges from reddish brown (5YR 4/3) to light yellowish brown (10YR 6/4). Mottles range from reddish to yellow. Texture ranges from loamy very fine sand to fine sandy loam. This horizon has a few, thin, discontinuous bands of material similar to that in the B22 horizon in some places. Reaction ranges from slightly acid to neutral.

The C horizon ranges from dark reddish gray (5YR 4/2) to pale brown (10YR 6/3). Mottles range from reddish to yellow, and black stains or concretions are present in some profiles. The texture is loamy fine sand or loamy very fine sand. Some profiles have varved silt and very fine sand or stratified gravel beginning at a depth of 36 to 46 inches. Reaction is neutral to mildly alkaline, with calcareous material rarely at a depth greater than 60 inches.

The Minoa soils formed in the same kind of material as the well-drained Arkport soils, the moderately well drained Galen soils, and the poorly drained and very poorly drained Lamson soils. The Niagara, Odessa, and Canandaigua soils are near the Minoa soils and similar to them, but they formed in finer textured lacustrine deposits.

Minoa very fine sandy loam (Mn).—This level to nearly level soil has slopes of 0 to 2 percent. It occupies depressions and receives runoff from adjacent, better drained soils. Areas range from 3 to 50 acres or more in size and are in drainageways, 100 to 200 feet wide, or are small, irregularly shaped depressions on foot slopes.

Included with this soil in mapping are areas of the moderately well drained Elnora or Galen soils on knolls and ridges, areas of the poorly drained and very poorly drained Lamson soils in deep, small depressions, and a few small areas of the siltier Niagara soils. Where areas of this soil are adjacent to a poorly drained soil, long, narrow areas of gently sloping Minoa soils are included. Where this soil is adjacent to the finer textured Odessa soils, Cosad soils are a common inclusion.

This soil is suited to crops, pasture, and woodland. Wetness limits the choice of crops in undrained areas. The soil is particularly well suited to intensive use for vegetable crops but needs adequate artificial drainage for best yields. (Capability unit IIIw–2; woodland suitability group 3w2)

Muck

Muck soils are deep to shallow, very poorly drained, organic soils developed in depressions or old glacial swamps from woody and fibrous plant remains. These soils are generally level but are gently sloping where they occupy the outer edges of depressions. Most areas are in large depressions scattered throughout the county, but a few small areas are associated with mineral soils.

A representative Muck, deep, soil has a surface layer, about 11 inches thick, of black muck. This is underlain by a 12-inch layer of black, medium acid muck. This layer is less decomposed than the surface layer, and small pieces of reddish-brown, woody plant remains are present. At a depth of 23 inches is reddish-brown, neutral, partly decomposed peaty material.

These soils have a seasonal high water table and are ponded for prolonged periods in places. The depth of soil available for rooting is related to the height of the water table, except for water-tolerant plants. Available water capacity is high. Permeability is rapid in the well-decomposed muck and variable in the peaty material. Prolonged wetness and rapid decomposition are among the major limitations to use of these soils for farming.

Representative profile of Muck, deep, in a cultivated area, located one-half mile south and one-half mile east of the junction of Sweets Corner and Dublin Roads (100 yards east of a pumphouse in a field):

1—0 to 11 inches, black (10YR 2/1), well-decomposed muck; weak, medium, granular structure, but tends toward weak, medium, subangular blocky structure; very friable; medium to slightly acid; gradual, smooth boundary.

2—11 to 23 inches, black (10YR 2/1), well-decomposed muck containing more than 20 percent reddish-brown (5YR 4/3) woody plant remains; structureless, but tends to weak, medium, subangular blocky structure; very friable; medium acid; clear, irregular boundary.

3—23 to 50 inches, reddish-brown (5YR 4/3), slightly decomposed peaty material consisting primarily of leaves and sedges with some reddish-brown (5YR 4/4) woody plant remains; material appears layered with no other visible structure; friable; spongy; neutral.

The depth of these soils ranges from 1 to 30 feet. The decomposed and partly decomposed material is variable in depth but generally ranges from 24 to 48 inches. Below this depth, the material is slightly decomposed or undecomposed and consists of leaves, sedges, woody material, and sphagnum moss. Partly decomposed logs are common below the first layer. The undecomposed material is generally reddish brown (5YR 4/3) but ranges to brown or dark brown (7.5YR 4/4) in color. Hue of the surface layer is 5YR or 10YR with a color value of 2 and a chroma of 1. The reaction of the surface layer is dominantly slightly acid but ranges from medium acid to neutral. In some places small undecomposed or partly decomposed wood fragments are in this layer.

The color of the second horizon ranges from very dark brown (10YR 2/2) to black (10YR 2/1, 5YR 2/1). Generally, woody plant remains increase in quantity and size in this horizon and are reddish brown (5YR 4/3–4/4) in color. The reaction of this layer is generally slightly acid to neutral but is medium acid in places. In some places tongues of the second layer extend 4 to 5 inches into the third layer.

The reaction of the underlying material in Muck, deep, is generally neutral but is slightly acid in places. In Muck, shallow, the reaction ranges from slightly acid to moderately alkaline and becomes calcareous with increasing depth. Normally, Muck, shallow, has no third layer; a thick upper layer or the upper two layers are underlain by various kinds of mineral material.

Muck soils are associated with the nearby Canandaigua, Lamson, Edwards, and Wayland soils. The shallow phase has clay, sand, loamy material, or bedrock at a depth of 16 to 40 inches and is generally near or on the perimeter of old swamp areas. The silty Canandaigua and loamy Lamson soils are also on the perimeter of old lakebed areas at a slightly higher elevation. Where small streams transect Muck soils, Wayland soils are generally nearby. Wayland soils are alluvial soils that have

a medium to moderately fine texture. Edwards soils are muck deposits that are underlain by marl at a depth of 16 to 40 inches.

Muck, deep (Mr).—This level soil has the profile described as representative of the Muck soils. Areas are in the lowest depressions, which are old glacial lakebeds, and in the kame and kettle topography of the Mendon Pond area. Most areas are larger than 10 acres in size, with some as large as 80 acres.

Commonly included with this soil in mapping is Muck, shallow, which may cause some tilth and drainage problems, depending upon the underlying material. Also included are small areas of Edwards soils, which have marl above a depth of 40 inches, and small spots of the silty Canandaigua soils, which border some of the larger areas of Muck, deep. Other minor inclusions are Lamson, Niagara, Minoa, Sun, Massena, and Lyons soils.

In its natural state, the soil is suited to use as wetland wildlife habitat. If adequate drainage is provided, however, this is one of the most productive soils in the county. It is well suited to cultivated row crops or specialized vegetable crops. Except for a few water-tolerant trees, the soil is not well suited to woodland. Management on this soil includes the installation of adequate drainage to control the height of the water table and measures to control soil blowing. Establishing adequate drainage outlets is a problem in some areas. (Capability unit IIIw–1; woodland suitability group not assigned)

Muck, shallow (Ms).—The profile of this soil differs from that described as representative of Muck soils because the muck is underlain by a variety of materials at a depth of 16 to 40 inches. The substratum is normally loam, but in some places it is clay or bedrock. Areas of Muck, shallow, border depressions or are in small shallow depressions. This soil is level, and most areas are less than 10 acres in size.

Included with this soil in mapping are minor areas of Canandaigua, Lamson, Sun, and Lyons soils. Areas where the muck is only 12 to 16 inches thick over mineral material are also included. These inclusions do not materially affect use and management of Muck, shallow.

In its natural state, this soil is suited to use as wetland wildlife habitat. Generally, drainage is not feasible on these muck areas, because of subsidence. Areas that can be safely drained, however, are suited to most of the common crops grown in the county. Such areas can be used intensively for cultivated row crops and many specialized crops. Use for woodland is limited because only water-tolerant trees are suitable. (Capability unit and woodland suitability group not assigned)

Niagara Series

The Niagara series is made up of deep, somewhat poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. These level or nearly level soils formed in lacustrine deposits dominated by silt and very fine sand with some clay. They occupy lake plains where runoff is slow or where some runoff accumulates.

A representative nearly level Niagara soil in a cultivated area has a surface layer, about 10 inches thick, of dark-gray silt loam. The subsoil is 17 inches thick. The upper 5 inches is neutral, mottled, dark-brown, friable silt loam. Underlying this is a layer of neutral, mottled, light-brown, firm silt loam that is 10 inches thick. The lower 2 inches of the subsoil is transitional to the substratum and consists of firm, mottled, dark yellowish-brown layers of silt and clay that are neutral to mildly alkaline and become calcareous. The substratum, beginning at a depth of 27 inches, is mottled, calcareous, light-brown, varved silt and clay.

A high water table is within 6 to 12 inches of the surface for long periods of time. The depth of soil available for rooting is related to the height of the water table and is mainly between 15 and 24 inches. In undrained areas most roots are restricted to the upper 12 inches; roots penetrate much deeper in drained areas. The available water capacity is moderate to high. Permeability of the subsoil ranges from moderate to moderately slow and of the substratum, from moderately slow to slow.

Representative profile of Niagara silt loam in a cultivated area, located 600 feet north and 1,000 feet west of the junction of Brighton-Henrietta Town Line Road and Clinton Road, town of Brighton:

Ap—0 to 10 inches, dark-gray (10YR 4/1) silt loam; moderate, medium, granular structure, but tends toward weak, fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

B21t—10 to 15 inches, dark-brown (7.5YR 4/4) silt loam; common, medium, prominent mottles of brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable; tongues of Ap material extend along cracks and root channels; few clay films on ped faces and in pores; neutral; abrupt, wavy boundary.

B22t—15 to 25 inches, light-brown (7.5YR 6/4) silt loam; many, medium, prominent mottles of strong brown (7.5YR 5/6), pinkish gray (5YR 7/2), and light yellowish brown (2.5YR 6/4); moderate, coarse, angular blocky structure; firm; dark grayish-brown (10YR 4/2) clay films on ped faces and in pores; ¼- to ½-inch thick clay layers are present; neutral; abrupt, wavy boundary.

B3—25 to 27 inches, dark yellowish-brown (10YR 4/4) stratified silt and clay; few, fine, faint to prominent mottles of yellowish brown (10YR 5/6) and reddish brown (5YR 4/4); moderate, coarse, blocky structure in strata; firm, dark-gray (10YR 4/1) clay films along fracture lines and ped faces; neutral to mildly alkaline, calcareous in lower part; abrupt, smooth boundary.

C—27 to 50 inches, light-brown (7.5YR 6/4), varved silt and clay; many, medium, prominent mottles of yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6); massive; clay layers are dominantly light greenish gray (5BG 7/1); calcareous.

The solum ranges from 24 to 40 inches in thickness and is dominantly slightly acid to neutral in reaction. Depth to the underlying calcareous silt, clay, or sand is sometimes greater than 3½ feet. The Ap horizon ranges from dark brown (7.5YR 3/2) and very dark gray (10YR 3/1) to dark grayish brown (2.5Y 4/2). Its structure is moderate, medium or coarse, granular. In places an A2 horizon is present that ranges from dark brown (7.5YR 4/2) to very pale brown (10YR 7/3) and light gray (2.5Y 7/2). The texture of the A2 horizon is coarse silt loam or very fine sandy loam; the structure is weak, fine or medium, subangular blocky; the consistence is friable or firm.

The Bt horizon ranges from dark reddish brown (5YR 3/2) to light yellowish brown (2.5Y 6/4). Ped coats in the upper and middle parts of the B horizon have colors with a chroma of 1 or 2. The ped interiors have distinct or prominent mottles. Texture of the Bt horizon ranges from silt loam or very fine sandy loam to light silty clay loam. Thin layers of clay are in some places. The B3 horizon is calcareous in places.

The C horizon ranges from dark reddish gray (5YR 4/2) to light yellowish brown (2.5Y 6/4) and has distinct or prominent mottles. It consists of varved silt, clay, and very fine sand.

In some places it is dominantly silt with thin layers of clay; in others, silt with thin layers of very fine sand.

The Niagara soils are closely associated with the moderately well drained Collamer soils and the poorly drained Canandaigua soils. They are also associated with the Minoa, Rhinebeck, and Odessa soils. All of these associated soils formed in lacustrine deposits. The Niagara soils have a finer textured B horizon than that in the Minoa soils and a coarser textured one than that in the Rhinebeck and Odessa soils. The Appleton soils are similar to the Niagara soils in drainage but formed in loamy till rather than in silty lacustrine deposits. The Niagara soils, loamy subsoil variant, have loamy till within a depth of 40 inches.

Niagara silt loam (Ng).—This level to nearly level soil has slopes of 0 to 2 percent. It occupies an intermediate landscape between high knobs and low depressions in old glacial lakebeds. One of the major mapping units in the county, this soil is scattered in areas generally greater than 10 acres in size. Where the soil borders Black Creek, it is subject to longer periods of ponding because of its lower elevation in relation to the flood plain of the creek.

Commonly included with this soil in mapping are coarser Minoa soils, Collamer and Hilton soils in the more sloping areas, and associated Canandaigua soils in the low depressions. Where this soil occurs in association with the glacial till landscape, it is generally found in depressions or drainageways and has inclusions of Appleton soils or the loamy subsoil variant of the Niagara soils. Small areas with a very fine sandy loam texture are included.

This soil is suited to crops, pasture, or woodland. A slight wetness restricts the choice of crops. When it is drained the soil is well suited to many specialized crops. (Capability unit IIIw–2; woodland suitability group 3w2)

Niagara Series, Loamy Subsoil Variant

The Niagara series, loamy subsoil variant, consists of deep, somewhat poorly drained soils that have a medium-textured surface layer and a medium-textured to moderately fine textured subsoil. These soils developed in thin deposits of lacustrine material dominated by silt and very fine sand with some clay. At a depth of 20 to 36 inches is calcareous glacial till. Areas of these soils form the perimeter of depressions or border old glacial lakebeds adjacent to the glacial end moraines or till plains along drainageway dissections.

A representative loamy subsoil variant of the Niagara soils has a surface layer, 10 inches thick, of very dark grayish-brown silt loam. The 4-inch thick subsurface layer is grayish-brown, firm very fine sandy loam that contains many mottles. The subsoil, about 18 inches thick, is brown to dark-brown, neutral, firm silty clay loam. It contains many yellow, yellowish-brown, and light-gray mottles. At a depth of 32 inches is the firm, calcareous, gravelly sandy loam till substratum.

A seasonal high water table is within 6 to 12 inches of the surface and persists late into spring. The depth of soil available for rooting is related to the height of the seasonal water table and is mainly in the upper 15 to 24 inches. Available water capacity is moderate to high. Permeability is moderate to moderately slow in the subsoil and slow to rapid in the substratum, depending on the density and texture of the till. Seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Niagara silt loam, loamy subsoil variant, in an unimproved pasture, located 2,600 feet south and 1,100 feet east of the junction of Embury and Scribner Roads, town of Penfield:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; friable; neutral; abrupt, wavy boundary.

A2—10 to 14 inches, grayish-brown (10YR 5/2) very fine sandy loam; many, coarse, distinct, yellowish-brown mottles that make up about 50 percent of the volume; weak, medium, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

B21t—14 to 24 inches, brown (7.5YR 5/2) silty clay loam; many, coarse, prominent mottles of yellow and yellowish brown make up about half of the matrix; moderate, medium, angular blocky structure; firm; many grayish-brown (10YR 5/2) ped coats; few, brown to dark-brown (7.5YR 4/4) clay films on ped faces and in pores; neutral; clear, wavy boundary.

B22t—24 to 32 inches, brown to dark-brown (7.5YR 4/2) silty clay; many, medium, prominent mottles of yellow and light gray; moderate, medium, angular blocky structure; firm; thick, brown to dark-brown (7.5YR 4/4) clay films on ped surfaces and in pores; neutral; abrupt, wavy boundary.

IIC—32 to 53 inches, reddish-brown (5YR 4/3) gravelly sandy loam; weak, thin and medium, platy structure; firm; calcareous.

The solum ranges from 20 to 36 inches in thickness and has up to a 5 percent content of coarse fragments. The dominant depth to calcareous till is 30 to 34 inches. The Ap horizon ranges from dark reddish brown (5YR 3/2) to brown or dark brown (10YR 4/3) or dark grayish brown (2.5Y 4/2). When moist, this horizon has a color value of 3 or 4 and a chroma of 2 or 3. The texture is silt loam or very fine sandy loam. Reaction of the Ap horizon ranges from medium acid to neutral. The A2 horizon ranges from reddish gray (5YR 5/2) to light yellowish brown (2.5Y 6/4) and has distinct or prominent mottles. Its texture is coarse silt loam or very fine sandy loam. The reaction ranges from medium acid to neutral and is generally slightly more acid than in the Ap horizon.

The Bt horizon ranges from reddish gray (5YR 5/2) to dark grayish brown (2.5Y 4/2). Mottles are distinct or prominent. Chroma on the ped faces is 1 or 2. The texture is silt loam or silty clay loam. Clay films become more numerous and thicker in the lower part of the B horizon. Reaction ranges from slightly acid to mildly alkaline, and characteristically, the pH increases with depth.

The IIC horizon ranges from dark reddish brown (5YR 3/2) to brown (7.5YR 5/4). Its texture ranges from gravelly sandy loam to gravelly loam and its consistence, from friable to very firm. Carbonates may be leached from the upper 2 to 4 inches of this horizon.

Niagara soils, loamy subsoil variant, are commonly adjacent to the moderately well drained, loamy subsoil variant of Collamer soils. These soils formed in similar material. The variant of the Niagara soils is near other Niagara soils, Canandaigua soils, and Appleton soils. Till is at a depth of 20 to 36 inches in the variant soils in contrast to the deep, silty deposits in which the Niagara and Canandaigua formed. The Niagara variant soils lack the quantity of coarse fragments in the upper part of the solum that are characteristic of the somewhat poorly drained Appleton soils, which formed in glacial till.

Niagara silt loam, loamy subsoil variant (Nr).—This level soil is on intermediate landscapes, in low depressions, and on ridges and knolls. Areas occur throughout the county, generally near the deeper Niagara soils. Most areas are 10 acres in size or larger. The slope is 0 to 2 percent.

In addition to inclusions of the deeper Niagara soils, small areas of poorly drained Canandaigua soils are commonly included in the low depressions. On some of the higher knolls and ridges are small inclusions of the moderately well drained Collamer silt loam and Collamer silt loam, loamy subsoil variant. Areas of Appleton soils,

which formed in glacial till, and of Minoa soils, which are dominated by very fine sand, are also common inclusions.

This soil is suited to crops, pasture, and woodland. If the soil is undrained, wetness restricts the choice of crops. Drained areas are well suited to most cultivated crops. The main management requirement is drainage, and in some areas establishing adequate drainage outlets is a problem. Land grading improves surface drainage. (Capability unit IIIw–2; woodland suitability group 3w2)

Odessa Series

In the Odessa series are deep, level to gently sloping, somewhat poorly drained soils that have a medium-textured surface layer and a fine-textured subsoil. These soils developed in deep deposits of calcareous lacustrine clay and silt in old glacial lakebeds. Areas are on intermediate slopes between the high knobs and low depressions, mainly in old glacial Lake Dana.

A representative Odessa soil has a surface layer, 7 inches thick, of dark reddish-brown silt loam. The subsoil is mottled, neutral, reddish-brown clay that is 16 inches thick. At a depth of 23 inches is the calcareous, very firm, reddish-brown and brown silty clay substratum. Below a depth of 45 inches, the substratum consists of firm layers of clay, silt, and very fine sand that are pink, brown, yellowish brown, dark yellowish brown, and light greenish gray in color. A few pebbles and cobbles are present below a depth of 56 inches.

A seasonal high water table is within 6 to 12 inches of the surface and is perched on the subsoil and substratum layers that are slowly permeable. The depth of soil available for rooting is related to the height of the water table and is mainly in the upper 15 to 24 inches. As the water table recedes, a few roots penetrate deeper. The available water capacity is moderate to low. Seasonal wetness is one of the major limitations to use of these soils for farming. Maintenance of good tilth is a problem.

Representative profile of Odessa silt loam, 0 to 2 percent slopes, in an idle area, located 1 mile east and 1,300 feet south of the junction of State Route 15A and Calkins Road, town of Henrietta:

Ap—0 to 7 inches, dark reddish-brown (5YR 3/2) silt loam; strong, fine, subangular blocky structure; firm, very hard; many fine roots; fine, distinct root staining; neutral; abrupt, smooth boundary.

B2t—7 to 23 inches, reddish-brown (5YR 4/3) clay; many, fine, faint mottles of dark brown to brown and dark reddish brown; moderate, medium and coarse, subangular blocky structure within strong, very coarse, prismatic structure; firm, very hard; clay films on ped faces are dark reddish brown (5YR 3/2); common fine roots; neutral; diffuse, wavy boundary.

C1—23 to 45 inches, reddish-brown (5YR 5/4) and brown (7.5YR 5/2) silty clay; strong, coarse, subangular blocky structure in a platy arrangement within strong, coarse prisms; very firm, extremely hard; few fine roots; faint streaks of greenish gray and gray; calcareous with some precipitated calcium carbonate; clear, wavy boundary.

IIC2—45 to 56 inches, pink (5YR 7/4), brown (7.5YR 5/4), yellowish-brown (10YR 5/6), and light greenish-gray (5G 7/1) layers of varved silt and clay with some very fine sand; strong, medium to very thick, platy structure; firm; no roots; calcareous; clear, wavy boundary.

IIIC3—56 to 60 inches, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4), varved silt and very fine sand; many, coarse, prominent spots of light reddish brown (5YR 6/3) and yellowish brown (10YR 5/6); strong, medium to very thick, platy structure; firm; few pebbles and cobbles; calcareous.

