SOIL SURVEY OF

Montgomery and Schenectady Counties New York

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

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

Major fieldwork for this soil survey was completed in the period 1966–71. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. 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 Montgomery and Schenectady Counties Soil and Water Conservation Districts. Financial assistance was provided by the Schenectady County Board of Supervisors.

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 farming, industry, and recreation.

Locating Soils

All the soils of Montgomery and Schenectady Counties 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 "Index to Soil Mapping Units on page iii lists all of the soils in the county by map symbol and shows the page where each soil is described. The capability unit and woodland group to which each soil has been assigned are specified at the end of the soil description.

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.

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

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

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering," 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 to Montgomery and Schenectady Counties 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 counties in the section "Environmental Factors Affecting Soil Use."

Cover: **Mohawk River Valley in the Hamlin-Wayland-Teel association, nearly level.**

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Summary of Tables

SOIL SURVEY OF MONTGOMERY AND SCHENECTADY COUNTIES, NEW YORK

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

MONTGOMERY AND SCHENECTADY Counties are in the east-central part of New York (fig. 1). They occupy about 395,520 acres, or 618 square miles. Fonda, the county seat of Montgomery County, is about 40 miles northwest of Albany. Schenectady, the county seat of Schenectady County, is about 15 miles northwest of Albany, the State capital. Albany is 150 miles north of the city of New York.

The main farm enterprise in the counties is dairy farming. Most of the milk produced is sold in New York City as fluid milk. The main crops are those that support dairy farming. These crops include corn for both grain and silage, oats, hay, and pasture. A few vegetables are grown, and some of these are processed in nearby Canajoharie.

It is estimated that about 24 percent of Montgomery County is commercial forest land (*10*).[1] Much of this acreage is in woodlots on farms. A small acreage, about 2.4 percent, is owned by the State. Most of the State lands were reforested more than 25 years ago. A larger percentage of land in Schenectady County, an estimated 34 percent, is in commercial forest. The sale of wood products is very low in both counties and provides very little supplemental income to farmers. Wooded areas contribute greatly to esthetic and scenic value and to recreational facilities in the counties.

The counties are industrial and heavily populated. The population density in 1970 was 776 people per square mile for Schenectady County and 137 for Montgomery County.

[1] Italic numbers in parentheses refer to Literature Cited, pp. 165.

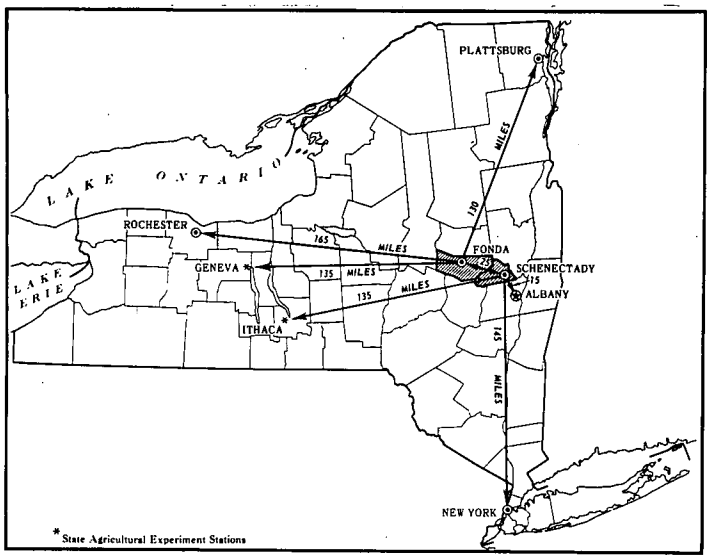

Figure 1.—**Location of Montgomery and Schenectady Counties in New York.**

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Montgomery and Schenectady Counties, where they are located, and how they can be used. The soil scientists went into the county knowing that they probably would find many familiar soils and perhaps some unfamiliar ones. 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 greatly by leaching or by the action of plant roots.

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

Soils that have nearly identical profiles make up a soil series. Except for the different texture in the sur-

face 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. Broadalbin and Palatine, for example, are the names of two soil series. All the soils in the United States that have 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. For example, Angola silt loam is one of two phases within the Angola 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 acccurately. 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 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. Three such kinds of mapping units—soil complexes, soil associations, and undifferentiated groups—are shown on the soil map of Montgomery and Schenectady Counties.

A soil complex consists of areas of two or more soils so intricately mixed 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. Generally, the name of a soil complex consists of the names of the dominant soils joined by a hyphen. Burdett-Scriba channery silt loams, 3 to 8 percent slopes, is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort needed to delineate them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly from each other. The name of an association consists of the names of the dominant soils joined by a hyphen. Hollis-Rock outcrop association, sloping, is an example.

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. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils joined by "and." Colonie and Plainfield soils, steep, is an example.

In most surveyed areas there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified as a 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, such as Made land.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops grown under defined management 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.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or to its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then 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 Montgomery and Schenectady Counties. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, 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 soil associations in this survey have been grouped into 14 general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included soil associations are described in the following pages.

The terms for drainage class used in the title for several of the broad groups apply to the dominant soil series within the associations. The names of the soil associations indicate their dominant slopes. The areas may contain soils that are less sloping or more sloping than the name suggests; however, the text indicates the range in slope of the soils within the association.

The Montgomery-Schenectady Counties general soil map does not join with the Schoharie and Herkimer Counties general soil maps, because the latter were published on a much smaller scale. The concepts and names of some series have also changed as a result of changes in the classification system since the soil surveys of Schoharie and Herkimer Counties were published.

Dominantly Deep, Well Drained and Moderately Well Drained Soils That Formed in Glacial Till; on Uplands

The 10 soil associations in this group are on dissected glacial till plains throughout the two counties. They make up about 12.1 percent of the survey area. The soils are deep. They formed in medium textured and moderately fine textured till that is gravelly or channery in places. They are mainly nearly level to moderately steep, but steep or very steep soils are on escarpments. Most of the acreage is in dairy farms, but some areas are idle.

1. Nellis-Amenia association, gently sloping

Deep, well drained and moderately well drained soils that have a medium-textured subsoil; on uplands

This association is on till plains mainly in the northwestern part of Montgomery County. It is also in small, low-lying areas scattered throughout the survey area and on a few knolls where limestone bedrock is near the surface. Slopes range from 0 to 15 percent.

The association makes up about 0.6 percent of the counties. It is about 75 percent Nellis soils, 20 percent Amenia soils, and 5 percent less extensive soils.

Nellis soils are deep and well drained and have a medium-textured subsoil. They formed in firm glacial till derived mainly from limestone. Amenia soils are deep and moderately well drained and have a medium-textured subsoil. They formed in glacial till similar to the parent material of Nellis soils. They commonly are below Nellis soils on the landscape.

Less extensive in this association are the well drained and moderately well drained, moderately deep Wassaic soils; the well-drained Lansing soils; the excessively drained sandy Plainfield soils; and the poorly drained and very poorly drained clayey Madalin soils.

Most of the association has been cleared and is in farms. Dairying is the major farm enterprise. The main crops are corn, grain, hay, and pasture.

The major soils of the association have few limitations for most nonfarm uses. Erosion is a hazard and should be controlled. Amenia soils are seasonally wet and have a more slowly permeable substratum than Nellis soils.

2. Mohawk-Lansing association, sloping

Deep, well drained and moderately well drained soils that have a medium-textured or moderately fine textured subsoil; on uplands

This association is on long, narrow hilltops and sloping hillsides on till plains in the central part of Montgomery County. Slopes range from 3 to 15 percent.

The association makes up about 1.8 percent of the counties. It is about 60 percent Mohawk soils, 25 percent Lansing soils, and 15 percent less extensive soils.

Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil. They formed in firm glacial till derived mainly from soft black shale. Lansing soils are deep and well drained and have a medium-textured subsoil. They formed in firm glacial till derived mainly from black shale, limestone, and sandstone.