The solum ranges from 20 to 40 inches in thickness. Its reaction ranges from medium acid to neutral, and it may be calcareous in the lower part. Depth to carbonates ranges from 17 to 45 inches. Depth to bedrock is greater than 40 inches and generally more than 10 feet. The coarse fragment content in the profile ranges from 0 to 5 percent. The Ap horizon ranges from dark reddish brown (5YR 3/2) to dark grayish brown (10YR 4/2). In some places an A2 horizon is present that is as thick as 4 inches. It is pinkish-gray (7.5YR 6/2) silt loam to silty clay loam and has distinct, strong-brown or reddish-brown mottles.

The B2t horizon ranges from dusky red (2.5YR 3/2) to brown (7.5YR 5/4) and contains many brown to dark-brown and dark reddish-brown mottles. The texture ranges from silty clay to clay. Ped coats are dark reddish brown or very dark gray with a color chroma of 2 or 1.

The C horizon has variable colors, ranging from gray (5Y 5/1) and light greenish gray (5G 7/1) to red (2.5YR 5/6), and consists of stratified clay and silt with lenses of sand in some places.

The Odessa soils are closely associated with the moderately well drained to well drained Schoharie soils and the poorly drained to very poorly drained Lakemont soils. These soils formed in similar material. The somewhat poorly drained Churchville soil and the well drained and moderately well drained Cayuga soils are similar to the Odessa soils but have till at a depth of 20 to 38 inches. Odessa soils are near the somewhat poorly drained Appleton soils and the somewhat poorly drained to moderately well drained Ovid soils. The Appleton and Ovid soils formed in till and have a coarser textured B horizon than that in the Odessa soils.

Odessa silt loam, 0 to 2 percent slopes (OdA).—This soil has the profile described as representative of the series. Areas are on intermediate landscapes between the high knobs and low depressions in old glacial lakebeds. Most areas are 10 acres or more in size.

Commonly included with this soil in mapping are small areas of poorly drained and very poorly drained Lakemont soils in low depressions and along drainageways. These Lakemont inclusions remain wet longer than Odessa soils. Inclusions of moderately well drained to well drained Schoharie soils that are too small to map separately are on small knobs. In some areas near the perimeter of old lakebeds are small included areas of silty Niagara soils. Where glacial till is above 40 inches, small areas of Churchville soils are included. Other inclusions are minor areas of Rhinebeck, Ovid, and Appleton soils and an Odessa soil that has a moderately fine textured surface layer.

This soil is suited to crops, pasture, or woodland. If drainage is not adequate, planting is delayed and the choice of crops is restricted. If drained, the soil is moderately well suited to a wide variety of commonly grown crops. The soil clods and puddles easily if tilled when too wet. A slight wetness is the major limitation to use of this soil. (Capability unit IIIw–3; woodland suitability group 3w1)

Odessa silt loam, 2 to 6 percent slopes (OdB).—The profile of this soil differs from that described as representative of the series because it is thinner in places. This soil is less susceptible to surface ponding during extremely wet periods than Odessa silt loam, 0 to 2 percent slopes. Most areas are small, generally less than 10 acres in size.

The most common inclusions with this soil in mapping are Schoharie soils on small knobs and Churchville soils in areas where till is at a depth above 40 inches. Minor inclusions are areas of Ovid, Lakemont, and Niagara soils

and areas of Odessa soils that have a moderately fine textured surface layer.

This soil is suited to crops, pasture, and woodland. In places the choice of crops is restricted if drainage is not adequate. A severe hazard of erosion exists on unprotected cultivated areas. If adequate drainage is provided and erosion is controlled, the soil is fairly well suited to a wide variety of commonly grown crops. If tilled when too wet, the soil clods and puddles easily. (Capability unit IIIw–4; woodland suitability group 3w1)

Ontario Series

The Ontario series is made up of deep, well-drained, medium-textured and moderately coarse textured soils. These soils formed in loamy, strongly calcareous glacial till dominated by red sandstone and limestone with minor quantites of shale. These upland soils are gently sloping to very steep. Areas occur throughout the county on the till plains, on glacial moraines, or on drumlins.

A representative Ontario soil has a surface layer, about 8 inches thick, of dark-brown loam. It is underlain by a subsurface layer, about 17 inches thick, of neutral, friable, reddish-brown very fine sandy loam that contains some gravel and cobbles. At a depth of about 25 inches is a dark reddish-brown, very firm gravelly loam subsoil. It is neutral in reaction and extends to a depth of 39 inches. The substratum is reddish-brown, very firm gravelly loam that is calcareous.

Permeability is moderate to a depth of about 25 inches and moderate to slow below that depth. The depth of soil available for rooting is 24 to 30 inches or more. Available water capacity is moderate to high. Other than the slope and erosion hazard, there are few limitations to use of these soils for farming. They respond well to lime and fertilizer.

Representative profile of Ontario fine sandy loam, 3 to 8 percent slopes, in a meadow, located 500 feet south and 200 feet west of the junction of Ayrault and Lyndon Roads, town of Perinton:

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) fine sandy loam; moderate, medium and fine, granular structure; very friable; less than 10 percent coarse fragments; slightly acid; abrupt, smooth boundary.

A2—8 to 25 inches, reddish-brown (5YR 4/4) very fine sandy loam; moderate, medium, platy structure; friable; 5 to 10 percent coarse fragments, including cobbles; neutral; clear, irregular boundary.

B2t—25 to 39 inches, dark reddish-brown (5YR 3/4) gravelly loam; weak, coarse, subangular blocky structure; very firm in place and when removed; yellowish-red (5YR 4/6) sandy or silty coats on peds in the upper 4 inches; distinct clay films in pores, along root channels, and on ped faces dominantly in the lower 10 inches; few, fine, faint, yellowish-red mottles in the bottom inch of the horizon; 15 to 30 percent gravel; neutral; abrupt, wavy boundary.

C—39 to 50 inches, reddish-brown (5YR 4/3) gravelly loam; moderate, medium and thick, platy structure; very firm; some reddish-brown (5YR 5/3) coats on plate faces; 25 to 30 percent gravel; calcareous.

The solum ranges from 30 to 42 inches in thickness. It ranges from medium acid to neutral in reaction. The content of coarse fragments in the solum ranges from 5 to 35 percent and includes some stones. Depth to calcareous till is dominantly 36 to 40 inches. The Ap horizon ranges from dark brown (7.5YR 3/2) to grayish brown (10YR 5/2) in color and from fine sandy loam to loam in texture. The A2 horizon ranges from reddish brown (5YR 4/4) to yellowish brown (10YR 5/4). Its texture ranges from fine sandy loam to very fine sandy loam and in some areas to light loam. The boundary of the A2 horizon may be clear or gradual and wavy or irregular.

Where the A2 horizon is thin, a B&A horizon is present that ranges in thickness from 0 to 9 inches. The exterior of the peds in this horizon is similar to that of the peds in the A2 horizon, and the ped interiors are similar to those of the B2t horizon. The B2t horizon ranges from dark reddish brown (5YR 3/3) to yellowish brown (10YR 5/4). Texture ranges from sandy clay loam to loam or the gravelly analogs, with a clay content ranging from 18 to 28 percent. In places tongues of the B2t horizon extend into the till material.

The C horizon ranges from reddish brown (5YR 4/3) to dark grayish brown (10YR 4/2). The texture is gravelly loam to gravelly sandy loam. Coarse fragment content includes some stones and ranges from 20 to 50 percent.

The Ontario soils are commonly associated with the Hilton and Appleton soils, which formed in similar material. The Hilton soils are moderately well drained, and the Appleton soils are somewhat poorly drained. Ontario soils are near the Cazenovia, Honeoye, and Madrid soils. They differ from the similar Cazenovia soils in having less clay in the B horizon, from the Honeoye in having a slightly coarser textured surface layer and a thicker solum, and from the Madrid soils in having a finer textured B horizon. The Ontario soils differ from the Sodus soils because they do not have a fragipan. Ontario soils are in a complex with the well-drained to excessively drained Palmyra soils and with the well-drained Arkport soils. The Palmyra soils formed in gravelly glacial outwash, and the Arkport soils formed in sandy deltaic deposits.

Ontario fine sandy loam, 3 to 8 percent slopes (OfB).—This gently sloping soil is on the glacial till plains at higher elevations. Its profile differs from that described as representative of the series because it is somewhat sandier throughout the solum.

The most common inclusions with this soil in mapping are areas of the gently sloping, moderately well drained Hilton soils, which have a higher seasonal water table and remain wet for a longer period. Also included are spots of the somewhat poorly drained Appleton soils in depressions, some areas of Arkport soils, and nearly level areas of Ontario fine sandy loam. In areas where Madrid soils are mapped nearby, there are inclusions of Madrid soils on comparable slopes.

This soil is well suited to all the crops commonly grown in the county, including corn, small grain, hay, and pasture. It is suited to some specialized crops. If properly managed, the soil can be cropped intensively. Measures for controlling erosion are the main management need. This soil is well suited to woodland and supports many good hardwood stands. (Capability unit IIe–1; woodland suitability group 2o1)

Ontario fine sandy loam, 8 to 15 percent slopes (OfC).—The profile of this soil differs from that described as representative of the series because it is somewhat sandier. Areas of this soil are generally larger than 10 acres in size. They occur on the side slopes of drumlins, near edges of drainageways, and on the steeper knobs and ridges on the glacial till plains.

Commonly included with this soil in mapping are Madrid, Palmyra, and Cazenovia soils. The included Madrid soils are generally around the base of slopes and are associated with this soil principally in the town of Penfield. Madrid soils have an eolian cap and a coarser textured subsoil than the Ontario. The Palmyra inclusions are underlain by gravel and are on the side slopes of drumlins where this soil is mapped. Small included areas of the finer textured, well drained and moderately well drained Cazenovia soils remain wet longer in spring. Also included are eroded spots of this soil that have small gullies in places.

This soil is suited to the crops commonly grown in the county, such as small grain, hay, pasture, and woodland. Corn and other cultivated crops can be grown if proper management is used to control erosion. Row crops cannot be grown intensively. Conservation measures for controlling erosion are the major management requirements. (Capability unit IIIe–1; woodland suitability group 2o1)

Ontario loam, 3 to 8 percent slopes (OnB).—This gently sloping soil has the profile described as representative of the series. It occurs on the till plains and on the sides of drumlins, generally as areas 10 acres in size or larger.

Dominant inclusions in mapping are spots of the somewhat poorly drained Appleton soils and moderately well drained Hilton soils and small eroded areas. In some places there are inclusions of small spots of Cayuga and Cazenovia soils that have a finer textured subsoil, coarser textured Madrid soils, or Honeoye soils that have a thinner solum. Areas of level to nearly level Ontario loam that are too small to map separately are also included.

This soil is well suited to the crops commonly grown in the county, including corn, small grain, hay, and pasture, and to many specialized crops. The soil is well suited to woodland, and it supports many excellent stands of hardwoods. Conservation measures that control erosion are the major management needed on cropped areas of this soil. (Capability unit IIe–1; woodland suitability group 2o1)

Ontario loam, 8 to 15 percent slopes (OnC).—The profile of this soil differs from that described as representative of the series because the subsurface layer is somewhat thinner. Areas of this soil are generally larger than 10 acres in size and occur on the side slopes of drumlins and near the edge of the till plains.

The dominant inclusions in mapping are areas of the coarser textured Madrid soils; the gently sloping, moderately well drained Hilton soils; and the strongly sloping, eroded Ontario soils. Minor inclusions are Palmyra, Arkport, and Cayuga soils.

This soil is suited to crops, pasture, or woodland. If the soil is cultivated and not protected, it is subject to severe erosion. (Capability unit IIIe–1; woodland suitability group 2o1)

Ontario loam, 8 to 15 percent slopes, eroded (OnC3).—Approximately 75 percent of these soil areas have most of the original surface soil removed through erosion. Shallow gullies are common. Most areas are long and narrow and are on the perimeter of gently sloping, cultivated fields. Areas are generally smaller than 10 acres in size, but a few are as large as 25 to 30 acres.

Commonly included with this soil in mapping are less severely eroded spots. Small areas of Honeoye, Hilton, and Palmyra soils are minor inclusions.

This soil is suited to hay, pasture, and woodland. It is poorly suited to cultivated crops. A rotation with long-term stands of close-growing crops should be favored. Because the texture of the present surface soil causes the water infiltration rate to be less than in uneroded areas, the runoff rate is higher and the hazard of erosion is greater on this eroded soil. The soil requires an extremely high level of management for controlling erosion. Fertilizer applications should be sufficient to encourage a rapid, thick plant growth. (Capability unit IVe–1; woodland suitability group 2o1)

Ontario loam, 15 to 25 percent slopes, eroded (OnD3).—The profile of this soil differs from that described as representative of the series because most of the original surface soil has been lost through erosion on 75 percent of the soil areas and the subsurface layer is thinner. This moderately steep soil is along escarpments and on the steeper sides of drumlins.

Uneroded, moderately steep Ontario loam soils are the major inclusion in mapping. Minor inclusions are areas of Hilton, Palmyra, Madrid, and Arkport soils.

This soil is suited to pasture and woodland. It is limited to use for farming by slope and by the severe hazard of continuing erosion. Tillage should be restricted mainly to pasture renovation. (Capability unit VIe–1; woodland suitability group 2r2)

Ontario loam, 25 to 60 percent slopes (OnF).—The profile of this soil differs from that described as representative of the series because it generally has thinner surface and subsurface layers. Areas are on the steeper escarpments bordering drainageways and on the steeper sides of drumlins. Most areas are oblong in shape and are 10 acres in size or larger.

Commonly included with this soil in mapping are small areas of Palmyra, Arkport, and Honeoye soils.

This soil has limited usefulness and should be kept in permanent vegetation, preferably woodland. Most slopes are too steep for tillage by machinery. The soil produces some excellent stands of hardwoods and conifers. Controlling erosion is the major management problem. (Capability unit VIIe–1; woodland suitability group 2r5)

Ontario-Palmyra-Arkport complex, rolling (OpC).—This complex consists of Ontario, Palmyra, and Arkport soils in varying proportions and occurring in an erratic pattern. Any one of these soils may make up as much as 40 percent of a mapped area or as little as 20 percent. Each of these soils is described under its respective series. This mapping unit has complex slopes closely resembling kame topography. The slope is dominantly 8 to 15 percent. The complex is not extensive, but occurs in large areas.

In some areas, Schoharie and Cayuga soils are included in mapping. Also included in depressions and along drainageways are somewhat poorly drained soils that formed in material similar to the parent material of the Ontario, Palmyra, or Arkport soils.

This mapping unit is moderately well suited to crops, pasture, or woodland. Complex slopes somewhat restrict the choice of cropping systems. Contour plowing to control erosion is generally not feasible. A rotation that includes long-term stands of close-growing crops is generally the only practical erosion control measure. (Capability unit IIIe–2; woodland suitability group 2o1)

Ontario-Palmyra-Arkport complex, hilly (OpD).—This complex consists of Ontario, Palmyra, and Arkport soils in varying proportions and erratic patterns. Any one of these soils may make up as much as 40 percent of a mapped area or as little as 20 percent. Each of these soils is described under its respective series. They occur in association with the rolling soils. Slopes are convex, and the gradient is mainly between 15 and 25 percent. The complex is not extensive, but occurs in large areas.

Included with these soils in mapping are the gently sloping Cayuga soils and the strongly sloping to steep Schoharie soils.

This complex is not well suited to cultivated crops, because it is moderately steep. Small grain, hay, pasture, and woodland are suitable uses for these soils. The major management need is controlling erosion. Most erosion control

practices that include contour measures are not applicable. The most feasible management is a rotation that favors sod crops. (Capability unit IVe–2; woodland suitability group 2r2)

Ontario-Palmyra-Arkport complex, steep (OpF).—This complex consists of Ontario, Palmyra, and Arkport soils in varying proportions. Any one of these soils may occupy as much as 40 percent of a mapping area or as little as 20 percent. Each of these soils is described under its respective series. Slopes are complex, and the gradient is 25 to 60 percent.

Included in mapping are small areas of Cayuga, Schoharie, Cazenovia, Colonie, and Madrid soils.

This complex is unsuited to cultivation because of the slope. It is suited to woodland, and in places it has limited suitability for pasture. The major management need is controlling erosion. (Capability unit VIIe–1; woodland suitability group 2r5)

Ovid Series

The Ovid series consists of deep, somewhat poorly drained to moderately well drained soils that have a medium-textured surface layer and a moderately fine textured subsoil. The soils are level to nearly level and are near old glacial lakebed areas, but at slightly higher elevations. These soils formed in calcareous glacial till high in shale, Medina sandstone, and reworked lacustrine deposits. Areas south of the Lockport escarpment contain more limestone.

A representative Ovid soil has a surface layer, 10 inches thick, of very dark brown silt loam. The neutral, mottled, reddish-brown subsoil is 14 inches thick. The upper part of the subsoil is firm silt loam and grades to firm silty clay loam at a depth of about 16 inches. The substratum begins at a depth of 24 inches and is very firm, reddish-brown, calcareous gravelly loam that contains numerous olive-gray shale fragments.

A seasonal high water table is 6 to 12 inches from the surface for extended periods of time. The lower part of the subsoil and underlying till layers are moderately slowly to slowly permeable. The depth of soil available for rooting is controlled by the height of the seasonal water table and is mainly between 15 to 24 inches. Available water capacity is moderate to high. Seasonal wetness is one of the major limitations to use of these soils for farming.

Representative profile of Ovid silt loam in an orchard, located half a mile south and 100 feet west of the junction of U.S. Route 104 and Redman Road, town of Clarkson:

Ap—0 to 10 inches, very dark brown (10YR 2/2) silt loam; moderate, medium, subangular blocky structure to weak, medium, granular structure; friable; neutral; clear, smooth boundary.

B21—10 to 16 inches, reddish-brown (2.5YR 4/4) silt loam; many, medium, prominent mottles of yellowish red and pinkish gray; weak, coarse, prismatic structure, breaking to moderate, medium, subangular blocky structure; firm; more plastic than Ap horizon; dark-brown (7.5YR 3/2) clay films on ped faces increase with depth; 5 percent gravel; neutral; gradual, wavy boundary.

B22t—16 to 24 inches, reddish-brown (5YR 4/3) silty clay loam; many, fine, distinct and prominent mottles of yellowish red and pinkish gray; moderate, medium and coarse, subangular blocky structure with weak prisms evident; firm; dark reddish-gray (5YR 4/2) clay films are prominent on ped faces and in pores and increase with depth; 5 percent gravel; neutral; abrupt, wavy boundary.

IIC—24 to 51 inches, reddish-brown (2.5YR 4/4) gravelly loam till; few, fine, faint mottles; massive, but tends toward weak, thick, platy structure; very firm; common shale frements of olive gray (5Y 4/2); 25 percent gravel; calcareous.

The solum ranges from 20 to 40 inches in thickness and from medium acid to neutral in reaction. It contains 5 to 30 percent coarse fragments. Red and greenish shale fragments are very common throughout the profile. Depth to bedrock is greater than 40 inches. The Ap horizon ranges from very dark brown (10YR 2/2) to dark brown (7.5YR 3/2). In some areas a highly mottled A2 horizon is present that is generally thin or discontinuous. The A2 horizon ranges from brown or dark brown (7.5YR 4/2) to pale brown (10YR 6/3).

The B horizon ranges from weak red (2.5YR 4/2) to brown (7.5YR 5/4) and has a chroma of 2 in the matrix where 7.5YR hues are dominant. Clay films are present on ped faces and in pores and have a chroma of 2. The texture of the upper part of the B horizon ranges from loam to silt loam and the texture of the lower part, from sandy clay loam to silty clay loam. The clay content ranges from 28 to 35 percent.

The IIC horizon ranges from weak red (2.5YR 4/2) to brown or dark brown (7.5YR 4/4). In areas near red shale bedrock, the dominant hue may be 10R. The texture ranges from loam to sandy loam. Gravel is common in the C horizon, and the coarse fragment content, including some stones, ranges from 10 to 30 percent. The horizon is weakly to strongly calcareous.

The Ovid soils are associated with the well drained to moderately well drained Cazenovia soils, which formed in the same kind of material. The Ovid soils are similar to the well drained and moderately well drained Cayuga soils and the somewhat poorly drained Odessa and Churchville soils. The Cayuga, Odessa, and Churchville soils have a higher clay content in the B2 horizon than the Ovid. The Ovid soils are also similar to Lakemont soils, loamy subsoil variant, which are poorly drained to very poorly drained and occur at lower elevations.

Ovid silt loam (Ov).—This level to nearly level soil has the profile described as representative of the series. It has slopes of 0 to 3 percent and lies on broad, flat areas adjacent to drainageways or bordering slight depressions. Areas are 10 acres in size or larger.

Common inclusions in mapping are areas of Lakemont silt loam, loamy subsoil variant, which are in the lowest part of the landscape and remain wet longer. Where clay deposits are deep, there are common inclusions of Odessa soils, which have a clay-textured subsoil and substratum. Small included areas of well drained to moderately well drained Cazenovia soils are at higher elevations.

This soil is suited to the crops commonly grown in the county, such as corn, small grain, hay, and pasture, and to woodland. If properly managed, the soil is suited to some specialized crops. Adequate surface and subsurface drainage is the main management need. Where this soil is cropped intensively, maintenance of tilth is a problem. (Capability unit IIIw–3; woodland suitability group 3w2)

Ovid and Appleton silt loams, limestone substratum (Ow).—These nearly level soils occur in broad areas, generally 10 acres in size or larger. They may occur singly or together in a mapped area. Each has a profile similar to that described as representative of its respective series, except that hard rock is at a depth of 3½ to 6 feet. These soils are closely associated with the Lockport escarpment, and some small areas are associated with other rock formations.

Commonly included in mapping are Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes, in the more sloping areas. Small inclusions of the

wetter Sun loam, moderately shallow variant, are in the lower areas. Some inclusions have limestone at a depth less than 3½ feet.

These soils are suited to crops, pasture, or woodland. If adequately drained, they are suited to many of the specialized crops grown in the county and can be cropped intensively. Establishing drainage outlets is a problem in places because bedrock is near the surface. (Capability unit IIIw–3; woodland suitability group 3w2)

Palmyra Series

In the Palmyra series are deep, well-drained to excessively drained soils that are medium-textured and moderately coarse textured. These nearly level to very steep soils developed in glacial outwash deposits of stratified sand and gravel with a high limestone content. Areas are throughout the county on kames, eskers, and terraces in old glacial outwash valleys and along the major streams. The principal areas of these soils occur in association with the old Rush-Victor and Fairport glacial lake outlets.

A representative Palmyra soil has a surface layer, 7 inches thick, of dark grayish-brown gravelly loam. Underlying this is a brown gravelly fine sandy loam subsurface layer that is very friable and is neutral in reaction. Beginning at a depth of 15 inches is the subsoil. The upper part is reddish-brown gravelly sandy clay loam. The lower part is brown to dark-brown gravelly fine sandy loam. At a depth of 30 inches is the reddish-brown, calcareous, stratified sand and gravel substratum.

The depth of soil available for rooting is unrestricted but is mainly between 24 and 30 inches. The available water capacity in the root zone is moderate. Permeability is moderately rapid in the surface and subsurface layers, moderate in the upper part of the subsoil, and moderately rapid to rapid in the lower part of the subsoil and in the substratum. These soils warm up early in spring. During dry periods of the growing season, there is a risk of droughtiness.

Representative profile of Palmyra gravelly fine sandy loam, 3 to 8 percent slopes, in a gravel pit, located 600 feet south and 300 feet west of the junction of Smith and Pittsford-Mendon Center Roads, town of Mendon:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) gravelly fine sandy loam; moderate, medium, granular structure; very friable; many roots; 20 percent gravel; neutral; gradual, smooth boundary.

A2—7 to 15 inches, brown (7.5YR 5/4) gravelly fine sandy loam; weak, medium, subangular blocky structure; very friable; common roots; 20 percent gravel; neutral; gradual, irregular boundary.

B2t—15 to 22 inches, reddish-brown (5YR 4/4) gravelly sandy clay loam; moderate, medium and coarse, subangular blocky structure; firm; brown (7.5YR 5/4) silt coats on ped surfaces and vertical faces are more prominent in upper part of horizon; clay films in pores and on ped faces; common roots; 20 to 30 percent gravel; neutral; gradual, irregular boundary.

B3—22 to 30 inches, brown to dark-brown (7.5YR 4/4) gravelly fine sandy loam; brown (7.5 YR 5/4) material present; weak, medium, subangular blocky structure; friable; few clay films in pores and on vertical ped faces; few roots; 25 to 35 percent gravel; neutral; gradual, irregular boundary.

C—30 to 60 inches, reddish-brown (5YR 5/4) stratified sand and gravel; single grain; loose; calcareous.

The average solum is between 20 and 40 inches thick, but tongues extend into the stratified material to a depth of 5 feet. The tongues are 3 to 10 feet apart and are very prominent. Reaction of the solum is slightly acid to neutral. Depth to calcareous material coincides with the depth to stratified material or is slightly less. The Ap horizon ranges from dark reddish brown (5YR 3/2) to dark grayish brown (10YR 4/2). Its texture is gravelly loam or gravelly fine sandy loam, with a gravel content ranging from 15 to 35 percent. The A2 horizon ranges from reddish brown (5YR 4/3) to light yellowish brown (10YR 6/4) in color and from gravelly fine sandy loam to light gravelly loam in texture. In some places an A&B horizon up to 8 inches thick replaces the A2 horizon. Although similar to the A2 horizon, the A&B horizon contains reddish-brown (5YR 4/4) bodies in the matrix of the peds. The proportion of B material in this horizon is about 30 percent and increases with depth.

The B2t horizon ranges from dark grayish brown (10YR 4/2) to reddish brown (2.5YR 5/4). Its texture ranges from gravelly heavy loam to gravelly sandy clay loam, with a clay content ranging from 18 to 28 percent. The gravel content increases with depth but does not exceed 35 percent. The B3 horizon ranges from dark grayish brown (10YR 4/2) to reddish brown (2.5YR 5/4). Its texture ranges from gravelly fine sandy loam to gravelly loam. The gravel content ranges from 25 to 35 percent. The C horizon consists of highly stratified sand and gravel, predominantly of poorly graded, rounded limestone fragments and layers of sand.

The Palmyra soils are closely associated with the moderately well drained Phelps soils, which formed in a similar kind of material. The very similar Wampsville soils formed in the same kind of material but have more clay in the B horizon. Palmyra soils are also associated with the Ontario and Madrid soils, both of which formed in glacial till on till plains, on glacial moraines, or on drumlins. Palmyra soils occur in a complex with Arkport soils, which are well drained and formed in deltaic deposits of very fine sand and fine sand.

Palmyra gravelly fine sandy loam, 0 to 3 percent slopes (PaA).—The profile of this level to nearly level soil differs from that described as representative of the series because it has a coarser textured surface layer and a slightly coarser textured subsoil. The soil is on level ridgetops or on broad, flat terraces in areas 10 acres or more in size.

Commonly included with this soil in mapping are the moderately well drained Phelps soils at lower elevations. Some areas, where Halsey soil inclusions are in the deeper depressions, remain wet for longer periods of time. Some small inclusions have a gravelly loam surface texture. Other minor inclusions are areas of Colonie, Arkport, and Schoharie soils.

This soil is well suited to woodland. It is suited to the crops commonly grown in the county and most specialized crops. Gravel in the surface layer interferes with cultivation and growth of some root crops. Cropping can be intensive if the soil is properly managed. Measures that conserve moisture are the main management need. In dry periods, this soil becomes droughty. If specialized crops are grown, supplemental irrigation is generally required. (Capability unit IIs–1; woodland suitability group 2o1)

Palmyra gravelly fine sandy loam, 3 to 8 percent slopes (PaB).—The profile of this soil differs from that described as representative of the series because its texture is slightly coarser. The soil occurs on the sloping edges of terraces, kames, or eskers or is along the edges of valleys bordering the glacial moraines. Most areas are 10 acres or larger in size.

Common inclusions in mapping are Phelps, Ontario, and Wampsville soils. The Phelps soil inclusions are in the lower part of the landscape and are moderately well drained. Small areas of Ontario soils, derived from glacial

till, are included where the Palmyra soils border glacial moraines. The Wampsville soil inclusions have a finer textured subsoil.

This soil is suited to corn, small grain, hay, and pasture, as well as to most of the specialized crops that are grown. It is well suited to most hardwoods and many conifers. There are excellent hardwood stands on this soil. Measures that conserve moisture are needed. In dry years, the soil is droughty, especially on the tops of knobs or on slope breaks. Gravel in the surface layer interferes with tillage in places. Some erosion control practices are necessary where intertilled crops are planted. (Capability unit IIs–1; woodland suitability group 2o1)

Palmyra gravelly fine sandy loam, 8 to 15 percent slopes (PaC).—The profile of this soil differs from that described as representative of the series because it has a gravelly fine sandy loam surface layer and is generally slightly coarser textured throughout. This sloping to strongly sloping soil is on the steeper escarpments and on the side slopes of kames and eskers. Areas are mainly oblong in shape and 10 acres or more in size.

Commonly included with this soil in mapping are the Wampsville soils that have a finer textured subsoil, the Ontario soils derived from glacial till, and the sandy Colonie soils. Other minor inclusions are Cayuga, Cazenovia, and Madrid soils; an unnamed soil that has dominantly a loamy fine sand texture throughout its profile; and Palmyra soils that have a gravelly loam surface layer.

This soil is suited to woodland. It is moderately well suited to small grain, hay, and pasture. If proper management and conservation measures are practiced, corn can be grown. The soil becomes droughty rapidly in dry periods. Measures that control erosion and conserve moisture are the major management requirements. (Capability unit IIIe–2; woodland suitability group 2o1)

Palmyra gravelly fine sandy loam, 15 to 25 percent slopes (PaD).—The profile of this moderately steep soil differs from that described as representative of the series because it has a coarser textured surface layer and in some places a slightly coarser texture throughout the profile. This soil is on the steeper escarpments, on the steeper sides of kames and eskers, and along the steeper edges of valleys. Most areas are oblong in shape and 10 acres in size or larger.

Common inclusions with this soil in mapping are Arkport, Ontario, Wampsville, and Colonie soils. The Arkport soil inclusions are dominated by very fine sand and the Colonie inclusions by fine sand. The Ontario inclusions developed in glacial till material, and the Wampsville inclusions have a finer textured subsoil. Also included are Palmyra soils that have a gravelly loam surface texture and some small spots of Cayuga soils.

This soil is suited mostly to small grain, hay and pasture, and to woodland. It is somewhat limited for use for crops because of its slope and the hazard of erosion. Measures for controlling erosion and conserving moisture are needed. The soil becomes droughty rapidly in dry periods. (Capability unit IVe–2; woodland suitability group 2r4)

Palmyra gravelly fine sandy loam, 25 to 60 percent slopes (PaF).—The profile of this steep to very steep soil differs from that described as representative of the series because it has a gravelly fine sandy loam surface texture and, in some places, a slightly coarser texture throughout. This soil is on the steeper escarpments bordering drainageways and on the steeper sides of kames and eskers. Areas are long, narrow, and oblong and generally less than 10 acres in size.

Where this soil is on drumlinlike landscapes, there are common inclusions of Ontario soils, which formed in glacial till.

This soil is generally better suited to woodland than to other uses. Although droughty, it provides limited grazing in places. It is unsuited to cultivated crops. The major management requirement is controlling erosion. Because of the steep slopes, this soil should be kept in woodland or well-maintained pasture if practical. The less sloping areas can be in permanent pasture, but management will be difficult. (Capability unit VIIe–1; woodland suitability group 2r5)

Palmyra gravelly loam, 3 to 8 percent slopes (PgB).—This gently sloping soil is on the tops of large terraces, kames, and eskers. Areas are generally 10 acres or more in size. The soil has the profile described as representative of the series.

Common inclusions with this soil in mapping are Phelps, Wampsville, and Ontario soils. In the lower landscapes are Phelps soil inclusions, which developed in similar material and remain wet for longer periods of time. Inclusions of Ontario soils, which formed in glacial till, are on comparable topography and border areas of this soil. The Wampsville soil inclusions are underlain by gravel but have a finer textured subsoil.

This soil can be used for crops, pasture, or woodland. It is well suited to the crops commonly grown in the county as well as to many specialty crops. The soil is also suited to woodland and supports excellent stands of hardwoods. Measures to control erosion and conserve moisture are the main management needs. In dry periods, droughtiness in the soil will affect most crops. (Capability unit IIe–2; woodland suitability group 2o1)

Phelps Series

The Phelps series consists of deep, nearly level to gently sloping soils that are moderately well drained. These soils have a moderately coarse textured surface layer and a moderately fine textured to medium-textured subsoil. They formed in glacial outwash sand and gravel that has a high limestone content. Areas are mainly on kames, eskers, and terraces. They lie adjacent to the first bottoms of the larger streams in the county, and the major areas are near and north of the Lake Iroquois beach ridge.

A representative Phelps soil has a surface layer of very dark grayish-brown gravelly fine sandy loam about 10 inches thick. Underlying this is a subsurface layer of light yellowish-brown, friable, slightly acid gravelly fine sandy loam that contains mottles. At a depth of about 19 inches is a subsoil of brown to dark-brown, firm to friable gravelly sandy clay loam. The subsoil has brownish-yellow mottles and is neutral in reaction. The substratum, beginning at a depth of 32 inches, consists of brown to dark-brown, loose, stratified sand and gravel. This layer is calcareous.

The Phelps soils have a seasonal high water table at a depth of 18 to 24 inches. The height of the water table governs the thickness of the root zone. The available water capacity in the root zone is moderate. Permeability

is moderate in the subsoil and rapid in the substratum. Slight seasonal wetness is one of the major limitations to the use of these soils for farming.

Representative profile of Phelps gravelly fine sandy loam, 0 to 3 percent slopes, in a cultivated area, located 300 feet south and 1,200 feet west of the junction of Cheese Factory Road and Mendon-Ionia Road (State Route 64), town of Mendon:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) gravelly fine sandy loam; moderate, fine, granular structure; very friable; 20 percent gravel; slightly acid; clear, smooth boundary.

A2—10 to 19 inches, light yellowish-brown (10YR 6/4) gravelly fine sandy loam; few, fine, faint, brownish-yellow mottles; weak, medium, subangular blocky structure; friable; 15 to 20 percent gravel; slightly acid; clear, wavy boundary.

B2t—19 to 32 inches, brown to dark-brown (7.5YR 4/4) gravelly sandy clay loam; few, fine and medium, distinct, brownish-yellow mottles; weak, thick, platy structure within weak, medium and coarse, subangular blocky structure; firm, becoming friable with depth; prominent clay films in pores and on fracture faces; ped coats of light yellowish brown (10YR 6/4) in the upper 4 or 5 inches; 15 to 20 percent gravel; neutral; clear, wavy boundary.

C—32 to 52 inches, brown to dark-brown (7.5YR 4/4) stratified sand and gravel; few, fine, prominent, brownish-yellow mottles; single grain; loose; neutral; calcareous at a depth of 38 to 40 inches.

The solum ranges from 24 to 40 inches in thickness. Depth to carbonates is equal to or slightly greater than the thickness of the solum. The Ap horizon ranges from dark brown to brown (7.5YR 3/2 to 10YR 4/3) in color and is slightly acid or neutral in reaction. Content of coarse fragments in the Ap horizon ranges from 15 to 35 percent. The A2 horizon ranges from brown (10YR 5/3) to light yellowish brown (10YR 6/4) in color and from gravelly fine sandy loam to gravelly loam in texture. In places the A2 horizon is not mottled. Reaction in this horizon is slightly acid or neutral.

The B2t horizon ranges from dark brown (10YR 3/3) to reddish brown (2.5YR 4/4) in color. It has sandy clay loam and loam textures. The clay content ranges from 18 to 28 percent, and the coarse fragment content, from 10 to 35 percent. Reaction is neutral, and the lower 2 to 3 inches of the B2t horizon is weakly calcareous in places.

The C horizon is brown or dark-brown (7.5YR 4/4) to dark grayish-brown (10YR 4/2), stratified sand and gravel; it contains brownish-yellow mottles in the upper 6 to 12 inches. Reaction in the upper 6 to 10 inches is neutral or mildly alkaline, and the C horizon is generally calcareous.

The Phelps soils in this county lack the 2-chroma mottles in the B2t horizon that are typical of Phelps soils. This difference does not affect their use and management.

Phelps soils are closely associated with the well-drained to excessively drained Palmyra soils and the very poorly drained Halsey soils. All of these soils formed in similar material. The Phelps soils are finer textured than the well-drained to excessively drained Alton and Colonie soils. They have less clay in the B horizon than the Wampsville soils.

Phelps gravelly fine sandy loam, 0 to 3 percent slopes (PhA).—This soil has the profile described as representative of the series. It occupies the areas between the higher knolls and ridges and the lower depressions.

Commonly included with this soil in mapping are areas of Palmyra, Alton, and Halsey soils. The Palmyra inclusions occur on the small higher knolls and are droughtier. The Halsey inclusions are in the lower depressions and remain wet longer in spring. Where Alton soils are included, they occupy the higher elevations and are droughtier during dry periods. In areas near Alton soils, there are inclusions of a soil similar to but coarser textured than the Phelps soil.

This soil is well suited to corn, small grain, and hay or pasture. It is suited to woodland, and under proper management, to certain specialized crops. Wetness may delay planting briefly in spring and restrict the growth of deep-rooted crops. Draining the included wet soils is generally desirable. Irrigating during prolonged dry periods improves the suitability of this soil for farming. (Capability unit IIw-1; woodland suitability group 2o1)

Phelps gravelly fine sandy loam, 3 to 8 percent slopes (PhB).—This soil occupies an intermediate position between the higher lying areas and the depressions. In some cultivated areas, where the subsurface layer is thinner than that of the soil representative of the series, the soil is consistently shallower to gravel.

Commonly included are small areas of Palmyra, Alton, Colonie, and Wampsville soils, which are on the higher knolls or ridges. These soils are better drained than the Phelps soil and generally show droughtiness more quickly. Also included are areas of Halsey soils, which are in depressions or drainageways and remain wet longer in spring. Other inclusions are areas of a soil that is similar to but coarser textured than the Phelps soil. These are near areas of Alton soils.

This soil can be used for crops, pasture, and woodland. It is suited to the crops commonly grown and, if proper management practices are used, to many of the specialized crops. Wetness may delay planting briefly in spring and restrict the depth of rooting. Measures that conserve moisture are needed in intensively cropped areas. Irrigation is needed during extended dry periods. In the more sloping areas, erosion is a hazard if the soil is cultivated and not protected. (Capability unit IIe-4; woodland suitability group 2o1)

Pits and Quarries

Pits and Quarries (Pu) are open excavations from which soil or underlying material has been removed. The slope ranges from level to very steep.

This land type consists chiefly of gravel pits, borrow pits, and limestone quarries. Some of the gravel pits are areas where gravel has been removed for construction purposes in large commercial operations. Others are old abandoned pits. Borrow pits are areas where excavations have been made for road construction material. Most areas have little value for farming. In places the excavations extend below the water table, and water ponds in them for long periods. Other areas have been excavated to the underlying bedrock. Many borrow pits are adjacent to the New York State Thruway and along the interstate highway system. Limestone quarries are deep excavations into the underlying bedrock. Three large quarries and several small ones are in the county.

Onsite investigation is needed to determine the feasibility of using specific areas. (Capability unit and woodland suitability group not assigned)

Rhinebeck Series

In the Rhinebeck series are deep, somewhat poorly drained soils that have a medium-textured surface layer and a fine-textured subsoil. These nearly level soils developed in deep lacustrine deposits of calcareous clay and silt. They are in old glacial lakebed areas between low depressions and the higher knobs and ridges. These soils

are mainly in the northeast corner of the town of Webster, near Lake Ontario, and in the southwest corner bordering the town of Penfield.

A representatve Rhinebeck soil has a surface layer of dark grayish-brown silt loam about 10 inches thick. Underlying this is a thin subsurface layer of light brownish-gray silt loam that is mottled, friable, and slightly acid. The subsoil is at a depth of about 12 inches. The upper 9 inches of the subsoil is firm, mottled, yellowish-brown silty clay loam that is slightly acid. The next 10 inches is very firm, mottled, brown to dark-brown clay that is neutral in reaction. At a depth below 31 inches, the subsoil consists of layers of firm, mottled, brown to dark-brown clay and silty clay and light yellowish-brown silt. This material is neutral in reaction. The calcareous substratum, at a depth of about 43 inches, consists of layers of firm, mottled, brown to dark-brown and light yellowish-brown silt and clay.

A seasonal high water table at a depth of 6 to 12 inches is present for short periods of time. The depth of root development is mainly between 15 and 24 inches, depending on depth to the seasonal water table and the degree of drainage. Available water capacity is moderate to high. Permeability of the subsoil and substratum is slow. Seasonal wetness is a major limitation that affects use of these soils for farming. Maintenance of tilth is also a problem.

Representative profile of Rhinebeck silt loam in an idle area, located 1,650 feet south and 2,750 feet east of the junction of Plank Road and Creek Street, town of Penfield:

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

A2—10 to 12 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, distinct, brownish-yellow mottles; weak, medium and fine, subangular blocky structure within moderate, very thick and medium, platy structure; friable; slightly acid; abrupt, irregular boundary.

B21t—12 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium and coarse, subangular blocky structure; firm; light brownish-gray (10YR 6/2) ped coats containing common, medium, distinct, yellowish-brown (10YR 5/6) mottles; few brown or dark-brown (7.5YR 4/4) clay films on ped faces; slightly acid; gradual, irregular boundary.

B22t—21 to 31 inches, brown to dark-brown (10YR 4/3) clay; many, medium, distinct, yellowish-brown (10YR 5/4–5/6) mottles; moderate, coarse, prismatic structure; very firm; thick, brown or dark-brown (7.5YR 4/4) clay films; light brownish-gray (10YR 6/2) coats on ped surfaces; neutral; clear, smooth boundary.

B3—31 to 43 inches, varved, brown to dark-brown (10YR 4/3) clay and silty clay and light yellowish-brown (10YR 6/4) silt; few, fine, distinct, yellowish-brown (10YR 5/6–5/8) mottles; moderate to strong, thin and medium, platy structure; firm; few brown or dark-brown (7.5YR 4/4) clay films; neutral; clear, smooth boundary.

C—43 to 55 inches, varved, brown to dark-brown (10YR 4/3) silt and clay; yellowish-brown mottles; moderate to strong, medium and thick, platy structure; firm; no clay films; many black manganese stains; mildly alkaline; calcareous with depth.