Less extensive in this association are the shallow to bedrock, well-drained Farmington soils and the moderately deep, well-drained and somewhat excessively drained Palatine soils. Other soils of minor extent are the somewhat poorly drained Rhinebeck, Churchville, and Manheim soils. The poorly drained and very poorly drained Madalin, Madalin variant, and Ilion soils are in low-lying pockets scattered throughout the hills.

Most of the association has been cleared and is in dairy farms (fig. 2). Only a few areas are idle or wooded. The main crops are corn, grain, hay, and pasture. Slope and the hazard of erosion are the main limitations to farming the dominant soils.

The dominant soils in the association have favorable properties for many nonfarm uses. The sloping hillsides and slow or moderately slow permeability of the underlying material are limitations for some uses.

3. Mohawk-Lansing association, moderately steep

Deep, well drained and moderately well drained soils that have a medium-textured or moderately fine textured subsoil; on uplands

This association is on moderately steep hillsides on till plains in the central part of Montgomery County. Slopes range from 15 to 25 percent.

The association makes up about 0.8 percent of the

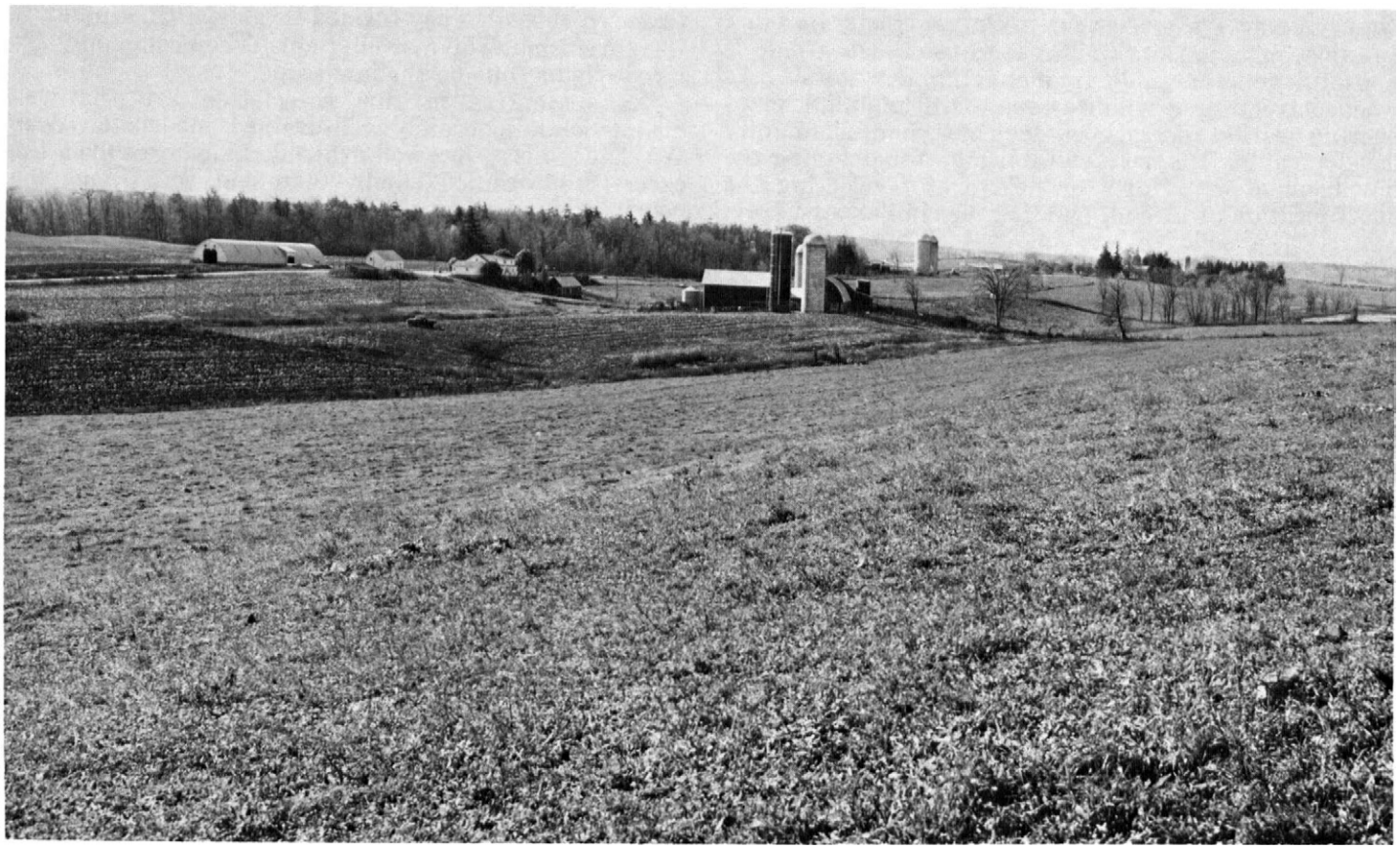

Figure 2.—**Dairy farms in Mohawk-Lansing association, sloping.**

counties. It is about 55 percent Mohawk soils, 25 percent Lansing soils, and 20 percent less extensive soils.

Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil. They formed in firm glacial till derived mainly from soft black shale. Lansing soils are deep and well drained and have a medium-textured subsoil. They formed in firm glacial till derived mainly from black shale, limestone, and sandstone.

Less extensive in this association are the moderately deep, well-drained and somewhat excessively drained Palatine soils. Also of minor extent are the somewhat poorly drained Manheim soils; the less sloping Lansing and Mohawk soils; and Fluvaquents, loamy, along the small streams.

Most of the association has been cleared and is in improved pasture. Some areas are wooded. The moderately steep slopes and the hazard of erosion are limitations for cultivated crops and many nonfarm uses. The moderately slow or slow permeability of the underlying material is a limitation for some uses.

4. Mohawk-Manheim association, gently sloping

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

This association is on gently sloping till plains that have small flats or depressional areas, mainly in the northwestern part of Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 0.6 percent of the counties. It is about 60 percent Mohawk soils, 20 percent Manheim soils, and 20 percent less extensive soils.

Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil. They formed in firm glacial till derived mainly from soft black shale. They occupy the higher positions in the landscape. Manheim soils are deep and somewhat poorly drained and have a medium-textured or moderately fine textured subsoil. They occupy the flatter areas and receive runoff from higher lying soils.

Less extensive in this association are the well-drained Lansing soils; the moderately well drained and well drained Hudson soils; and the somewhat poorly drained Appleton, Darien, and Rhinebeck soils. Other soils of minor extent are the poorly drained and very poorly drained Ilion, Madalin, and Fonda soils.

Most of the association is in dairy farms. Only a few small areas are wooded. The main crops are corn, grain, hay, and pasture. Manheim soils are wetter than Mohawk soils. The wetness is a limitation to farming.

The Manheim soils have a higher seasonal water table and slower permeability than Mohawk soils. These are limitations for many nonfarm uses.

5. *Mohawk-Palatine association, sloping*

Deep and moderately deep, moderately well drained to somewhat excessively drained soils that have a medium-textured or moderately fine textured subsoil; on uplands

This association is on sloping hillsides and gently sloping areas on till plains, mainly in the northwestern part of Montgomery County. Slopes range from 3 to 25 percent.

The association makes up about 0.1 percent of the counties. It is about 60 percent Mohawk soils, 30 percent Palatine soils, and 10 percent less extensive soils.

Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil. They formed in firm glacial till derived mainly from soft black shale. Palatine soils are moderately deep, are well drained and somewhat excessively drained, and have a medium-textured subsoil. They formed in thin glacial till over dark, calcareous shale bedrock. They occupy bedrock-controlled landforms.

Less extensive in this association are the somewhat poorly drained Manheim soils and the well-drained Lansing soils.

Most of the association has been cleared and is used for growing corn, grain, and hay in support of dairy farming. Sloping hillsides and the hazard of erosion are the main limitations to farming. Slope, a seasonal high water table, and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses.

6. *Lansing-Mohawk association, moderately steep*

Deep, well drained and moderately well drained soils that have a medium-textured or moderately fine textured subsoil; on uplands

This association is on moderately steep hillsides on till plains in the northwestern and central parts of Montgomery County. Slopes range from 15 to 25 percent.