The solum ranges from 30 to 48 inches in thickness, which corresponds to the depth to calcareous material. Reaction in the solum is dominantly slightly acid but ranges from medium acid to mildly alkaline. The Ap horizon ranges from dark brown (7.5YR 3/2) to dark grayish brown (2.5Y 4/2) and has a color value and chroma of 6/2 when dry. The A2 horizon ranges from grayish brown (10YR 5/2) to light brownish gray (2.5YR 6/2) in color and from silt loam to silty clay loam in texture. The B horizon ranges from pinkish gray (7.5YR 6/2) to olive brown (2.5Y 4/4) in color and is clay loam, silty clay loam, silty clay, or clay in texture. The clay content of the B horizon ranges from 35 to 50 percent. In some profiles there are thin strata that have a hue of 5YR, but in most places, these strata make up no more than 10 percent of the B and C horizons. In places the C horizon has a few thin lenses of sand.

Rhinebeck soils formed in the same kind of material as the moderately well drained Hudson soils and the poorly drained to very poorly drained Madalin soils. They are similar to Churchville and Cayuga soils, which are underlain by calcareous glacial till at a depth of 20 to 40 inches. Rhinebeck soils are commonly associated with Niagara soils, which formed in silty lacustrine deposits.

Rhinebeck silt loam (Rb).—This soil lies along small drainageways or in slightly depressed areas between Hudson soils on the higher knolls and Madalin soils in the lower depressions. The slope is 0 to 2 percent.

Included with this soil in mapping are areas of Hudson, Madalin, Niagara, and Churchville soils. The Hudson soils are moderately well drained and occur at slightly higher elevations than this soil. The Niagara soils are siltier. The Churchville soils have a till substratum at a depth of less than 40 inches. Madalin soils are poorly drained and very poorly drained; they occur in lower areas than the Rhinebeck soil and remain wet for longer periods.

Rhinebeck silt loam can be used for crops, pasture, or woodland. In undrained areas, wetness restricts the choice of crops. The main management need is the establishment of adequate drainage. Where artificial drainage is adequate, the soil is suited to the crops commonly grown in the county. Surface drainage is an important practice on this soil, but establishing adequate drainage outlets is a problem in some places. Maintaining tilth is a problem if this soil is intensively cropped. (Capability unit IIIw–3; woodland suitability group 3w1)

Riga Series

The Riga series is made up of moderately deep, moderately well drained to well drained soils that have a medium-textured surface layer and a fine-textured subsoil. These gently sloping soils are on the higher knobs and ridges on the glacial till plains or are near the lower perimeters of drumlin landscapes. The Riga soils developed in a mixture of glacial till material derived mainly from local shale and partly from shale residuum. Soft shale bedrock is at a depth of 20 to 40 inches. These soils are mainly over two shale formations, the Rochester and Vernon-Camillus.

A representative Riga soil has a surface layer, about 8 inches thick, of brown to dark-brown silt loam. The mottled, silty clay subsoil is about 22 inches thick and is neutral in reaction. The upper 8 inches is firm and dark grayish brown, and the lower part is very firm and pale olive. At a depth of about 30 inches is grayish-brown shale. The upper 6 to 8 inches is soft and slightly weathered.

A seasonal high water table is 18 to 24 inches below the surface, but it does not remain for long periods. The subsoil is slowly permeable. The depth of soil available for rooting is restricted in areas where shale rock is at the shallower end of its range. These soils have a moderate to high available water capacity in the root zone. A slight seasonal wetness is one of the major limitations to use of these soils for farming. Maintenance of good tilth is a problem.

Representative profile of Riga silt loam, 2 to 8 percent slopes, in an idle area, located 1,500 feet south and 2,600 feet west of the junction of Smith Road and Union Street, town of Wheatland:

Ap—0 to 8 inches, brown to dark-brown (10YR 4/3) silt loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

B21t—8 to 16 inches, dark grayish-brown (2.5Y 4/2) silty clay; common, fine, distinct, light olive-brown (2.5Y 5/4) mottles; strong, medium and coarse, subangular blocky structure; firm; brown (10YR 5/3) silt coats on ped surfaces and vertical faces in upper part of horizon; thin, dark-brown (10YR 4/3) clay films in pores and on some ped faces; neutral; gradual, wavy boundary.

B22t—16 to 30 inches, pale-olive (5Y 6/3) silty clay; many, medium, prominent mottles of light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6); moderate, medium and thick, platy structure within weak, medium and coarse, angular blocky structure; very firm; olive (5Y 5/3) clay films along cleavage planes; neutral; abrupt, smooth boundary.

R—30 to 36 inches +, grayish-brown (2.5Y 5/2) shale; slightly weathered and soft in upper 6 to 8 inches, becoming harder with depth; weakly calcareous.

The solum ranges in thickness from 20 to 40 inches and generally corresponds to the depth to shale bedrock. In places fragments of sandstone and limestone are present throughout the solum. The Ap horizon ranges from dark brown (7.5YR 3/2, 10YR 4/3) and brown (10YR 4/3) to dark grayish brown (2.5Y 4/2). Matrix colors with a chroma of 2 are influenced by the parent rock and are not indicative of a degree of wetness. In some places an A2 horizon up to 8 inches thick is present. The A2 horizon has hues similar to those of the Ap horizon, but color values are 1 to 2 units higher. The texture is slightly coarser than that of the Ap horizon. Reaction of the A horizon is slightly acid to mildly alkaline.

The B horizon ranges from dark brown (7.5YR 3/2) to pale olive (5Y 6/4). In the upper part of the B horizon are thin silt coats with colors of the A2 horizon and some faint or distinct mottles. Distinct to prominent mottles with a high chroma are in the lower part of the B horizon, particularly in the area immediately above the underlying shale. The texture of the B horizon is clay loam, silty clay loam, silty clay, or clay. The clay content exceeds 35 percent and generally ranges from 40 to 50 percent. Reaction of the B horizon ranges from slightly acid to mildly alkaline.

In some profiles a thin C horizon is present that is similar to the lower part of the B horizon but has a higher coarse fragment content and has platy structure but lacks the blocky structure. Where a C horizon is present, the profile is at the deeper end of its range, but the underlying shale is within the maximum 40-inch depth. The underlying shale is normally partly weathered in the upper part, and tongues or lenses of soil material are present in places. The shale is dominantly olive or gray in color but is interbedded with red shale. Reaction of the shale is neutral to moderately alkaline and may be weakly calcareous.

The Riga soils formed in the same kind of material as the somewhat poorly drained Brockport soils. Riga soils are similar to Cazenovia soils, which formed in deep glacial till, and to Lairdsville soils, which formed in redder material.

Riga silt loam, 2 to 8 percent slopes (RgB).—This gently sloping soil is at the higher elevations on the glacial till plains and is influenced by the proximity of shale bedrock. Areas are 10 acres or larger in size.

The dominant inclusions in mapping are Brockport, Hilton, Ontario, Cazenovia, and Lairdsville soils. The Brockport inclusions are in small depressions or drainageways and remain wet for longer periods or tend to pond during wet periods. The deeper Hilton, Ontario, and Cazenovia soil inclusions generally are on higher knolls and ridges. They are coarser textured in the subsoil and dry out faster in spring than Riga soils. Small areas of the redder Lairdsville soils are included where Riga soils are mapped over the Vernon-Camillus shale formation. Also included are areas that have a shaly or gravelly surface layer and spots of silty clay loam.

This soil can be used for crops, pasture, or woodland. It is suited to crops commonly grown in the county, such as corn, small grain, hay, and pasture, and to some specialized crops. If cropped intensively, this soil needs measures for controlling erosion. The soil clods and puddles easily if tilled when too wet. Areas of included Brockport soils need drainage. (Capability unit IIe–7; woodland suitability group 3o1)

Rock Land

Rock land (Ro) consists of areas of rock outcrops and very shallow soils. Areas generally have 70 to 80 percent exposed bedrock, and in the remaining part the soil material is less than 10 inches deep. This mapping unit is generally associated with the Onondaga and Lockport limestone escarpments. Slopes are variable and range from nearly level to very steep.

Included in mapping are small spots of Benson soils that are 10 to 20 inches deep over limestone and areas that have many large glacial boulders or chunks of limestone.

This land type is suited to possible use for recreation or wildlife habitat. Some areas could be used for limited grazing, but vegetation is sparse and stunted. Most areas require onsite investigation to determine the feasibility of proposed uses. (Capability unit VIIIs–1; woodland suitability group not assigned)

Schoharie Series

The Schoharie series consists of deep, moderately well drained to well drained soils that have a medium-textured or moderately fine textured surface layer and a fine textured to moderately fine textured subsoil. Those soils developed in old glacial lakebeds from dominantly reddish-colored, calcareous clay and silt deposits. These nearly level to very steep soils are scattered throughout the county on the highest areas, knobs, and low ridges of old lakebeds. Major areas are in old glacial Lake Dana, which parallels the Albion-Rochester moraine in the towns of Henrietta, Brighton, and Chili. A large area is east of Honeoye Falls and south of Cheese Factory Road.

A representative Schoharie soil has a surface layer, 8 inches thick, of brown to dark-brown silt loam. It is underlain by a 3-inch leached subsurface layer of reddish-gray, firm silt loam. The subsoil is 27 inches thick. It is reddish-brown silty clay in the upper part and, below about 19 inches, is light reddish-brown clay with a few faint mottles. At a depth of 38 inches is the firm, strongly calcareous, light reddish-brown substratum. The substratum consists of layers of silt and clay, with the clay dominant.

A seasonal high water table rises to within 18 to 24 inches of the surface during wet seasons of the year and is perched on the slowly permeable subsoil and underlying material. The depth of soil available for rooting is mainly between 20 and 30 inches. The available water capacity of the root zone is moderate to high. A slight seasonal wetness is one of the major limitations to use of these soils for farming. Maintenance of tilth is a problem.

Representative profile of Schoharie silt loam, 2 to 6 percent slopes, in an idle area, located half a mile west of the junction of Lehigh Station Road, on the south side, and State Route 15A:

Ap—0 to 8 inches, brown to dark-brown (7.5YR 4/2) silt loam; moderate, medium and fine, granular structure; friable; neutral; clear, wavy boundary.

A2—8 to 11 inches, reddish-gray (5YR 5/2) silt loam; moderate, medium and fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

B21t—11 to 19 inches, reddish-brown (2.5YR 5/4) silty clay; moderate, coarse, subangular blocky structure breaking to strong, medium, subangular blocky structure; ped faces and vertical faces have silt coats of reddish brown (5YR 5/3) and yellowish red (5YR 5/6) in the upper part of the horizon; clay films prominent on ped faces and in pores; firm; neutral; gradual, smooth boundary.

B22t—19 to 38 inches, light reddish-brown (2.5YR 6/4) clay; few, fine, faint mottles of low color contrast; strong, coarse, subangular blocky structure; firm; clay films on ped faces and in pores decrease in prominence with depth; pinkish-white (5YR 8/2) lime accumulation visible in lower part; neutral; clear, smooth boundary.

C—38 to 51 inches, varved, light reddish-brown (5YR 6/3) clay and silt, with clay dominant; platy structure inherited from original deposition; firm; pinkish-white (5YR 8/2) lime accumulations; strongly calcareous.

The solum ranges in thickness from 20 to 40 inches. Depth to carbonates ranges from 20 to 40 inches with 28 to 36 inches dominant. Coarse fragments are generally not in the solum but may range up to 5 percent. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 5/3) in color and is silt loam or silty clay loam in texture. The A2 horizon ranges from dark brown (7.5YR 4/2) to light red (2.5YR 6/6) in color, from silt loam to silty clay in texture, and from firm to friable in consistence.

The Bt horizon ranges from reddish brown (2.5YR 4/4, 5YR 4/3) to light brown (7.5YR 6/4). If low contrast mottling is present in the upper part, the chroma is greater than 3. Texture of the Bt horizon ranges from silty clay loam to clay with clay dominant. The clay content ranges from 35 to 55 percent. The structure is moderate to strong, medium to very coarse, angular blocky or subangular blocky.

The C horizon ranges from dusky red (10R 3/2) to light reddish brown (5YR 6/4). It consists of layered clay with thin strata of silt and very fine sand and generally has prominent lime accumulations.

Schoharie soils formed in the same kind of material as the somewhat poorly drained Odessa soils and the poorly drained to very poorly drained Lakemont soils. The Schoharie soils are similar to the Cayuga soils, which are underlain by glacial till at a depth of 20 to 40 inches. Schoharie soils are near the Collamer and Cazenovia soils. The Collamer soils formed in silty lacustrine deposits, and the Cazenovia formed in deep till deposits. Both of these soils have a coarser textured B horizon than that in the Schoharie soils.

Schoharie silt loam, 0 to 2 percent slopes (SeA).—This level to nearly level soil is on the tops of the higher flat knobs and knolls in the old lakebeds. Areas are mainly 10 acres in size or larger.

Commonly included with this soil in mapping are Cayuga, Odessa, and Cazenovia soils. The Cayuga soil inclusions are underlain by glacial till at a depth less than 40 inches. The somewhat poorly drained Odessa soil inclusions are in the lower depressions or drainageways and remain wet for longer periods of time. The coarser textured Cazenovia inclusions occupy knolls of till. Other minor inclusions consist of Lakemont, Niagara, Hilton, and Ontario soils.

This soil can be used for crops, pasture, or woodland. It is suited to the crops commonly grown, such as corn, small grain, and hay, and is well suited to sugar beets, a newer crop in the county. If tilth can be maintained, the soil is moderately well suited to some specialized truck crops, such as tomatoes and sweet corn. A slight wetness may delay planting briefly. Where this soil is cropped intensively, maintenance of tilth is a problem. Timeliness of plowing and condition of the soil at the time of plowing are important. (Capability unit IIw–2; woodland suitability group 2o1)

Schoharie silt loam, 2 to 6 percent slopes (SeB).—This gently sloping soil has the profile described as representative of the series. Areas are 10 acres in size or larger and occur on the sides of higher knolls and knobs in the old lakebeds.

Commonly included with this soil in mapping are some small, somewhat poorly drained Odessa soil areas along drainageways. Small inclusions of Cayuga soils, which have till above a depth of 40 inches, are on the tops of knobs or along the sides of knolls.

This soil can be used for crops, pasture, or woodland. It is suited to common crops, such as corn, small grain, and hay; most cultivated crops; and many specialized crops. It is well suited to sugar beets, a newer crop grown in the county. The major management problems on this soil are maintenance of tilth and control of erosion. There is a slight wetness limitation. Because the soil compacts easily, tillage operations should be kept to a minimum. Timeliness of plowing and condition of the soil at the time of plowing are important. (Capability unit IIe–7; woodland suitability group 2o1)

Schoharie silty clay loam, 6 to 12 percent slopes, eroded (ShC3).—The profile of this soil differs from that described as representative of the series because it has a silty clay loam surface layer and is thinner. In most areas the leached layer and some of the upper part of the subsoil are mixed into the surface layer, or the clayey subsoil is exposed. This sloping to strongly sloping soil is in long, oblong areas generally less than 10 acres in size. Some large areas are on the steeper escarpments along the main drainageway dissections; other areas are on the perimeter of the steeper knolls.

Included with this soil in mapping are small areas of uneroded or slightly eroded soil or steeper Schoharie soils too small to map separately. Other inclusions are small areas of Cayuga soils that are less than 40 inches deep to glacial till.

This soil is fairly well suited to small grain and hay. It is suited to pasture and woodland. Use for most cultivated crops is limited because of the hazard of continuing erosion. Major management problems on this soil are erosion control and maintenance of tilth and fertility. (Capability unit IVe–1; woodland suitability group 2r1)

Schoharie silty clay loam, 12 to 20 percent slopes, eroded (ShD3).—The profile of this soil differs from that described as representative of the series because it is thinner and the surface layer is silty clay loam. Small, long, oblong areas of this soil are adjacent to the major drainageways.

Most commonly included with this soil in mapping are steeper Schoharie soils. Also included are small areas of Cayuga soils with till above a depth of 40 inches and small areas of Ontario soils, which have formed in till and are on similar slopes.

This soil is suited to pasture or woodland. Because of the hazard of continuing erosion and the moderately steep

slopes, the soil is poorly suited to cultivated crops. Tillage should be restricted mainly to the renovation of pasture sod. The main management problems are erosion control and maintenance of tilth and fertility. A vegetative cover should be kept on the soil as long as practical. (Capability unit VIe–1; woodland suitability group 2r3)

Schoharie silty clay loam, 20 to 60 percent slopes (ShF).—This steep and very steep soil is on escarpments along drainageway dissections. Its profile differs from that described as representative of the series because it is thinner and has a silty clay loam surface layer.

Commonly included with this soil in mapping are areas of Cayuga soils where till is within a depth of 40 inches, and small areas of Ontario and Cazenovia soils.

This soil is suited to limited use for pasture or woodland. It should have some kind of permanent vegetative cover. The major management problem is erosion control if the vegetation is disturbed or removed. (Capability unit VIIe–1; woodland suitability group 2r3)

Sodus Series

In the Sodus series are deep, well-drained, moderately coarse textured soils that have a dense fragipan. These soils developed in glacial till material rich in red Medina sandstone with some limestone. They occur at the highest elevation on the glacial till plains and on ridgetops, knolls, and escarpments. Most areas are in the northeastern corner of the town of Webster, adjacent to the Monroe-Wayne County line. A few smaller areas are in the towns of Ogden and Greece.

A representative Sodus soil in a cultivated area has a surface layer, about 8 inches thick, of very dark grayish-brown gravelly fine sandy loam. The upper part of the subsoil, about 11 inches thick, is friable to firm, medium acid, strong-brown gravelly fine sandy loam. The lower part, a dense fragipan, begins at a depth of about 19 inches. In the upper 10 inches of the lower part of the subsoil is reddish-brown, medium acid gravelly fine sandy loam that is very firm to extremely firm and brittle. Below a depth of 29 inches, the fragipan is brown to dark-brown, slightly acid gravelly fine sandy loam that is firm and brittle. At a depth of 40 inches is a firm, reddish-brown gravelly fine sandy loam substratum that is neutral in the upper part and becomes calcareous below a depth of 60 inches.

Permeability is moderate in the upper 18 to 24 inches and slow in the fragipan. Much of the free water in the soil moves laterally above the pan. The root zone is restricted to the soil above the fragipan. Available water capacity is low to moderate. Lack of rain for about 2 weeks causes a water shortage for most vegetation. The quantity and size of the coarse fragments interfere with tillage operations but do not prevent planting intertilled crops.

Representative profile of Sodus gravelly fine sandy loam, 2 to 8 percent slopes, in a cultivated field, located 700 feet north and 500 feet east of the junction of Basket and Woodard Roads, town of Webster:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) gravelly fine sandy loam; weak, fine, granular structure; very friable; 20 percent coarse fragments; medium acid; abrupt, smooth boundary.

B21—8 to 11 inches, strong-brown (7.5YR 5/8) gravelly fine sandy loam; weak, fine and medium, subangular blocky structure; friable; 20 percent coarse fragments; medium acid; clear, smooth boundary.

B22—11 to 19 inches, strong-brown (7.5YR 5/8) gravelly fine sandy loam; weak, very thick, platy structure that breaks to moderate, medium, angular blocky structure; firm; very pale brown (10YR 7/3) ped coats on vertical faces of the blocks; 20 percent coarse fragments; medium acid; clear, smooth boundary.

B'x1—19 to 29 inches, reddish-brown (5YR 4/4) gravelly fine sandy loam; platy structure that breaks to weak, medium, subangular blocky structure within strong, coarse, prismatic structure; very firm to extremely firm in place, platelets hard and extremely brittle when removed; prisms are surrounded by light-gray (10YR 7/2), coarser material; a few, thin clay films in pores; 25 percent coarse fragments; medium acid; gradual, irregular boundary.

B'x2—29 to 40 inches, brown to dark-brown (7.5YR 4/4) gravelly fine sandy loam; weak, very thick, platy structure that breaks to weak, medium and coarse, subangular blocky structure; firm in place, platelets brittle when removed but less brittle than those of the B'x1 horizon; a few thin clay films in pores; slightly acid; 25 percent coarse fragments; gradual, smooth boundary.

C—40 to 60 inches, reddish-brown (5YR 4/3) gravelly fine sandy loam; weak, medium, subangular blocky structure; firm; 30 percent coarse fragments; neutral, becoming calcareous at a depth of 60 inches.

The solum ranges in thickness from 35 to 60 inches. Its coarse fragment content ranges from 15 to 35 percent. Sandstone flagstones and cobbles are the dominant fragments, but some large stones and boulders are also present. The clay content averages less than 18 percent. Depth to the fragipan ranges from 18 to 24 inches. Depth to carbonates ranges from 50 to 80 inches. The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3). Its reaction is naturally strongly acid, but when limed, it may be neutral. In places a gravelly fine sandy loam or gravelly loam A2 horizon is present. The A2 horizon ranges from brown (10YR 5/3) to light reddish brown (5YR 6/4) in color and from strongly acid to medium acid in reaction.

The B2 horizon ranges from yellowish red (5YR 4/6) to yellowish brown (10YR 5/8) in color, from gravelly fine sandy loam to gravelly loam in texture, and from strongly acid to medium acid in reaction. The B'x horizon ranges from weak red (2.5YR 4/2) to yellowish brown (10YR 5/4). Prisms range from 6 to 30 inches in diameter. The texture is gravelly fine sandy loam or gravelly loam with a clay content ranging from 10 to 18 percent. Reaction of the B'x horizon ranges from strongly acid to slightly acid.

The C horizon ranges from weak red (2.5YR 4/2) to brown (7.5YR 5/4). Its texture is gravelly fine sandy loam or gravelly loam and is slightly coarser than that of the B'x horizon. The coarse fragment content, ranging from 20 to 45 percent, includes some large stones and boulders. Reaction ranges from slightly acid to neutral in the upper part; carbonates are present deep in the C horizon.