The association makes up about 0.6 percent of the counties. It is about 65 percent Lansing soils, 15 percent Mohawk soils, and 20 percent less extensive soils.

Lansing soils are deep, are well drained, and have a medium-textured subsoil. They formed in firm glacial till derived mainly from black shale, limestone, and sandstone. Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil. They formed in firm glacial till derived mainly from soft black shale.

Less extensive in this association are the well drained Nellis soils; the well drained and moderately well drained, moderately deep Wassaic soils; and the somewhat poorly drained Churchville soils.

Most of the association is in improved pasture for dairy cattle (fig. 3). Moderately steep slopes and the hazard of erosion are limitations for cultivated crops and many nonfarm uses.

7. *Lansing-Mohawk association, very steep*

Deep, well drained and moderately well drained soils that have a medium-textured or moderately fine textured subsoil; on uplands

This association is on very steep hillsides on till plains in Montgomery County. It is dissected by streams that enter the Mohawk River. Slopes range from 25 to 60 percent.

The association makes up about 1.7 percent of the counties. It is about 70 percent Lansing and Mohawk silt loams and 30 percent less extensive soils. Lansing soils are deep and well drained and have a medium-textured subsoil. Mohawk soils are deep, are well drained and moderately well drained, and have a medium-textured or moderately fine textured subsoil.

Less extensive in this association are the well drained to excessively drained Howard soils, the moderately well drained and well drained Hudson soils, the moderately well drained Phelps soils, and the well drained and moderately well drained Wassaic soils. A few small areas of Fluvaquents, loamy, are along some streams.

Most of the association is wooded, since the slopes are too steep for farming and many nonfarm uses.

8. *Lansing-Appleton association, gently sloping*

Deep, well-drained to somewhat poorly drained soils that have a medium-textured subsoil; on uplands

This association is on a gently sloping and sloping till plain that has long, narrow, depressional areas. The association is mainly in the northern part of Montgomery County. Slopes range from 3 to 15 percent.

The association makes up about 5.2 percent of the counties. It is about 50 percent Lansing soils, 25 percent Appleton soils, and 25 percent less extensive soils.

Lansing soils are deep, are well drained, and have a medium-textured subsoil. They formed in firm glacial till derived mainly from black shale, limestone, and sandstone. Appleton soils are deep and somewhat poorly drained and formed in the same kind of material as Lansing soils.

Less extensive in this association are the somewhat poorly drained and wetter Churchville, Rhinebeck, Madalin, Fonda, Darien, Ilion, and Manheim soils. These soils occupy the flatter areas. Other soils of minor extent are the well drained and moderately well drained Mohawk soils and the moderately deep Angola, Palatine, and Wassaic soils. These soils occupy the gently sloping and sloping areas. Along streams are small areas of gravelly Herkimer and Phelps soils and Fluvaquents, loamy.

Most of the association has been cleared and is in dairy farms. The main crops are corn, grain, hay, and pasture. Erosion control is needed on the more sloping soils. Artificial drainage is needed on the Appleton soils.

Lansing soils have fewer limitations for nonfarm uses than Appleton soils. Slope and the slow to very slow permeability of the substratum are limitations for the use of Lansing soils. Seasonal wetness and slow permeability of the substratum are the main limitations for the use of Appleton soils.

Figure 3.—**Pasture on Lansing-Mohawk association, moderately steep. In background is the Darien-Ilion-Burdett association, gently sloping.**

9. Nunda association, moderately steep

Deep, moderately well drained soils that have a moderately fine textured subsoil; on uplands

This association is on moderately steep and steep hillsides on till plains in the southern part of the counties. Slopes range from 15 to 50 percent.

The association makes up about 0.5 percent of the counties. It is about 85 percent Nunda soils and 15 percent less extensive soils.

Nunda soils are deep, are moderately well drained, and have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till.

Less extensive in this association are the less sloping, somewhat poorly drained Burdett soils and the poorly drained Ilion soils.

Most of the association is wooded. In cleared areas, it is used for native pasture or is idle. The steep slopes are limitations to farming and many nonfarm uses.