Sodus soils are like the moderately well drained Ira soils, which are at slightly lower elevations. These two soils formed in the same kind of material. Sodus soils are similar to the Ontario, Madrid, and Honeoye soils in the upper part of the profile, but they have a fragipan, which is lacking in all the other soils.

Sodus gravelly fine sandy loam, 2 to 8 percent slopes (SoB).—This soil generally occurs on sloping or undulating topography and is at higher elevations than the adjacent soils developed in lake-laid sediments. Areas are generally larger than 10 acres in size.

Included with this soil in mapping are spots of moderately well drained Ira soils, which developed in the same kind of material and are on more gentle slopes or nearly level areas. These Ira soil inclusions are at slightly lower elevations where some runoff accumulates. Minor inclusions are small, more sloping areas and small areas of soil that have a slightly finer texture.

This soil can be used for crops, pasture, or woodland. It is suited to most of the commonly cultivated crops, small grain, hay, and, because of its location near Lake Ontario, to some orchard crops. If the soil is cultivated and not protected, it is subject to moderate erosion. This soil is droughty during extended dry periods and needs irrigation in places. (Capability unit IIe–1; woodland suitability group 3o1)

Sun Series

The Sun series is made up of deep, poorly drained to very poorly drained, moderately coarse textured soils. These soils formed in calcareous, gravelly, waterworked glacial till. Sun soils are principally in the town of Penfield, and lesser areas are in the towns of Greece, Ogden, Perinton, Webster, Rush, and Parma.

A representative Sun soil has a surface layer, about 9 inches thick, of black fine sandy loam. The subsoil extends to a depth of 30 inches and is mildly alkaline. The upper part of the subsoil is gray gravelly fine sandy loam that is very friable. Below a depth of 12 inches it is mottled, light olive-brown, friable gravelly fine sandy loam. At a depth of 20 inches is mottled, strong-brown gravelly very fine sandy loam. The substratum is brown, calcareous, very gravelly fine sandy loam that is friable in the upper part and becomes firm with depth.

Undrained areas of Sun soils have a prolonged high water table at or near the surface and generally are ponded at times. Permeability is moderate to moderately rapid. The depth of soil available for rooting is mainly in the upper 10 to 20 inches because of the high water table. The available water capacity is very low to moderate, but plants seldom lack moisture because of the water supplied by surrounding areas for long periods after rains. Prolonged wetness is one of the major limitations to use of these soils for farming.

Representative profile of Sun fine sandy loam in an idle area, located 1,300 feet north of the junction of Penfield Center Road and Fairport-Ninemile Point Road (State Route 250), town of Penfield:

Ap—0 to 9 inches, black (10YR 2/1) fine sandy loam; weak, fine and medium, granular structure; very friable; common fine roots; neutral; abrupt, wavy boundary.

B21g—9 to 12 inches, gray (5Y 5/1) gravelly fine sandy loam; weak, thin, platy structure; very friable; few fine roots; 20 percent gravel and stones; clear, wavy boundary.

B22g—12 to 20 inches, light olive-brown (2.5Y 5/4) gravelly fine sandy loam; many, medium and coarse, faint and distinct, gray and grayish-brown mottles occupy 50 percent of the horizon; weak, fine, subangular blocky structure; friable; 20 percent gravel and stones; mildly alkaline; gradual, wavy boundary.

B23g—20 to 30 inches, strong-brown (7.5YR 5/6) gravelly very fine sandy loam; many, fine and medium, prominent, light-gray and light brownish-gray mottles; weak, fine and medium, subangular blocky structure, grading to massive; friable; 30 percent gravel and stones; weakly calcareous; clear, wavy boundary.

C—30 to 52 inches, brown (10YR 5/3) very gravelly fine sandy loam; weak, medium, platy structure; friable, becoming firm with depth; 40 percent coarse fragments; calcareous.

The solum ranges from 24 to 40 inches in thickness. The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (2.5Y 3/2). A few stones or boulders are on the surface in places. Reaction ranges from slightly acid to mildly alkaline.

Texture of the B horizon ranges from gravelly fine sandy loam or gravelly very fine sandy loam to gravelly coarse loam. The coarse fragment content includes some stones and ranges from 15 to 35 percent. The B21g horizon ranges from brown (7.5YR 5/2) to gray or light gray (5Y 6/1). Its reaction is mildly alkaline to slightly acid. The lower part of the B horizon ranges from reddish brown (5YR 5/3) to olive yellow (5Y 6/6). Reaction ranges from neutral to mildly alkaline.

The C horizon ranges from reddish brown (5YR 5/3) to olive yellow (5Y 6/6). Its texture is very gravelly fine sandy loam, very fine sandy loam, or coarse loam. Coarse fragment content includes stones and is greater than 35 percent. In the upper 4 to 6 inches there are a few, faint mottles in places. The upper part of the C horizon is friable and becomes firm at a depth of 3½ to 4 feet. The C horizon is mildly alkaline to moderately alkaline, and free carbonates are present.

Sun soils are most commonly adjacent to the well-drained Madrid soils and the somewhat poorly drained to poorly drained Massena soils that developed in similar material. The Sun soils are similar to the poorly drained Canandaigua soils that developed in deep deposits of silty material and to the finer textured Lyons soils that formed in till.

Sun fine sandy loam (Ss).—This level to nearly level soil is in the lowest depressions on the glacial till plains below the Massena and Madrid soils. Slopes are 0 to 3 percent. Areas are generally larger than 10 acres in size.

Included with this soil in mapping are minor areas of the finer textured Lyons soils and the slightly better drained Massena soils. In some areas adjacent to the lake plain are sandy Lamson or silty Canandaigua soil inclusions. Where this soil is adjacent to shallow or moderately shallow bedrock areas, there are minor inclusions of the moderately shallow variant of Sun soils. Also included are a few very stony areas.

Unless drainage is adequate, this soil is suited to pasture and trees that tolerate wetness. With adequate drainage and fertilization, the soil can be cropped intensively. Location of drainage outlets is difficult in places. (Capability unit IVw–3; woodland suitability group 4w1)

Sun Series, Moderately Shallow Variant

The Sun series, moderately shallow variant, consists of poorly drained and very poorly drained, medium-textured soils. These soils formed in gravelly, calcareous glacial till that is underlain by hard rock at a depth ranging from 20 to 40 inches. The soils occur in association with all the hard bedrock formations in the county, but the major areas are over Lockport dolomite.

A representative moderately shallow variant Sun soil has a plow layer, 8 inches thick, of black loam. The subsoil is 17 inches thick. The upper 7 inches of the subsoil is mottled, light olive-gray, friable gravelly very fine sandy loam that is neutral in reaction. The lower part is mottled, light brownish-gray, friable gravelly fine sandy loam. The substratum, beginning at a depth of 25 inches, is grayish-brown, friable very gravelly very fine sandy loam. At a depth of 36 inches is hard dolomitic limestone.

Undrained areas of these soils remain ponded for prolonged periods. The depth of soil available for rooting is mainly in the upper 20 inches. The available water capacity is moderate to very low in the root zone. Because the depth to bedrock varies, establishing a grade for surface ditches or underground tile requires blasting the bedrock in places. The effectiveness of removal of surface water and lowering the water table determines use of these soils.

Representative profile of Sun loam, moderately shallow variant, in a pasture, located 400 feet south and 50 feet east of the junction of Kennedy and Salt Roads, town of Penfield:

Ap—0 to 8 inches, black (N 2/0) loam; weak, fine and medium, granular structure; very friable; neutral to mildly alkaline; abrupt, smooth boundary.

B21g—8 to 15 inches, light olive-gray (5YR 6/2) gravelly very fine sandy loam; many, medium, prominent mottles of greenish gray, olive, and yellowish brown; weak, fine and medium, subangular blocky structure; friable; 20 percent coarse fragments; neutral; clear, smooth boundary.

B22g—15 to 25 inches, light brownish-gray (10YR 6/2) gravelly fine sandy loam; common, medium, prominent mottles of olive yellow, yellowish brown, and strong brown; weak, fine and medium, subangular blocky structure; friable; 20 percent coarse fragments; neutral, abrupt, wavy boundary.

C—25 to 36 inches, grayish-brown (10YR 5/2) very gravelly very fine sandy loam; weak, fine and medium, subangular blocky structure, but tends toward platy structure; friable; 40 to 50 percent coarse fragments; calcareous; abrupt, smooth boundary.

R—36 inches, unweathered dolomitic limestone.

The solum ranges from 20 to 30 inches in thickness and corresponds to the depth to calcareous glacial till material. Depth to the underlying bedrock ranges from 20 to 40 inches. The Ap horizon is black (N 2/0, 10YR 2/1) in color, and its reaction ranges from slightly acid to mildly alkaline.

The texture of the B horizon ranges from gravelly fine sandy loam or gravelly very fine sandy loam to gravelly coarse loam. The coarse fragment content includes some stones and ranges from 15 to 35 percent. The B21g horizon ranges from brown (7.5YR 5/2) to gray or light gray (5Y 6/1). Its reaction ranges from slightly acid to mildly alkaline. The B22g horizon ranges from reddish gray (5YR 5/2) to gray or light gray (5Y 6/1). Reaction ranges from neutral to mildly alkaline, and in the shallowest profiles this horizon may be weakly calcareous in the lower several inches.

The C horizon ranges from dark reddish gray (5YR 4/2) to grayish brown (10YR 5/2). The texture is very gravelly very fine sandy loam or very gravelly coarse loam. Coarse fragment content includes stones and ranges from 35 to 80 percent. In the shallowest profiles, which are 20 to 24 inches to bedrock, the C horizon is thin and lacking in places. In some places thin beds of shale are above the hard underlying bedrock.

Sun soils, moderately shallow variant, formed in the same kind of material as the well drained to moderately well drained Wassaic soils. These Sun soils are commonly associated with Ovid and Appleton silt loams, limestone substratum, which are somewhat poorly drained and underlain by limestone at a depth of 42 to 72 inches. These variant soils are similar to and associated with the Lyons soils, which are deeper and finer in texture. Areas are generally near the deeper Sun soils and the somewhat poorly drained to poorly drained Massena soils that formed in similar material.

Sun loam, moderately shallow variant (St).—This level to nearly level soil is dominantly in large depressions and along major drainageways. It receives runoff from soils at higher elevations. Slopes are 0 to 3 percent. Individual areas are generally more than 10 acres in size except along drainageways, where they are mainly oblong and less than 10 acres.

Included with this soil in mapping are minor areas of finer textured Lyons soils, somewhat poorly drained to poorly drained Massena soils at slightly higher elevations, and small, very stony soil areas. Because the depth to bedrock varies, inclusions of some similar poorly drained soils are less than 20 inches to bedrock or deeper than 40 inches.

If this soil is not drained, it is poorly suited to most of the commonly cultivated crops and small grain crops, but it provides some pasture. Installing drainage can be difficult because of the shallowness to bedrock and because of the difficulty of finding outlets. (Capability unit IVw-3; woodland suitability group 4w1)

Urban Land

Urban land (Ub) consists of areas that have been so altered or obscured by urban works and structures that identification of the soils was not feasible. Areas are mainly in the closely built-up parts of the city of Rochester. (Capability unit and woodland suitability group not assigned)

Wampsville Series

The Wampsville series consists of deep, well-drained soils that have a medium-textured surface layer and a moderately fine textured subsoil. These soils formed in calcareous glacial outwash rich in red shale. They are nearly level to strongly sloping and occupy kames and terraces. Areas are north of the Onondaga limestone escarpment, both east and west of the Genesee River, and are associated with the drainage of the preglacial Genesee River and several of its tributaries. Most individual areas are larger than 10 acres in size. A number of commercial gravel excavations are in operation.

A representative Wampsville soil has a surface layer, about 7 inches think, of very dark grayish-brown cobbly loam. The subsurface layer is reddish-brown cobbly silt loam about 1 inch thick. The weak-red subsoil is 22 inches thick. It is firm cobbly silty clay loam in the upper 5 inches; neutral, firm cobbly clay loam in the next 7 inches; and very friable, weakly calcareous cobbly sandy loam below a depth of 20 inches. The calcareous substratum begins at a depth of about 30 inches and consists of loose gravel and cobbles with a high proportion of red and green shale.

The main depth of soil available for rooting is in the upper 25 to 30 inches because of the moderate depth to gravel. The root zone has a moderate to high available water capacity. Permeability is moderate in the upper part of the subsoil and moderately rapid to rapid below. The high content of cobbles in the surface and subsurface layers restricts some root crops. The cobbles also interfere slightly with tillage. During long dry periods these soils require supplemental irrigation.

Representative profile of Wampsville cobbly loam, 0 to 3 percent slopes, in a pasture, located 300 feet south of Stewart Road and 1,600 feet east of Wheatland Center Road, town of Wheatland:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) cobbly loam; moderate, fine, granular structure; friable; 20 percent cobbles and gravel; neutral; clear, wavy boundary.

A2—7 to 8 inches, reddish-brown (2.5YR 5/4) cobbly silt loam; moderate, fine, granular structure; friable; 20 percent cobbles and gravel; neutral; clear, broken boundary.

B21t—8 to 13 inches, weak-red (2.5YR 4/2) cobbly silty clay loam; moderate, fine, angular blocky structure; firm; reddish-brown (2.5YR 5/4) ped coats; clay films in pores; 20 percent cobbles and gravel; neutral; clear, wavy boundary.

B22—13 to 20 inches, weak-red (2.5YR 4/2) cobbly clay loam; moderate, fine, angular blocky structure; firm; prominent clay films on ped, cobble, and gravel surfaces and in pores; 20 percent cobbles and gravel; neutral, very weakly calcareous; clear, wavy boundary.

B3—20 to 30 inches, weak-red (2.5YR 4/2) cobbly sandy loam; very weak, medium, subangular blocky structure; very friable; thin clay films on the coarse fragments; 25 percent cobbles and gravel; weakly calcareous; clear, wavy boundary.

C—30 to 53 inches, poorly sorted gravel and cobbles; single grain; loose; cobble content averages 30 percent; fragments are light-gray limestone and red and green shale; calcareous.

The solum ranges from 20 to 40 inches in thickness and averages 30 inches. The Ap horizon is very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). Reaction is neutral or slightly acid. The A2 horizon, where present, ranges in color from reddish brown (2.5Y 5/4) to dark brown (7.5YR 4/4). Its texture is cobbly loam, gravelly loam, cobbly silt loam, or gravelly silt loam. Structure is weak or moderate, fine or medium, granular.

The Bt horizon ranges in color from weak red (2.5YR 4/2) to brown (7.5YR 5/4). The texture is cobbly clay loam, gravelly clay loam, cobbly silty clay loam, or gravelly silty clay loam. Clay content ranges from 28 to 35 percent, and clay films present in pores and on ped surfaces are very pronounced in the lower part of the Bt horizon. Cobble and gravel content ranges from 20 to 35 percent, and most of these fragments have some clay coating. Peds in the upper part are coated with material that is very similar in color and texture to that of the A2 horizon. The B3 horizon is weak red (2.5YR 4/2) to brown (7.5YR 5/4). This horizon lacks the high clay content of the Bt horizon. Thin clay coatings are on the coarse fragments. Free carbonates are present in places. The reaction throughout the B horizon is neutral, except for the weakly calcareous areas where it is mildly alkaline. A few tongues of the B3 horizon, shaped like inverted cones, extend to a depth of 8 to 10 feet or more and have the regular B horizon sequence.

The upper several feet of the C horizon is poorly sorted and contains up to 40 percent cobbles. The fragments in this horizon are a mixture of sandstone, limestone, and shale.

The Wampsville soils are commonly associated with the well-drained to excessively drained Palmyra soils and the moderately well drained Phelps soils that formed in similar material. Wampsville soils are redder in color than these associated soils. They have a finer textured B horizon than the Palmyra soils and lack the seasonal high water table of the Phelps soils. The adjacent Cazenovia and Cayuga soils normally are at lower elevations. The Cayuga soils formed in lacustrine deposits underlain by glacial till, and the Cazenovia soils formed in till.

Wampsville cobbly loam, 0 to 3 percent slopes (WcA).—This soil has the profile described as representative of the series. Areas are on the level to nearly level parts of terraces and kames.

The major inclusions with this soil in mapping are the moderately well drained Phelps soils in the lower depressionlike areas or along small drainageways. Also included are areas where the subsoil has a higher clay content, small areas with a cobbly fine sandy loam or gravelly loam surface layer, and extremely cobbly areas.

This soil is suited to crops, pasture, or woodland. It is well suited to most of the common crops grown in the area, such as corn, small grain, and hay. Some specialized crops are well suited if they are not root crops or crops where cobbles, stones, and gravel interfere with planting, cultivating, and harvesting. In dry periods, this soil may be droughty. The content of coarse fragments in the surface layer slightly hinders many farming operations. (Capability unit I–1; woodland suitability group 2o1)

Wampsville cobbly loam, 3 to 8 percent slopes (WcB).—This soil is on the undulating areas of terraces or kames and on terrace escarpments. Areas are 10 acres or larger in size.

The major inclusions with this soil in mapping are areas of steeper soils, such as those occupying the perimeter of escarpments. Also included are small areas with a cobbly fine sandy loam surface layer, areas of a similar soil with a clay subsoil, and extremely cobbly areas.

This soil is suited to crops, pasture, or woodland. It is well suited to the common crops, such as corn, small grain, and hay, and to some vegetable crops. Crops that require soils relatively free of coarse fragments are not well suited. In most areas the cobbles and gravel interfere slightly with tillage. The productivity potential is moderate to high if good management is practiced. If this soil is cultivated and not protected, it is subject to moderate erosion. Moisture conserving practices are needed because the soil is droughty in dry periods. (Capability unit IIe–2; woodland suitability group 2o1)

Wampsville cobbly loam, 8 to 15 percent slopes (WcC).—This soil generally has a thinner solum than that described as representative of the series. Most areas border the gently sloping Wampsville soils or are on narrow ridges within other Wampsville soil areas.

The major inclusions with this soil in mapping are small areas of Wampsville soils where the slope is outside the range of this soil. Also included are extremely cobbly areas, small areas with a fine sandy loam surface layer, and areas with a finer textured subsoil.

This soil is suited to crops, pasture, or woodland. It is moderately well suited to small grain, hay, and pasture. Slopes somewhat limit the suitability for cultivating intertilled crops, such as corn. If this soil is cultivated and not protected, it is subject to severe erosion. Less sloping Wampsville soils do not get droughty as quickly as this soil in dry periods and generally have a thicker root zone. Moisture conserving practices are important on this soil. Gravel and cobbles interfere with tillage. (Capability unit IIIe–2; woodland suitability group 2o1)

Wassaic Series

In the Wassaic series are moderately deep, well drained and moderately well drained soils that are moderately coarse textured. These level to gently sloping soils occupy relatively flat areas on the till plains. They are underlain by hard rock at a depth ranging from 20 to 40 inches. The soils are geographically associated with the three major hard bedrock formations in the county. The largest acreage of Wassaic soils occurs over the Lockport escarpment. Most of the remaining acreage is over the red Medina sandstone, but a small acreage is over the Onondaga limestone.

A representative Wassaic soil has a surface layer, 8 inches thick, of dark-brown fine sandy loam. The subsurface layer is dark yellowish-brown, loose, medium acid loamy fine sand that extends to a depth of 18 inches. The friable, neutral, brown to dark-brown subsoil is 14 inches thick. The upper 8 inches is gravelly loamy fine sand, and the lower part is gravelly fine sandy loam. At a depth of 32 inches is limestone bedrock.

A seasonal water table rises to within 18 to 24 inches of the surface during some periods of the year. The depth of soil available for rooting is generally restricted to the depth of material above the bedrock. These soils have low to high available water capacity. Permeability ranges from moderate to moderately rapid throughout the profile. The depth to bedrock ranges from 20 to 40 inches and makes these soils subject to droughtiness in dry seasons.

Representative profile of Wassaic fine sandy loam, 0 to 4 percent slopes, in an idle area, located 3,000 feet southwest of the junction of Lyell and Elmgrove Roads, town of Gates:

Ap—0 to 8 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary.

A2—8 to 18 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; single grain; loose; many fine roots; medium acid; clear, smooth boundary.

IIA&B—18 to 26 inches, brown to dark-brown (7.5YR 4/4) gravelly loamy fine sand; weak, medium, platy structure; friable; thick, pinkish-gray (7.5YR 7/2) ped coats in more than 50 percent of the horizon; many fine roots; slightly acid; clear, smooth boundary.

IIB2t—26 to 32 inches, brown to dark-brown (7.5YR 4/2) gravelly fine sandy loam; weak, thick, platy structure that parts to weak, medium and coarse, subangular blocky structure; friable; clay films in all pores and patchy clay films on structural plates; neutral; few fine roots; abrupt, broken boundary.

R—32 inches, unweathered dolomitic limestone; very few cracks.

The solum ranges in thickness from 20 to 40 inches and corresponds to the depth to hard rock. The Ap horizon ranges from dark brown to brown (7.5YR 3/2 to 10YR 4/3). Its reaction ranges from medium acid to neutral. The A2 horizon ranges from brown (7.5YR 5/2) to light yellowish brown (10YR 6/4) in color, from loamy fine sand to fine sandy loam in texture, and from medium acid to slightly acid in reaction.