10. Nunda-Burdett association, sloping

Deep, moderately well drained and somewhat poorly drained soils that have a moderately fine textured subsoil; on uplands

This association is on sloping hillsides; narrow, rounded ridgetops; and a few smaller, gently sloping areas on till plains in the southern part of Montgomery County. Slopes range from 3 to 15 percent.

The association makes up about 0.2 percent of the counties. It is about 70 percent Nunda soils, 15 percent Burdett soils, and 15 percent less extensive soils.

The Nunda soil is moderately well drained, and the Burdett soil is somewhat poorly drained. Both soils have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till.

Less extensive in this association are the somewhat poorly drained Darien soils and the poorly drained Ilion soils.

This association was once farmed, but now is mainly idle or is in native pasture. It is suited to corn, grain, hay, and pasture. Most of the soils need lime to correct acidity. Erosion control is also needed. The seasonal high water table and slow or very slow permeability are limitations for many nonfarm uses.

Dominantly Deep, Somewhat Poorly Drained Soils That Formed in Glacial Till; on Uplands

The soil associations in this group are on gently sloping till plains that have scattered low-lying, depressional areas. The eight associations in this group make up about 38.3 percent of the counties. The soils are deep. They formed in medium-textured and moderately fine textured till that is gravelly or channery in places. They are nearly level to sloping. Most areas are in dairy farms. Some areas are idle.

11. Darien-Ilion-Burdett association, gently sloping

Deep, somewhat poorly drained and poorly drained soils that have a moderately fine textured subsoil; on uplands

This association is on a gently sloping till plain that has low-lying, nearly level areas of wetter soils. It is in the southwestern part of Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 6.1 percent of the counties. It is about 60 percent Darien soils, 15 percent Ilion soils, 10 percent Burdett soils, and 15 percent less extensive soils.

Darien soils are deep, are somewhat poorly drained, and have a moderately fine textured subsoil. Ilion soils are deep and poorly drained and have a moderately fine textured subsoil. Darien and Ilion soils formed in firm glacial till derived from limestone, black shale, and sandstone. Burdett soils are deep and somewhat poorly drained and have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till.

Less extensive in this association are the somewhat poorly drained Churchville and Appleton soils and the somewhat poorly drained or moderately well drained Hornell soils. Other soils of minor extent are the poorly drained and very poorly drained Madalin soils and the well-drained Lansing soils.

Most of the association has been cleared. About half is in dairy farms, and the other half is idle. The main crops are hay and pasture. Some corn and grain are grown. The seasonal high water table is the main limitation to farming and nonfarm uses.

12. Darien-Appleton-Ilion association, gently sloping

Deep, somewhat poorly drained and poorly drained soils that have a moderately fine textured and medium-textured subsoil; on uplands

This association is on a gently sloping till plain that has small, flat, depressional areas. It is in the central part of Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 3.6 percent of the counties. It is about 60 percent Darien soils, 10 percent Appleton soils, 10 percent Ilion soils, and 20 percent less extensive soils.

Darien soils are deep, are somewhat poorly drained, and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, sandstone, and some granitic rock. Appleton soils are deep and somewhat poorly drained and have a medium-textured subsoil. They formed in the same kind of material as Darien soils. Ilion soils are deep, are poorly drained, and have a moderately fine textured subsoil. They also formed in firm glacial till.

Less extensive in this association are the clayey, moderately well drained and well drained Hudson soils; the somewhat poorly drained Churchville and Rhinebeck soils; and the poorly drained and very poorly drained Madalin soils. Other soils of minor extent are the well-drained Lansing soils, the moderately well drained Phelps soils, and the moderately deep Palatine soils. Small areas of Fluvaquents, loamy, are along small streams.

Most of the association has been cleared and is in dairy farms. The main crops are corn, grain, hay, and pasture. Artificial drainage is needed. The seasonal high water table and slow or very slow permeability are the main limitations to farming and most nonfarm uses.

13. Appleton-Lansing association, gently sloping

Deep, somewhat poorly drained to well-drained soils that have a medium-textured subsoil; on uplands

This association is on a nearly level and gently sloping till plain that has long, depressional areas of lake plains. It is in the northern part of Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 5.5 percent of the counties. It is about 35 percent Appleton soils, 30 percent Lansing soils, and 35 percent less extensive soils.