The A&B horizon ranges from reddish brown (5YR 4/3) to light olive brown (2.5Y 5/4). Its texture ranges from gravelly loamy fine sand to gravelly fine sandy loam. The coarse fragment content includes stones and ranges from 15 to 35 percent. Ped coats have a color value of 6 to 8 and may extend into the upper 2 to 3 inches of the Bt horizon. Reaction of the A&B horizon ranges from slightly acid to neutral.

The Bt horizon ranges from dark reddish gray (5YR 4/2) to light olive brown (2.5Y 5/4). Its texture ranges from gravelly loam to gravelly fine sandy loam. The coarse fragment content includes stones and ranges from 15 to 35 percent. Reaction ranges from slightly acid to mildly alkaline. In some thicker profiles, a B3 horizon is present that is mildly alkaline and may contain free carbonates. The texture of the B3 horizon is similar to that of the Bt horizon, but it contains less clay. The limestone or sandstone bedrock is fractured in places.

In Monroe County, the Wassaic soils are coarser textured than the defined range for the series. This difference affects the available water capacity of the soils and reduces the available water for some crops.

Wassaic soils formed in material similar to that giving rise to the poorly drained to very poorly drained Sun soils, moderately shallow variant. The Wassaic soils are similar in color and texture to the Madrid soils, which formed in deep glacial till. They are similar to Benson soils but have more clay in the B horizon and a slightly greater depth to bedrock.

Wassaic fine sandy loam, 0 to 4 percent slopes (WfA).—This is a nearly level to gently sloping soil.

Included with this soil in mapping are small areas underlain by Medina sandstone that have a loamy fine sand texture throughout the profile. These inclusions are somewhat more acid and droughtier than the fine sandy loam soil. Common inclusions are the deeper Madrid soils, shallow Benson soils, Rock land, and small areas of Sun soils, moderately shallow variant. Small areas of Wassaic soils that have a silt loam or loam surface layer are also included.

This soil is suited to crops, pasture, or woodland. The major limitations to use are the deficiency of nutrients and lack of moisture in spots because of the variable depth to bedrock. (Capability unit IIs–2; woodland suitability group 2o1)

Wayland Series

The Wayland series is made up of deep, poorly drained and very poorly drained soils that have a medium-textured surface layer and a moderately fine textured subsoil. These level to nearly level soils are of limited extent in the county. They formed in recently deposited alluvial material and are subject to periodic flooding. Areas are on first bottoms, principally along the major creeks and streams, in the old oxbow areas of former stream channels, or in the lower depressions on flood plains.

A representative Wayland soil has a surface layer, about 8 inches thick, of very dark grayish-brown silt loam. This is underlain by a firm, mottled, dark-gray silty clay loam subsoil that is neutral in reaction. The substratum begins at a depth of about 20 inches. The upper 12 inches is mottled, brown, firm silty clay loam that is neutral in reaction. Below a depth of 32 inches, the substratum consists of neutral layers of mottled, pinkish-gray gravelly silty clay loam, very fine sand, silt, clay, and gravel.

A seasonal high water table is at or near the surface for long periods. In undrained areas, the depth of soil available for rooting is mainly in the upper 10 to 20 inches. Available water capacity ranges from low to high. Plants seldom lack moisture. Permeability is moderately slow to moderate in the subsoil and variable in the substratum. Prolonged wetness and flooding are the major limitations to use of these soils for farming.

Representative profile of Wayland silt loam in an idle area, located half a mile north and just west of the junction of Erie Station and Middle Roads:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, coarse, granular structure; friable; neutral; clear, smooth boundary.

Bg—8 to 20 inches, dark-gray (10YR 4/1) silty clay loam; many, medium, distinct mottles of light gray and yellowish red; weak, coarse, granular structure; firm; coats of very dark grayish brown (10YR 3/2) along old root channels and fracture planes; neutral; clear, wavy boundary.

C1g—20 to 32 inches, brown (7.5YR 5/2) silty clay loam; many, medium, distinct mottles of strong brown and reddish yellow; very weak, coarse, subangular blocky structure; firm; neutral; clear, wavy boundary.

IIC2g—32 to 51 inches, pinkish-gray (7.5YR 6/2) stratified gravelly silty clay loam, very fine sand, silt, clay, and gravel; mainly gravelly silt loam in texture; many, medium, distinct mottles of yellowish red and yellow; massive; very sticky; neutral.

The thickness of the silt and clay deposits over variable stratified sand, silt, and gravel materials, with thin strata of clay, ranges from 20 to 40 inches but is dominantly 24 to 36 inches. Reaction is neutral to a depth of 40 inches. The Ap horizon ranges from black (N 2/0) to very dark grayish brown (2.5Y 3/2). The color value of the Ap or A1 horizon, if present, is less than 5 if it is moist, rubbed, or dry.

The Bg horizon ranges from dark gray (10YR 4/1) to very dark gray (10YR 3/1) in color and from silt loam to silty clay loam in texture. Its structure ranges from weak, medium and coarse, granular to weak, fine and medium, subangular blocky. Its consistence is friable or firm.

The C horizon ranges from brown or dark brown (7.5YR 4/2) to grayish brown (2.5Y 5/2) and includes dark gray (10YR 4/1). The texture ranges from silt loam to silty clay loam, and the average clay content ranges from 18 to 35 percent. Chroma of the mottles ranges from 4 to 8. A chroma of 1 or 2 in the matrix and mottles is in 30 to 40 percent of the soil between the Ap horizon and the stratified material. The texture of the stratified material in the IIC horizon is variable.

The Wayland soils formed in the same kind of material as the well drained Genesee soils and the moderately well

drained Eel soils. Wayland soils are associated with the silty Canandaigua soils, the sandy Lamson soils, and the clayey Madalin soils, all of which formed in various lacustrine deposits. These associated soils have a well-developed B horizon, which is lacking in the Wayland soils.

Wayland silt loam (Wg).—This level to nearly level soil is on the lowest areas of the first bottoms adjacent to streams or in old oxbows. Slopes range from 0 to 3 percent. Most areas are 10 acres or more in size.

Included with this soil in mapping are small spots of the better drained Eel and Genesee soils and areas that have a thin organic deposit on the surface. In areas where this soil is associated with bedrock escarpment, a special symbol, as indicated on the legend of conventional signs, is used on the soil map to show that bedrock exists at a depth of 20 to 40 inches. Bedrock varies from Medina sandstone to limestone.

This soil is suited to limited cropping, pasture, or woodland. The prolonged high water table and hazard of flooding are major limitations to use for farming. The soil should remain in long-term hay or pasture that tolerates wetness. If drainage is adequate and measures for flood control are applied, this soil can be cropped intensively. (Capability unit IVw–1; woodland suitability group 4w1)

Formation, Morphology, and Classification of the Soils

This section discusses the factors of soil formation and the methods and criteria used in classifying soils. Table 11 lists the soil series and their classification.

Factors of Soil Formation

Soils are formed through the interaction of five major factors: climate, plant and animal life, parent material, topography, and time. The relative influence of each factor generally varies from place to place. Local variations in soils are due to differences in kind of parent material and in topography and drainage. In places one factor may dominate the formation of a soil and determine most of its properties.

Climate

Climate, particularly temperature and precipitation, is an active soil-forming factor. It determines to a large degree the nature of the weathering of mineral materials. It also affects growth of vegetation and the leaching and

TABLE 11.—*Classification of soil series*

Series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Alton [1]	Loamy-skeletal, mixed, mesic.	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Appleton	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Arkport	Coarse-loamy, mixed, mesic.	Psammentic Hapludalfs	Alfisols	Sols Bruns Acides intergrading to Gray-Brown Podzolic soils.	Zonal.
Benson [1]	Loamy-skeletal, mixed, mesic.	Lithic Eutrochrepts	Inceptisols	Brown Forest soils	Intrazonal.
Brockport	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Canandaigua	Fine-silty, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Humic Gley soils.	Intrazonal.
Cayuga	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Cazenovia	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Churchville	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Claverack	Sandy over clayey, mixed, nonacid, mesic.	Aquic Udorthents	Entisols	Sols Bruns Acides	Zonal.
Collamer	Fine-silty, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Collamer, loamy subsoil variant.	Fine-silty, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Colonie	Mixed, mesic	Alfic Udipsamments	Entisols	Sols Bruns Acides	Zonal.
Cosad	Sandy over clayey, mixed, nonacid, mesic.	Aquic Udorthents	Entisols	Sols Bruns Acides	Zonal.
Dunkirk	Fine-silty, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Edwards	Marly, mesic	Limnic Medisaprists	Histosols	Bog soils	Intrazonal.
Eel [1]	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils	Azonal.
Elnora	Mixed, mesic	Aquic Udipsamments	Entisols	Sols Bruns Acides	Zonal.
Galen	Coarse-loamy, mixed, mesic	Psammentic Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Genesee [1]	Fine-loamy, mixed, mesic	Fluventic Eutrochrepts	Inceptisols	Alluvial soils	Azonal.
Halsey	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Hamlin [1]	Coarse-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils	Azonal.

See footnote at end of table.

TABLE 11.—*Classification of soil series*—Continued

Series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Hilton	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Honeoye	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Hudson	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Ira	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Lairdsville	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Lakemont	Fine, illitic, mesic	Udollic Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Lakemont, loamy subsoil variant.	Fine, illitic, mesic	Udollic Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Lamson	Coarse-loamy, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Humic Gley soils.	Intrazonal.
Lima	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Lockport	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Lyons [1]	Fine-loamy, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Madalin	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols	Low-Humic Gley soils	Intrazonal.
Madrid	Coarse-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Massena	Coarse-loamy, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Brown Forest soils	Intrazonal.
Minoa	Coarse-loamy, mixed, mesic	Aquic Dystric Eutroehrepts.	Inceptisols	Brown Forest soils intergrading to Gray-Brown Podzolic soils.	Intrazonal.
Niagara	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Niagara, loamy subsoil variant.	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Odessa	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Ontario	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Ovid	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Palmyra	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Phelps [1]	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Rhinebeck	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Riga	Fine, illitic, mesic	Glossaquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Schoharie	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Sodus	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols	Sols Bruns Acides	Zonal.
Sun	Coarse-loamy, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Humic Gley soils intergrading to Low-Humic Gley soils.	Intrazonal.
Sun, moderately shallow variant.	Coarse-loamy, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols	Humic Gley soils intergrading to Low-Humic Gley soils.	Intrazonal.
Wampsville	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Wassaic [1]	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols	Gray-Brown Podzolic soils	Zonal.
Wayland	Fine-silty, mixed, nonacid, mesic.	Mollic Fluvaquents	Entisols	Alluvial soils	Intrazonal.

[1] These soils are taxadjuncts to the series. They are outside the defined range for the series in the following respects:

Alton soils have higher reaction.

Benson soils lack sufficient coarse fragments to be classified as loamy-skeletal.

Eel soils have dark inherent colors and, in the upper part of the solum, free carbonates. They are less than 18 percent clay and are coarse-loamy.

Genesee soils are less than 18 percent clay and are coarse-loamy.

Some of the Hamlin soils in this county have a hue of 5YR in the B horizon and are mottled to a depth of 24 inches.

Some of the Lyons soils have a thick, dark-colored A horizon.

Phelps soils lack low-chroma mottles in the B horizon.

Wassaic soils are coarser textured.

translocation of weathered materials. The soils of Monroe County formed under a cool-humid climate, which has contributed to an accumulation of organic matter in the surface layer.

Plant and animal life

All living organisms are important to soil formation. These include vegetation, animals, bacteria, and fungi.

The vegetation is generally responsible for the amount of organic matter, color of the surface layer, and the amount of nutrients in the soil. Earthworms, cicadas, and burrowing animals help keep the soil open and porous. Bacteria and fungi decompose the vegetation, thus releasing nutrients for plant food. In Monroe County, the native forests have had more influence on soil formation than any other plant and animal life.

Parent material

Parent material is the unconsolidated mass in which soils are formed. It determines the mineralogical and chemical composition of the soil, and, to a large extent, the rate at which soil-forming processes take place.

In Monroe County, the parent materials are glacial till, glacial outwash, glacio-lacustrine materials, recent alluvium, and organic materials. Most of the soil materials were left after the glaciers melted 10,000 to 15,000 years ago. Alluvial and organic materials are of recent origin, and deposition is a continuing process.

Soils formed in glacial till are the most extensive and have a wide range in characteristics. Soils of the Honeoye, Lima, Ontario, Madrid, Appleton, and Lyons series are a few examples. Soils formed in glacial outwash deposits are generally loamy and are commonly underlain by stratified sand and gravel. Examples of these are soils of the Alton, Palmyra, Wampsville, and Phelps series.

The soils formed in lacustrine material range from loamy fine sand to silty clay loam in surface texture. Examples of soils formed in coarse-textured lacustrine material are soils of the Colonie and Elnora series. Examples of soils formed in fine-textured lacustrine materials are those of the Schoharie, Odessa, and Lakemont series.

Soils on the stream bottoms formed in recent alluvium. They are medium textured and exhibit little or no soil development. Examples of these are soils of the Genesee and Eel series. Soils that formed in organic material are referred to as muck.

Topography

The shape of the land surface, the slope, and the position in relation to the water table have had great influence on the formation of the soils of this county. Soils formed in sloping areas where runoff is moderate to rapid generally are well drained, have a bright-colored, unmottled subsoil, and in most places are leached to greater depths than wetter soils in the same general area. In more gently sloping areas where runoff is slower, the soils generally exhibit some evidence of wetness for short periods of time, such as mottling in the subsoil. In level areas or slight depressions, where the water table is at or near the surface for long periods, the soils show marked evidence of wetness. They have a dark-colored, thick, organic surface layer and a very strongly mottled or grayish subsoil. Some soils, however, are wet because of a high water table or because of their position. Also, the permeability of the soil material, as well as the length, gradient, and configuration of the slope, influence the kind of soil that is formed from place to place. Local differences in soils are largely the result of differences in parent material and topography.

Time

The formation of soils requires time for changes to take place in the parent material, and this is usually a long time when measured in years. The soils of Monroe County developed in the period since glaciation. Evidence of this relatively limited time can be seen in the soils. Soils formed on low bottoms, subject to varying degrees of flooding, may receive new sediments with each flooding. These soils have only weak structure and weak color differences between horizons. An example is the Eel soils. Soils that have well-developed horizons, such as those of the Ontario series, have been developing for longer periods than soils of the Eel series.

Morphology of the Soils

Several processes are involved in the formation of soil horizons. These include the accumulation of organic matter, the leaching of soluble salts, the formation and translocation of clay minerals, and the reduction and transfer of iron. These processes are continually taking place at the same time throughout the profile. They are very slow and are measured in thousands of years. The accumulation of organic matter takes place as plant residue decomposes. This process darkens the surface layer and helps form the A1 horizon. Organic matter, once it has been lost, replenishes itself only after a long time. The surface layer of Monroe County soils averages about 3.5 percent organic matter.

For soils to have distinct soil horizons, it is probable that some of the lime and other soluble salts are leached before the translocation of clay minerals. Many factors affect this leaching, such as the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil.

The most important process of horizonation in Monroe County is the formation and translocation of silicate clay minerals. The amount of clay minerals in a soil profile is inherent in the parent material, but the clay content varies from one soil horizon to another. Clay minerals are generally leached from the A horizon and accumulate in the B horizon as clay films on ped faces and in the pores and root channels. In some soils, an A2 horizon has been formed by considerable eluviation of clay minerals to the B horizon. The A2 horizon is light colored and has platy structure in places. The Ontario soils are an example of translocation of clay minerals.

The reduction and transfer of iron is associated mainly with the wetter soils. This process is called gleying. Moderately well drained to somewhat poorly drained soils have yellowish-brown and reddish-brown mottles, which indicate the segregation of iron. Such poorly drained to very poorly drained soils as those of the Canandaigua, Lakemont, and Lyons series have a grayish-colored subsoil, which indicates the reduction and transfer of iron.

Classification of the Soils

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*6*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 and supplemented in March 1967 and in September 1968 (*8*). This system is under continual study, and readers interested in the development of the system should refer to the latest literature available.

Table 11 shows the classification of the soils of Monroe County according to the current system and also gives the great soil group and the order according to the 1938 system.

The current system defines classes in terms of observable or measurable properties of soils (*4*). The properties chosen are primarily those that permit the grouping of soils that are similar in genesis. The classification is designed to encompass all soils. It has six categories. Begin-

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ning with the most inclusive, they are the order, the suborder, the great group, the subgroup, the family, and the series. The categories are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are generally those that tend to give broad climatic groupings of soils. Entisols, Histosols, and, to some extent, Inceptisols, are exceptions; they occur in many different climates. Four of the ten soil orders occur in Monroe County: Entisols, Inceptisols, Alfisols, and Histosols.

Entisols are recent soils (fig. 12) in which there has been little, if any, horizon development. This order is represented by soils of the Claverack, Colonie, Cosad, Elnora, and Wayland series.

Inceptisols (fig. 13) occur on young land surfaces. This order is represented by soils of the following series: Alton, Benson, Canandaigua, Eel, Genesee, Halsey, Hamlin, Ira, Lamson, Lyons, Massena, Minoa, Sodus, Sun, and Sun, moderately shallow variant.

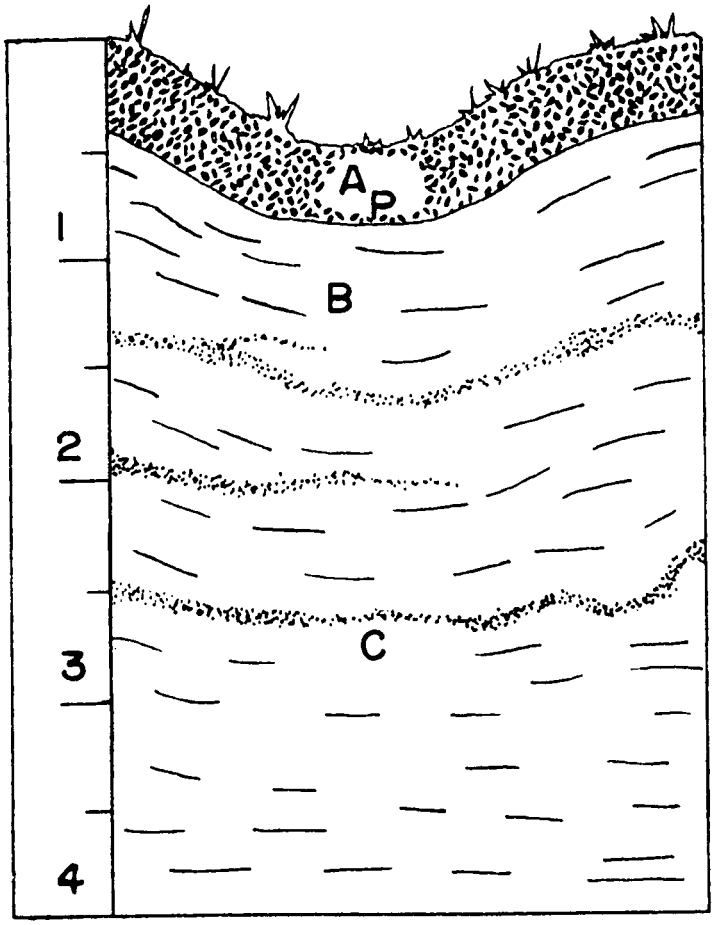

Figure 12.—**Characteristics of Entisols in Monroe County, represented by Colonie loamy fine sand. The Ap horizon is dark-colored loamy fine sand that is moderate in organic-matter content. The B horizon is reddish-yellow loamy fine sand that fades with depth to gray; there are a few thin, brown bands of loamy fine sand. The boundary between the B and C horizons is not distinct.**

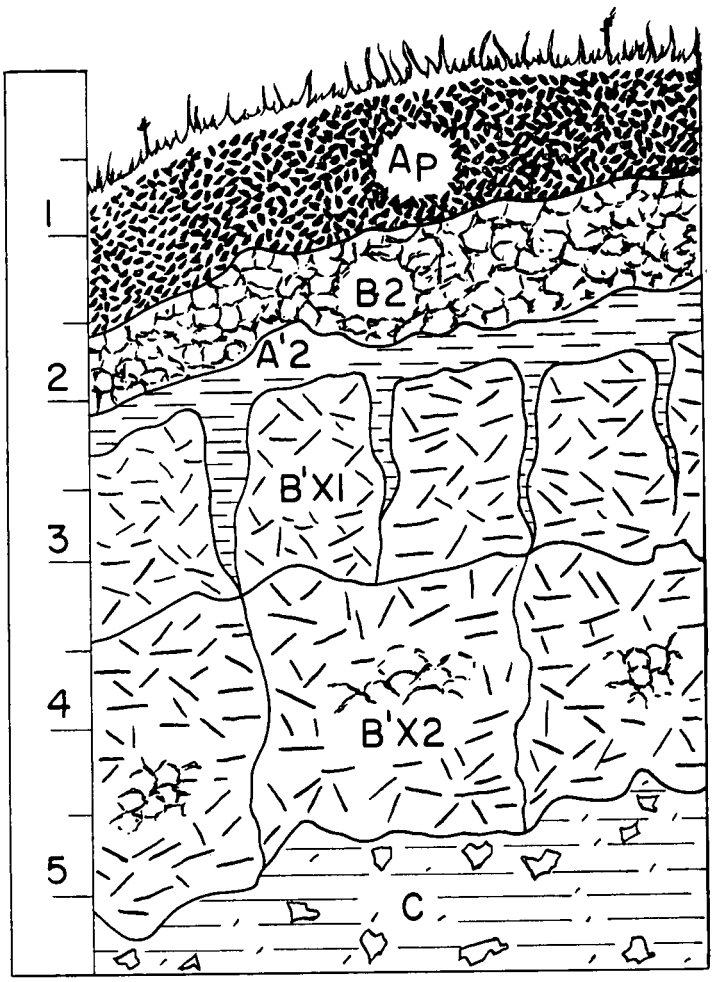

Figure 13.—**Characteristics of Inceptisols that have a fragipan, represented by Ira gravelly fine sandy loam. The Ap horizon is dark-brown gravelly fine sandy loam that is moderately high in organic-matter content. The B2 horizon is brown gravelly fine sandy loam that has very weak, fine, subangular blocky structure. There is no increase in clay content. The A'2 horizon is light yellowish-brown gravelly fine sandy loam that appears leached; tongues separate the prisms in the underlying B'x1 horizon. The B'x1 horizon is reddish-brown gravelly fine sandy loam arranged in prisms 10 to 18 inches wide. This horizon is massive or has very weak, crude, blocky structure and a slightly higher content of clay than the A'2 horizon. The B'x2 horizon is reddish-brown gravelly fine sandy loam arranged in prisms 18 to 30 inches wide and is massive or has very weak, coarse, subangular blocky structure. The C horizon is reddish-brown gravelly fine sandy loam glacial till that has weak, medium and thick, platy structure.**

Alfisols have a clay-enriched B horizon (figs. 14 and 15) and a base saturation of more than 35 percent. Figures 14 and 15 show the difference in the thickness of the horizons of uneroded Honeoye and Ontario soils. This order is represented by soils of the following series: Appleton; Arkport; Brockport; Cayuga; Cazenovia; Churchville; Collamer; Collamer, loamy subsoil variant; Dunkirk; Galen; Hilton; Honeoye; Hudson; Lairdsville; Lakemont; Lakemont, loamy subsoil variant; Lima; Lockport; Madalin; Madrid; Niagara; Niagara, loamy subsoil variant; Odessa; Ontario; Ovid; Palmyra; Phelps; Rhinebeck; Riga; Schoharie; Wampsville; and Wassaic series.