Appleton soils are deep, are somewhat poorly drained, and have a medium-textured subsoil. They formed in firm glacial till derived mainly from limestone, calcareous black shale, and some granitic and sandstone rocks. Lansing soils are deep and well drained and have a medium-textured subsoil. They formed in material similar to that in which Appleton soils formed. They generally occupy the higher positions in the landscape.

Less extensive in this association are the moderately well drained and well drained Hudson soils, the somewhat poorly drained Rhinebeck and Churchville soils, and the poorly drained and very poorly drained Madalin soils. These soils occupy the long, depressional areas of lake plains. Other soils of minor extent are the somewhat poorly drained Darien soils, the poorly drained Ilion soils, the moderately deep Palatine soils, and the gravelly Phelps soils. Small areas of Fluvaquents, loamy, are along small streams.

Most of the association is in dairy farms (fig. 4). The main crops are corn, grain, hay, and pasture. The seasonal high water table and slow permeability are the main limitations to farming and many nonfarm uses.

14. Burdett-Nunda association, gently sloping

Deep, somewhat poorly drained and moderately well drained soils that have a moderately fine textured subsoil; on uplands

This association is on a gently sloping and sloping till plain, mainly in the southwestern part of Mont-

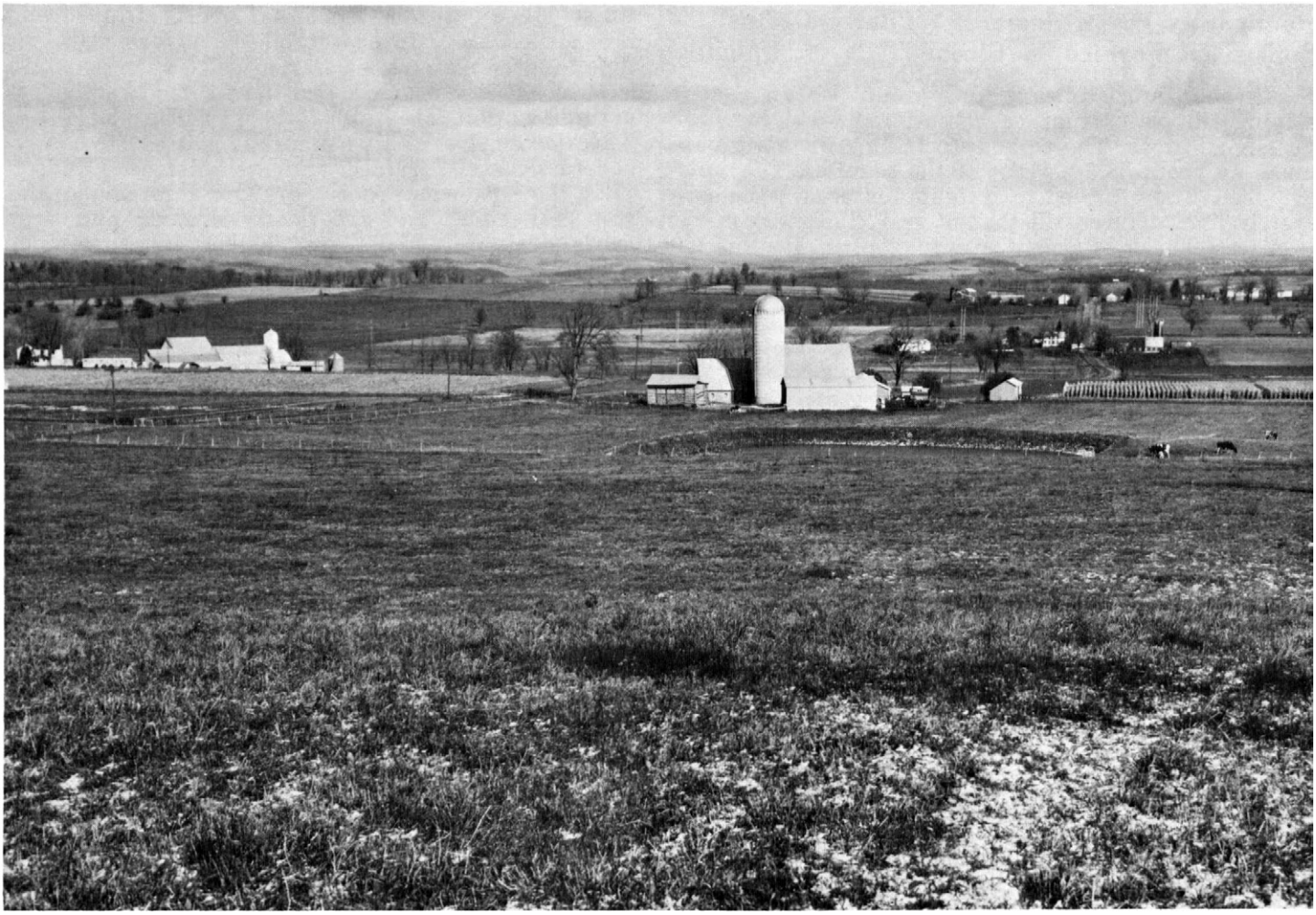

Figure 4.—**Dairy farming in the Appleton-Lansing association, gently sloping.**

gomery County. Slopes range from 0 to 15 percent.

The association makes up about 1.0 percent of the counties. It is about 70 percent Burdett soils, 15 percent Nunda soils, and 15 percent less extensive soils.

Burdett soils are somewhat poorly drained. Nunda soils are moderately well drained. Both Burdett and Nunda soils have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till. The Burdett soils occupy the lower positions in the landscape. The Nunda soils occupy more sloping landforms.

Less extensive in this association are the somewhat poorly drained Darien and Churchville soils; the poorly drained Ilion soils; the moderately deep, somewhat poorly drained Angola soils; the somewhat poorly drained or moderately well drained Hornell soils; and the well-drained Lansing soils.