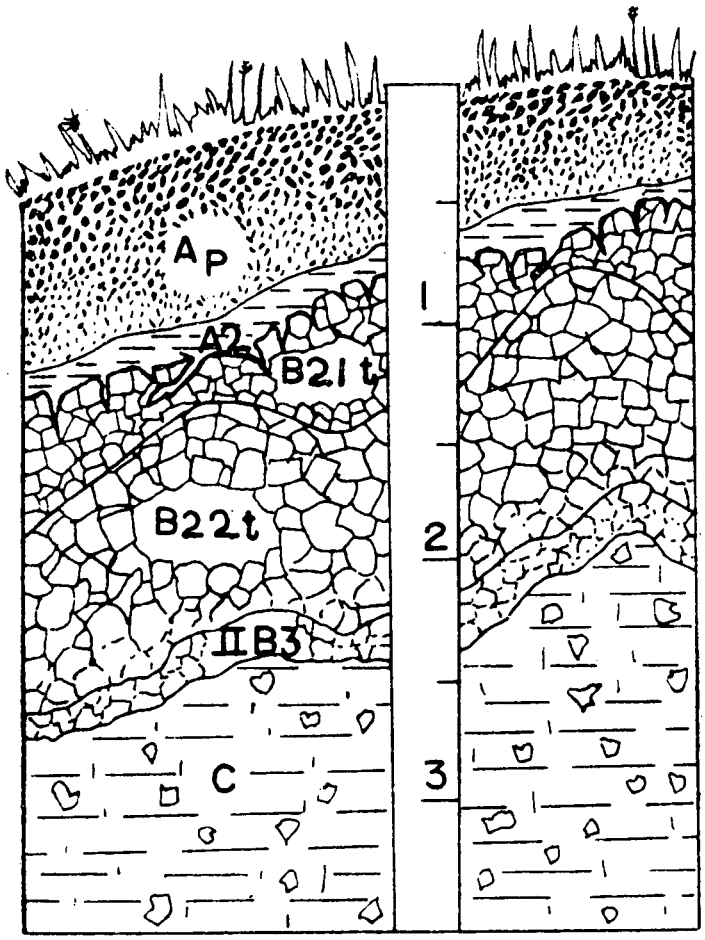

Figure 14.—Profile of Honeoye silt loam. The Ap horizon is dark colored and moderate in organic-matter content. The A2 horizon is brown and low in clay content. It appears bleached. Narrow tongues extend 1 to 3 inches into the B21t horizon. The B21t horizon is brown in color and has blocky structure. The B22t horizon is dark brown to dark yellowish brown in color and has blocky structure. Clay has accumulated in this horizon. In the IIB3 horizon, clay is replacing lime. The C horizon is dense, calcareous loamy glacial till parent material.

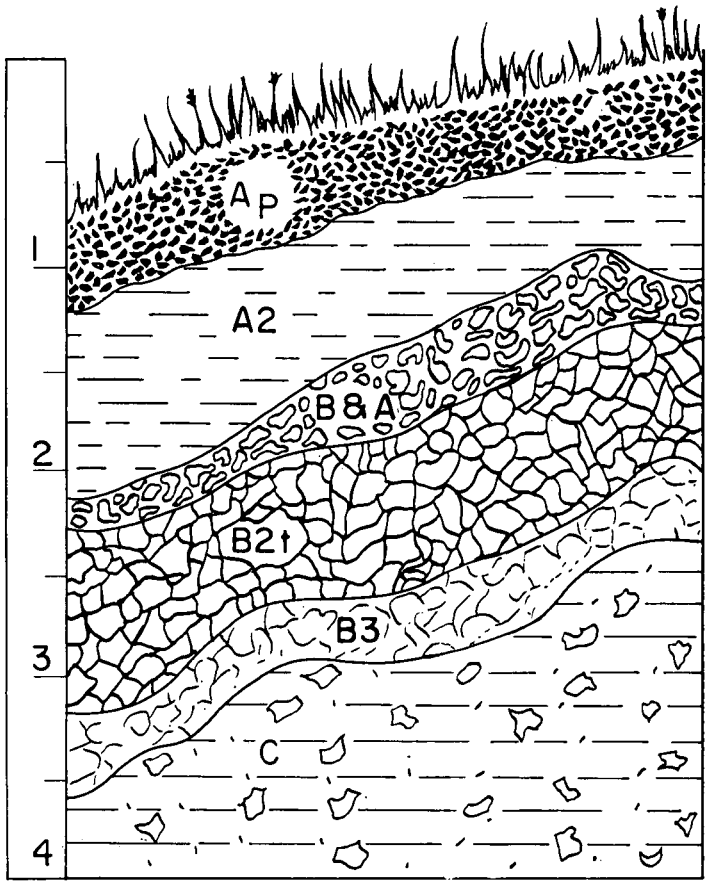

Figure 15.—Profile of Ontario loam. The Ap horizon is dark colored and moderate in organic-matter content. The A2 horizon is grayish brown and leached, and is low in clay content. The B&A horizon is grayish-brown material surrounding brown blocky material that is degrading by gradual removal of clay. The B2t horizon has brown blocky structure and an accumulation of clay. The B3 horizon intergrades between the B2 and C horizons; clay is beginning to accumulate as lime is removed. The C horizon is dense, calcareous loamy glacial till parent material.

Histosols (fig. 16) have high organic-matter content. They developed in plant remains and some mineral matter, under water. They consist of peat or muck. This order is represented by soils of the Edwards series.

SUBORDER.—Each order is divided into suborders, primarily on the basis of soil characteristics that indicate genetic similarity. The suborders narrow the broad climatic range in the orders. The characteristics for suborders reflect either the presence or absence of waterlogging or soil differences that result from the climate or vegetation.

GREAT GROUP.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of genetic horizons. The horizons considered are those in which clay, iron, or humus have accumulated or those that have pans that interfere with growth of roots or movement of water. The features selected are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and others.

SUBGROUP.—Each great group is divided into subgroups, one representing the central (typic) segment of the group and other groups, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside the range of any other great group, suborder, or order.

FAMILY.—Families are established within a subgroup primarily on the basis of properties that affect the growth of plants or behavior of soils when used for engineering purposes. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

SERIES.—The series is a group of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and in arrangement in the profile.

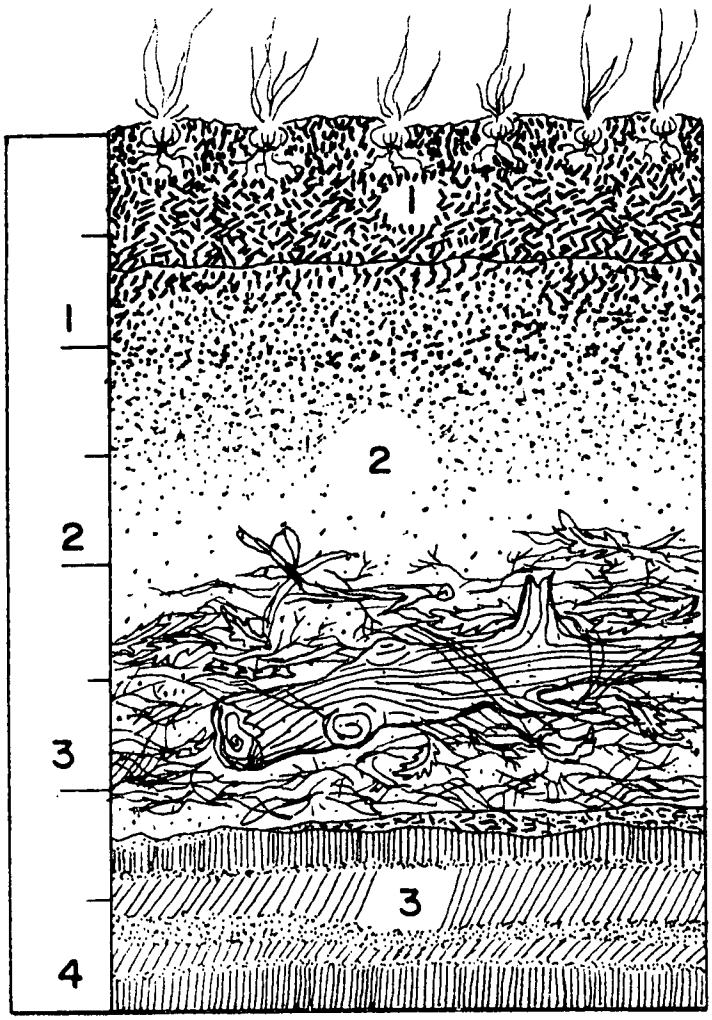

Figure 16.—**Characteristics of Histosols in Monroe County, represented by soils of the Edwards series. The plow layer is black, granular muck. The next layer is black to very dark brown muck that grades with depth to brown, fibrous peat. The next layer is gray, bedded clay, silt, or sand in varying degrees of purity and proportion.**

General Nature of the County

The area that is now Monroe County was formerly occupied by Indian tribes of the Iroquois Confederation. It was first permanently settled in 1790. A permanent settlement, Penfield, was established in 1801, and lots in Rochester were surveyed and sold in 1811. Monroe County was organized in 1821. In 1825 the opening of the Erie Barge Canal greatly stimulated settlement.

The population of Monroe County was 423,881 in 1930 compared with 586,387 in 1960 and 625,128 in 1964. The population of Rochester was 328,123 in 1930, reached a peak of 332,488 in 1950, but has declined since to a point where the population of the surrounding towns exceeds that of the city. A population of 319,279 was concentrated in the suburban and rural areas outside the city in 1964.

When the early settlers came, most of the county was covered with forest, but there were a few large open areas, such as the marshlands along the shore of Lake Ontario. The kinds of trees that grew in any given area depended mainly on drainage of the soils. The wetter sites supported such trees as beech, birch, elm, ash, soft maple, willow, and hemlock. Common, but less numerous, were arborvitae, larch, and redcedar. The drier sites supported hard maple, beech, several varieties of oak, hickory, chestnut, dogwood, and sycamore, along with birch, poplar, butternut, and locust.

Few, if any, virgin stands of timber remain in the county. Today, abandoned and idle fields have a characteristic second-growth vegetation, which consists of species of thornapple, ironwood, and willow. Weeds are common in untended fields. Some of these are paintbrush, Queen-Annes-lace (wild carrot), goldenrod, ragweed, and povertygrass.

Monroe County has numerous recreational facilities. It has a system of parks that offer such activities as skiing, horseback riding, hiking, picnicking, boating, camping, and golf. These parks are scattered throughout the county, and the system is expanding rapidly. The proximity of Lake Ontario makes available many opportunities for water sports. Hamlin Beach State Park and the Erie Barge Canal System, operated by the State of New York, also offer a variety of recreational activities. Hunting and fishing facilities are excellent. These include good trout streams. There are also many private golf courses and country clubs.

Transportation and Industry

Transportation is supplied by an excellent system of roads that include several limited-access, high-speed highways; several railroads; ships plying the Great Lakes or the New York State (Erie) Barge Canal; and three major airlines. More than 100 trucking companies serve the county, and buslines provide passenger service to the city of Rochester and the outlying towns.

Coal, bulk cement, and general freight brought in by ship is unloaded at the Port of Rochester. The harbor has a minimum depth of 23 feet and a 600-foot turning basin. It is on the shipping lanes through the St. Lawrence River to the Atlantic Ocean. The New York State (Erie) Barge Canal carries only a small amount of freight traffic. It is used by small pleasure craft for local excursions and for access to other parts of the State. Commercial airlines provide passenger service and limited cargo service. The Rochester-Monroe County airport can accommodate large jet planes. There are also a number of small municipal and private airfields.

More than 100 industries in the county produce cameras and photographic equipment, clothing, glass, electronic equipment, and other manufactured goods. The need for skilled and semiskilled workers frequently exceeds the local labor supply. Several food-processing companies contract for the vegetables, fruit, and meat produced on farms in the county and throughout the multicounty area. All the manufactured goods and processed foods are sold nationwide. Locally, there are two major farmers' markets, a number of grocery chains, and several shopping plazas. These outlets provide the goods and services required by the new suburbs that are developing as a result of expanding industry.

Farming

According to the 1964 Census of Agriculture, 46 percent of the acreage of Monroe County was in farms. Of the 1,466 farms in the county, only 970 were classified as commercial. The acreage included 131,781 acres of cropland, 8,704 acres of pasture, 14,929 acres of woodland, and about 14,000 acres used for buildings, lanes, and other purposes. The statistics do not include cropland that was neither harvested nor pastured.

Between 1959 and 1964, the number of farms, especially small farms, declined rapidly, but the average size increased. For example, the number of farms more than 500 acres in size increased from 33 to 38. The number of cash-grain farms is increasing. The number of dairy farms and vegetable and fruit farms is decreasing, but the trend is to larger farms.

Water Supply

The domestic water supply in the dominantly rural areas of Monroe County comes from deep wells in both rock and unconsolidated deposits. Wells are also the main source of water for the towns and villages, except those that are near Lake Ontario or that make up the suburbs of Rochester. In areas south of the Lockport limestone escarpment, the water supply is adequate in most places, but to the north of this escarpment it is erratic and not dependable. In areas that are underlain by Queenston Shale bedrock, neither the quality nor quantity of water are reliable. In many places several wells must be dug before a reliable water supply can be found, and most of the wells drilled into this shale are not adequate during prolonged dry periods. In many places, the water contains sulfur and a large amount of salts. There are several artesian wells closely associated with the Lockport limestone escarpment. Both the Lockport and the Onondaga escarpments are good sources of water, but the water is hard.

The water supply for the city of Rochester comes from Hemlock Lake and other upland reservoirs, as well as directly from Lake Ontario. Much of the water for the suburbs of Rochester also comes from Lake Ontario. These suburbs are served by the rapidly expanding Monroe County Water Authority, which uses Lake Ontario as its main source of water. Many of the small villages also pump water from the lake.

Climate [7]

The climate of Monroe County is humid-continental. Atmospheric flow and weather systems come predominantly from continental sources. Warm, occasionally humid, weather results when the airflow is from the south or southwest; cold, dry weather results when the flow is from the northwest or north. From time to time, well-developed weather systems off the mid- or north-Atlantic coast bring airflow from maritime sources into the county. Cool, cloudy, and often damp weather conditions prevail in this flow coming from the easterly quadrant.

Summers are pleasantly warm. Winters are quite long and cold and have frequent periods of stormy, unsettled weather. Precipitation on the average is evenly distributed in winter. Table 12 gives data on temperature and precipitation. Table 13 gives the probabilities of freezing temperatures in spring and fall.

[7] By A. Boyd Pack, State climatologist, National Weather Service, Ithaca.

TABLE 12.—*Temperature and precipitation data*

[Data from Rochester]

Month	Temperature				Precipitation				
			7 years in 10 will have—			3 years in 10 will have—		Snowfall	
	Average daily maximum	Average daily minimum	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—	Average total	More than—	Less than—	Average total	7 years in 10 will have more than—
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*	*Inch*
January	33	18	46	3	2.3	2.8	1.6	20	13
February	33	17	50	3	2.6	2.8	2.0	21	14
March	40	24	62	11	2.7	2.9	2.1	15	8
April	55	36	74	26	2.8	3.2	2.2	3	1
May	67	46	84	34	2.7	3.2	2.2	(1)	(2)
June	78	56	90	45	2.5	3.3	1.8	0	0
July	83	61	92	51	2.8	2.8	1.9	0	0
August	80	59	90	47	2.8	3.4	2.1	0	0
September	73	52	88	39	2.4	2.7	1.9	0	0
October	62	42	79	31	2.5	3.3	1.4	(1)	(2)
November	48	33	69	22	2.6	3.0	2.0	7	4
December	36	22	51	5	2.2	2.2	1.8	14	8
Year	57	39	94	−2	30.9	32.9	27.0	80	66

[1] Less than half an inch.
[2] 1 year in 10 will have more than 1 inch.

TABLE 13.—*Probabilities of last freezing temperature in spring and first in fall at Rochester*

Probability	Dates for given probability and temperature					
	16° F.	20° F.	24° F.	28° F.	32° F.	36° F.
Spring:						
1 year in 10 later than	April 1	April 5	April 16	April 25	May 19	May 31
1 year in 4 later than	March 23	March 30	April 9	April 21	May 10	May 22
1 year in 2 later than	March 15	March 23	April 2	April 16	May 1	May 13
3 years in 4 later than	March 8	March 17	March 26	April 11	April 22	May 4
9 years in 10 later than	February 27	March 11	March 19	April 6	April 13	April 26
Fall:						
1 year in 10 earlier than	November 18	November 12	November 2	October 12	September 27	September 15
1 year in 4 earlier than	November 24	November 18	November 9	October 21	October 4	September 23
1 year in 2 earlier than	December 2	November 25	November 17	October 30	October 13	October 1
3 years in 4 earlier than	December 10	December 3	November 25	November 9	October 21	October 10
9 years in 10 earlier than	December 16	December 9	December 2	November 17	October 28	October 18

The county is in or near the path of most major weather systems that move across the continent or up the Atlantic Coast. This tends to produce a variety of weather conditions. Temperature and other atmospheric conditions usually undergo considerable change within a time span of a few days. In any given week, the weather can be quite different on the average from that in the preceding or following week. Seasonal weather is commonly variable from year to year.

Lake Erie and Lake Ontario have an important influence on the climate of the county. Of prime importance is the moderating effect on temperature. Extremely high temperatures in summer are less frequent than in areas well removed from the Great Lakes. Similarly, in areas near the Great Lakes, especially Lake Ontario, the soils are slow to warm up in spring. This delays plant growth and allows tender crops to pass more safely through critical periods of freezing temperatures. Cooling at night is reduced, which extends the growing season, especially in autumn. Lake Ontario remains largely unfrozen during the winter; thus, it modifies the severe, below-zero temperatures that affect more inland localities of the State at similar latitudes and elevations.

Elevation has a minor influence on the climate because of the relatively small topographic differences. Except as affected by distance from the Great Lakes, the climate is comparatively uniform. Thus, climatic data for Rochester are reasonably applicable to most other parts of the county.

The annual precipitation ranges from about 29 inches in the extreme northwest to nearly 32 inches in the southeastern quarter of the county. About 40 to 45 percent of the annual total is received during the growing season, May through September.

Proximity to the Great Lakes is an important factor in the amount of snowfall. Airflow across the open water of the lakes during the cold months results in frequent, and often heavy, snowfall over the adjacent land areas. These storms are characterized by substantial snowfall over wide areas and heavy amounts in one or more local areas. The intensity of these storms tends to diminish late in winter when a greater part of the lake surface is frozen.

The climate favors much cloudiness in winter. Severe hailstorms and high winds are not serious hazards to life and property. High winds often accompany snowstorms, and travel is greatly hampered at times by blowing and drifting snow.

Physiography, Relief, and Drainage

The northern part of the county is a nearly level to gently sloping lake plain. Except for the ridges of glacial till, this plain is dominantly the lakebed of old glacial Lake Iroquois. West of the Genesee River, it ranges from 4½ to 8 miles in width, and overall, it slopes gently toward the lake at a gradient of about 25 feet to the mile. It is crossed by a number of small streams that occupy rather shallow valleys. These streams flow in a generally northeasterly direction and empty into Lake Ontario. Within this plain are numerous low ridges and small, circular or elliptical hills that range from 5 to 50 feet or more above the general level of the plain. East of the Genesee River, the lake plain ranges from 2 to 5 miles in width, and, as a whole, lies at a slightly higher elevation above Lake Ontario than in the western part. There are also more lake bluffs near Lake Ontario in this part of the lake plain. The edges of the plain along the Genesee River, Irondequoit Bay, and other major drainageways are steep and heavily dissected by small drainageways.

Just south of the lake plain is the beach ridge formed by glacial Lake Iroquois. This beach ridge crosses the county in a generally east-west direction. Typically, it is made up of outwash sand and gravel. Areas of this sand and gravel extend southward along the major drainageways from the beach ridge, and there are extensive deposits in the towns of Greece, Parma, and Ogden.

South of the beach ridge, most areas are made up of end moraines, till plains, and drumlins. Intermingled in these areas are small lakebeds and alluvial flood plains. The slope range in this area is nearly level to steep. Kame-and-kettle relief is dominant in the Mendon Ponds area and in small areas in other parts of the county.

The elevation is 246 feet above sea level on Lake Ontario, about 400 feet on the lake plain, and a maximum of 900 feet in some areas that have drumlin relief.

Monroe County is in the drainage system of the St. Lawrence River. Most of the rivers, large streams, and creeks have a dendritic or branching pattern. The Genesee River, which is the major stream, crosses the county from

south to north. It meanders through a level to nearly level valley about 1 to 2 miles wide, but where the river passes over a series of falls in the center of Rochester, the valley narrows to a gorge. The main tributaries of the Genesee River are Oatka Creek, Honeoye Creek, Red Creek, and Black Creek, all of which flow into the river south of the city of Rochester.

The smaller streams typical of the lake plain in the northern part of the county generally flow directly into Lake Ontario. Mainly, they have a relatively flat gradient, and they originate near the old glacial beach ridge or just north of the Lockport limestone escarpment. The flood plains along these streams are restricted.

Most of the streams south of the beach ridge flow into the Genesee River or Irondequoit Creek, which empty into Lake Ontario. Irondequoit Creek drains the southeastern part of Monroe County and flows into Irondequoit Bay. Irondequoit Bay, which was the preglacial outlet of the Genesee River, also drains much of the area south of the beach ridge. It forms a deep indentation in the shore of Lake Ontario.

Geology

The most prominent geologic features in Monroe County are those related to the ice age or the Pleistocene Epoch, which began about a million years ago. These features are the result of material accumulated and deposited during the last stage of glaciation, which is the Wisconsin Stage. This stage occurred about 10,000 years ago, and some evidence indicates that it may have persisted until as recently as 5,000 years ago.

Less conspicuous than the glacial features, but equally significant, are the various bedrock formations [8] that underlie all the soils of the county. In shallow soils, bedrock governs the topography of the area. Generally, it also influences the nature of the glacial deposits. All the bedrock is sedimentary; it is made up of material deposited in ancient seas. The dip is toward the south at a gradient of approximately 60 feet per mile, but locally, there are some extreme variations.

Both glacial geology and bedrock geology are discussed briefly in this section.

Glacial geology.—As the glacial ice receded, a series of relatively short-lived postglacial lakes formed. These lakes extended southward from the glacial front and generally drained toward the east. The oldest postglacial lake that affected Monroe County was Lake Warren. About the only remnants of this lake are the sandy deposits at the highest elevations in the southeastern corner of the county, near Baker Hill.

The next postglacial lake was Lake Dana, which formed as the moraine built up when the receding ice stopped for a time. The ice stopped along a line that extended from Albion in Orleans County to Rochester, and the resulting moraine now parallels Highland Avenue in Rochester. The remnants of this lake are the red clay deposits in the town of Henrietta and the sandy deposits in the Turk-Baker Hill area. The outflow channel from this lake is not evident in Monroe County, but the kames in Mendon Ponds were probably small islands during the existence of this lake.

The next postglacial lake was the relatively small, shallow Lake Scottsville, which remained after the ice had receded northward and Lake Dana had drained. The remnants of this lake are the silty deposits that extend along the present Genesee River from the Genesee Valley Park south past the county line and for a short distance westward along Black Creek.

Postglacial Lake Dawson began to form as Lake Scottsville drained northward through the moraine. The level of Lake Dawson dropped as the glacier continued its northward recession and Lake Scottsville drained. The most conspicuous remnant of Lake Dawson is its outflow channel, which passes through the village of Fairport.

The last postglacial lake was Lake Iroquois, the predecessor of Lake Ontario. Apparently, it persisted for a longer time than most of the other lakes because it developed a well-defined beach ridge. This ridge generally coincides with the present Ridge Road (U.S. Route 104). Immediately north of the ridge is a well-defined sand plain that extends across the county in an east-west direction.

Interspersed with the remnants of the glacial lakes are other glacial deposits. Among these deposits are drumlins, moraines, eskers, and kames, which also occur throughout the county.

Bedrock geology.—The oldest bedrock formation is Queenston Shale. This formation is red and fairly soft, but it is interspersed with hard, greenish-gray layers. The material in which this shale formed was deposited more than 410 million years ago during the last stages of the Ordovician Period.

Medina Sandstone overlies Queenston Shale. This sandstone is believed to have formed, at least in part, from material similar to that in which Queenston Shale formed, but after the fine particles had been removed. The sandstone is red but is interspersed with some light-green layers. The entire formation is quite hard. This material was deposited somewhat less than 410 million years ago, during the oldest part of the Silurian period.

Formations of the Clinton Group overlie the Medina Sandstone. These formations consist of relatively thin shale, shaly sandstone, and beds of limestone. In this group, the formations range from the light gray green of the Thorold Sandstone to the red of the Furnaceville Formation and the nearly black of the Williamson Shale. At the top of the Clinton Group is Lockport Dolomite. This dolomite is gray and hard. All of these formed in materials deposited during a period ranging from more than 350 million to less than 410 million years ago, generally about the middle of the Silurian period.

Above the Lockport Dolomite are other shale or shaly formations, the first or oldest of which is the black Pittsford Shale that underlies intermingled beds of red Vernon Shale and green Camillus Shale. Because the seas were quite salty when the beds were laid down, there are extensive deposits of salt and gypsum associated with Vernon Shale and Camillus Shale. At the top of this group of shaly formations is the gray Bertie Waterlime that formed in material deposited at the close of the Silurian period.

The youngest rock formation in the county is Onondaga Limestone. This limestone is light gray, and it contains layers of hard, flinty chert. It appears that some material

[8] The areas of the county underlain by the various bedrock formations are shown on the "Geologic Map of Monroe County, N.Y.," published by the Monroe County Division of Regional Planning.

between the Onondaga Limestone and the underlying Bertie Waterlime may have been removed through erosion. The material in which the Onondaga Limestone formed is believed to have been deposited less than 350 million years ago in the earlier stages of the Devonian Period.

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Glossary

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; but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water 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 capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

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.

Coarse fragments. Rock or mineral particles larger than 2 millimeters in diameter. Terms used to describe coarse fragments are—

Gravel.—Rounded fragments less than 3 inches in diameter.

Channery fragments.—Angular fragments as much as 6 inches in size along the longer axis.

Cobblestones.—Rounded fragments 3 to 10 inches in diameter.

Stones.—Rounded fragments 10 inches or more in diameter and flat fragments that are 15 inches or more in size along the longer axis.

Coarse-textured soils. Soils that have a texture such as sand or loamy sand.

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 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 and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effect of such runoff.

Drainage class (natural). Drainage that existed during the development of the soil, 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 different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A horizon and upper part of the B horizon and have mottling in the lower part of the B horizon and in the C horizon.

Somewhat poorly drained soils are wet for significant periods but not all the time. If Podzolic, they commonly have mottling at a depth below 6 to 16 inches, in the lower part of the A horizon, and in the B and C horizons.

Poorly drained soils are wet for long periods; they are light gray and generally mottled from the surface downward, but some have few or no mottles.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Drift (geology). Material of any sort deposited by geologic processes in one place after having been removed from another; includes drift materials deposited by glaciers and by streams and lakes associated with them.

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.

Eluviation. The movement of material from one place to another

within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Erratics, glacial (geology). Stones, ranging from pebbles to large boulders in size, that were transported by glacial ice and were left stranded far from their original source when the ice melted.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine-textured soils. Soils that have a texture such as sandy clay, silty clay, or clay.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice; the deposits are stratified and occur in the form of kames, eskers, deltas, and outwash plains.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Green manure crop. Any crop grown for the purpose of being turned under when green or soon after maturity for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A horizon to the underlying C horizon. The B horizon also has distinctive characteristics caused by (1) accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Medium-textured soils. Soils that have a texture such as very fine sandy loam, loam, silt loam, or silt.

Moderately coarse textured soils. Soils that have a texture such as sandy loam or fine sandy loam.

Moderately fine textured soils. Soils that have a texture such as clay loam, sandy clay loam, or silty clay loam.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Permeability. The quality that enables a soil horizon to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Rill. A steep-sided channel resulting from accelerated erosion. A rill normally is a few inches in depth and width and is not large enough to be an obstacle to farm machinery.

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

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

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 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Soil variant. A soil having properties sufficiently different from those other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

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

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand), or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

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 may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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

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

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Water table, perched. The upper surface of a body of free water that is separated from an underlying body of ground water by unsaturated material.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit or a woodland group, read the introduction to the section it is in for general information about its management. Dashes indicate that the soil was not placed in that particular grouping. Other information is given in tables as follows:

Estimated yields, tables 1, 2, and 3, pp. 21 through 29.
Suitability of the soils for woodland, table 4, pp. 30 through 33.
Rating of the soils for wildlife habitat, table 5, pp. 36 through 41.
Engineering, tables 6, 7, and 8, pp. 44 through 79.
Nonfarm uses of the soils, table 9, pp. 84 through 103.
Approximate acreage and extent, table 10, pp. 105 through 106.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Symbol	Page
Al	Alluvial land	106	------	--	------	--
AnA	Alton gravelly sandy loam, 0 to 3 percent slopes	107	IIs-1	15	3o1	32
AnB	Alton gravelly sandy loam, 3 to 8 percent slopes	107	IIs-1	15	3o1	32
AoB	Alton gravelly loam, 3 to 8 percent slopes	107	IIe-2	11	3o1	32
AoC	Alton gravelly loam, 8 to 15 percent slopes	107	IIIe-2	15	3o1	32
ApA	Appleton loam, 0 to 3 percent slopes	108	IIIw-2	17	3w2	32
ArB	Arkport very fine sandy loam, 0 to 6 percent slopes	109	IIe-3	12	2o1	30
ArC	Arkport very fine sandy loam, 6 to 12 percent slopes	109	IIIe-3	16	2o1	30
ArD	Arkport very fine sandy loam, 12 to 20 percent slopes	109	IVe-2	19	2r2	30
AsC	Arkport-Dunkirk very fine sandy loams, 2 to 12 percent slopes	109	IIIe-3	16	2o1	30
AsD	Arkport-Dunkirk very fine sandy loams, 12 to 25 percent slopes	109	IVe-2	19	2r2	30
AtF3	Arkport, Dunkirk and Colonie soils, 20 to 60 percent slopes, eroded	110	VIIe-1	20	2r5	32
BcB	Benson channery loam, 0 to 8 percent slopes	110	IIIs-2	18	5d1	32
BrA	Brockport silty clay loam, 0 to 2 percent slopes	111	IIIw-3	17	3w1	32
Ca	Canandaigua silt loam	112	IIIw-5	18	4w1	32
CeA	Cayuga silt loam, 0 to 2 percent slopes	113	IIw-2	14	2o1	30
CeB	Cayuga silt loam, 2 to 6 percent slopes	113	IIe-7	13	2o1	30
CgA	Cazenovia gravelly loam, 0 to 3 percent slopes	114	IIw-4	14	2o1	30
CgB	Cazenovia gravelly loam, 3 to 8 percent slopes	114	IIe-5	12	2o1	30
ChA	Churchville silt loam, 0 to 2 percent slopes	115	IIIw-3	17	5w1	32
ChB	Churchville silt loam, 2 to 6 percent slopes	115	IIIw-4	17	3w1	32
CkA	Claverack loamy fine sand, 0 to 2 percent slopes	116	IIw-1	13	3s1	32
CkB	Claverack loamy fine sand, 2 to 6 percent slopes	116	IIw-5	14	3s1	32
CkC	Claverack loamy fine sand, 6 to 12 percent slopes	116	IIIe-4	16	3s1	32
ClA	Collamer silt loam, 0 to 2 percent slopes	117	IIw-1	13	2o1	30
ClB	Collamer silt loam, 2 to 6 percent slopes	117	IIe-6	12	2o1	30
ClC	Collamer silt loam, 6 to 12 percent slopes	117	IIIe-5	16	2r1	30
CmA	Collamer silt loam, loamy subsoil variant, 0 to 2 percent slopes	118	IIw-1	13	2o1	30
CmB	Collamer silt loam, loamy subsoil variant, 2 to 6 percent slopes	118	IIe-6	12	2o1	30
CoB	Colonie loamy fine sand, 0 to 6 percent slopes	120	IIIs-1	18	4s1	32
CoC	Colonie loamy fine sand, 6 to 12 percent slopes	120	IVs-1	20	4s1	32
CoD3	Colonie loamy fine sand, 12 to 20 percent slopes, eroded	120	VIIs-1	20	4s2	32
Cu	Cosad loamy fine sand	121	IIIw-2	17	4w1	32
Cw	Cut and fill land	121	------	--	------	--
DuB	Dunkirk silt loam, 2 to 6 percent slopes	122	IIe-6	12	2o1	30
DuC3	Dunkirk silt loam, 6 to 12 percent slopes, eroded	122	IVe-1	18	2r1	30
DuD3	Dunkirk silt loam, 12 to 20 percent slopes, eroded	122	VIe-1	20	2r3	30
Ed	Edwards muck	123	IVw-4	20	5w1	32
Ee	Eel silt loam	124	IIw-3	14	2o2	30
ElA	Elnora loamy fine sand, 0 to 2 percent slopes	124	IIw-1	13	4s1	32
ElB	Elnora loamy fine sand, 2 to 6 percent slopes	124	IIw-5	14	4s1	32
Fw	Fresh water marsh	125	------	--	------	--
GaA	Galen very fine sandy loam, 0 to 2 percent slopes	126	IIw-1	13	2o1	30
GaB	Galen very fine sandy loam, 2 to 6 percent slopes	126	IIw-5	14	2o1	30

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Symbol	Page
Ge	Genesee silt loam	126	IIw-3	14	2o2	30
Ha	Halsey gravelly loam	127	IIIw-5	18	5w1	32
Hc	Hamlin silt loam	128	IIw-3	14	2o2	30
HfA	Hilton fine sandy loam, 0 to 3 percent slopes	129	IIw-4	14	2o1	30
HfB	Hilton fine sandy loam, 3 to 8 percent slopes	129	IIe-5	12	2o1	30
HlA	Hilton loam, 0 to 3 percent slopes	129	IIw-4	14	2o1	30
HlB	Hilton loam, 3 to 8 percent slopes	129	IIe-5	12	2o1	30
HmA	Hilton-Cazenovia stony silt loams, 0 to 3 percent slopes	129	IIw-4	14	2o1	30
HmB	Hilton-Cazenovia stony silt loams, 3 to 8 percent slopes	129	IIe-5	12	2o1	30
HnB	Honeoye silt loam, 3 to 8 percent slopes	130	IIe-1	11	2o1	30
HnC	Honeoye silt loam, 8 to 15 percent slopes	131	IIIe-1	15	2o1	30
HoA	Honeoye silt loam, limestone substratum, 0 to 3 percent slopes	131	I-1	11	2o1	30
HoB	Honeoye silt loam, limestone substratum, 3 to 8 percent slopes	131	IIe-1	11	2o1	30
HuB	Hudson silt loam, 2 to 6 percent slopes	132	IIe-7	13	2o1	30
IgB	Ira gravelly fine sandy loam, 0 to 6 percent slopes	133	IIe-5	12	3o1	32
LaB	Lairdsville silt loam, 2 to 6 percent slopes	134	IIe-7	13	3o1	32
Lb	Lake beaches	134	------	--	------	--
Le	Lakemont silt loam	135	IVw-2	19	5w1	32
Lk	Lakemont silt loam, loamy subsoil variant	135	IVw-2	19	5w1	32
Lm	Lamson very fine sandy loam	136	IIIw-5	18	4w1	32
LnA	Lima silt loam, 0 to 3 percent slopes	137	IIw-4	14	2o1	30
LnB	Lima silt loam, 3 to 8 percent slopes	137	IIe-5	12	2o1	30
LoB	Lima and Cazenovia silt loams, limestone substratum, 0 to 6 percent slopes	137	IIe-5	12	2o1	30
Lp	Lockport silty clay loam	138	IIIw-3	17	3w1	32
Ly	Lyons silt loam	139	IVw-3	19	4w1	32
Ma	Madalin silty clay loam	140	IVw-2	19	5w1	32
Mb	Made land	140	------	--	------	--
MdA	Madrid fine sandy loam, 0 to 3 percent slopes	141	I-1	11	2o1	30
MdB	Madrid fine sandy loam, 3 to 8 percent slopes	141	IIe-1	11	2o1	30
MdC	Madrid fine sandy loam, 8 to 15 percent slopes	141	IIIe-1	15	2o1	30
MeB	Madrid very stony fine sandy loam, 3 to 8 percent slopes	141	VIs-1	20	2o1	30
Mf	Massena fine sandy loam	142	IIIw-2	17	3w2	32
Mn	Minoa very fine sandy loam	143	IIIw-2	17	3w2	32
Mr	Muck, deep	144	IIIw-1	17	------	--
Ms	Muck, shallow	144	------	--	------	--
Ng	Niagara silt loam	145	IIIw-2	17	3w2	32
Nr	Niagara silt loam, loamy subsoil variant	145	IIIw-2	17	3w2	32
OdA	Odessa silt loam, 0 to 2 percent slopes	146	IIIw-3	17	3w1	32
OdB	Odessa silt loam, 2 to 6 percent slopes	146	IIIw-4	17	3w1	32
OfB	Ontario fine sandy loam, 3 to 8 percent slopes	147	IIe-1	11	2o1	30
OfC	Ontario fine sandy loam, 8 to 15 percent slopes	147	IIIe-1	15	2o1	30
OnB	Ontario loam, 3 to 8 percent slopes	148	IIe-1	11	2o1	30
OnC	Ontario loam, 8 to 15 percent slopes	148	IIIe-1	15	2o1	30
OnC3	Ontario loam, 8 to 15 percent slopes, eroded	148	IVe-1	18	2o1	30
OnD3	Ontario loam, 15 to 25 percent slopes, eroded	148	VIe-1	20	2r2	30
OnF	Ontario loam, 25 to 60 percent slopes	148	VIIe-1	20	2r5	32
OpC	Ontario-Palmyra-Arkport complex, rolling	148	IIIe-2	15	2o1	30
OpD	Ontario-Palmyra-Arkport complex, hilly	148	IVe-2	19	2r2	30
OpF	Ontario-Palmyra-Arkport complex, steep	149	VIIe-1	20	2r5	32
Ov	Ovid silt loam	149	IIIw-3	17	3w2	32
Ow	Ovid and Appleton silt loams, limestone substratum	149	IIIw-3	17	3w2	32
PaA	Palmyra gravelly fine sandy loam, 0 to 3 percent slopes	150	IIs-1	15	2o1	30
PaB	Palmyra gravelly fine sandy loam, 3 to 8 percent slopes	150	IIs-1	15	2o1	30
PaC	Palmyra gravelly fine sandy loam, 8 to 15 percent slopes	151	IIIe-2	15	2o1	30
PaD	Palmyra gravelly fine sandy loam, 15 to 25 percent slopes	151	IVe-2	19	2r4	30
PaF	Palmyra gravelly fine sandy loam, 25 to 60 percent slopes	151	VIIe-1	20	2r5	32
PgB	Palmyra gravelly loam, 3 to 8 percent slopes	151	IIe-2	11	2o1	30
PhA	Phelps gravelly fine sandy loam, 0 to 3 percent slopes	152	IIw-1	13	2o1	30

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Symbol	Page
PhB	Phelps gravelly fine sandy loam, 3 to 8 percent slopes	152	IIe-4	12	2o1	30
Pu	Pits and Quarries	152	------	--	------	--
Rb	Rhinebeck silt loam	153	IIIw-3	17	3w1	32
RgB	Riga silt loam, 2 to 8 percent slopes	154	IIe-7	13	3o1	32
Ro	Rock land	154	VIIIs-1	21	------	--
SeA	Schoharie silt loam, 0 to 2 percent slopes	155	IIw-2	14	2o1	30
SeB	Schoharie silt loam, 2 to 6 percent slopes	155	IIe-7	13	2o1	30
ShC3	Schoharie silty clay loam, 6 to 12 percent slopes, eroded	155	IVe-1	18	2r1	30
ShD3	Schoharie silty clay loam, 12 to 20 percent slopes, eroded	155	VIe-1	20	2r3	30
ShF	Schoharie silty clay loam, 20 to 60 percent slopes	156	VIIe-1	20	2r3	30
SoB	Sodus gravelly fine sandy loam, 2 to 8 percent slopes	156	IIe-1	11	3o1	32
Ss	Sun fine sandy loam	157	IVw-3	19	4w1	32
St	Sun loam, moderately shallow variant	158	IVw-3	19	4w1	32
Ub	Urban land	158	------	--	------	--
WcA	Wampsville cobbly loam, 0 to 3 percent slopes	159	I-1	11	2o1	30
WcB	Wampsville cobbly loam, 3 to 8 percent slopes	159	IIe-2	11	2o1	30
WcC	Wampsville cobbly loam, 8 to 15 percent slopes	159	IIIe-2	15	2o1	30
WfA	Wassaic fine sandy loam, 0 to 4 percent slopes	160	IIs-2	15	2o1	30
Wg	Wayland silt loam	161	IVw-1	19	4w1	32

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