Most of the association is idle or is wooded. Some areas are in dairy farms. The main crops are corn, grain, hay, and pasture. The seasonal high water table and slow or very slow permeability are limitations to farming and many nonfarm uses.

15. Burdett-Ilion association, gently sloping

Deep, somewhat poorly drained and poorly drained soils that have a moderately fine textured subsoil; on uplands

This association is on a nearly level and gently sloping till plain that has broad flats or depressions. It is in the southern part of Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 7.1 percent of the counties. It is about 70 percent Burdett soils, 15 percent Ilion soils, and 15 percent less extensive soils.

Burdett soils are deep, are somewhat poorly drained, and have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till. Burdett soils occupy the more sloping areas on the landscape. Ilion soils are deep and poorly drained and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, and sandstone. Ilion soils occupy the more nearly level areas or depressions.

Less extensive in this association are the somewhat

poorly drained Darien, Appleton, and Churchville soils. Other soils of minor extent are the moderately well drained Nunda soils, the poorly drained and very poorly drained Madalin soils, and small areas of the moderately deep Angola soils and the shallow Arnot soils.

About one-third of the association is in dairy farms, one-third is wooded, and one-third is idle. Seasonal wetness and slow or very slow permeability are limitations to farming and many nonfarm uses.

16. Burdett-Scriba-Nunda association, gently sloping

Deep, somewhat poorly drained and moderately well drained soils that have a moderately fine textured and medium-textured subsoil; on uplands

This association is on a gently sloping till plain that has flat areas and sloping hillsides, mainly in the southern part of Schenectady County. Slopes range from 0 to 15 percent.

The association makes up about 7.0 percent of the counties. It is about 45 percent Burdett and Scriba soils, 25 percent Nunda soils, and 30 percent less extensive soils.

Burdett soils are somewhat poorly drained. Nunda soils are moderately well drained. Both Burdett and Nunda soils have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till. Burdett soils occupy the lower positions in the landscape. Nunda soils occupy the higher positions. Scriba soils are deep, are somewhat poorly drained, and have a medium-textured subsoil. They have a dense, very firm fragipan that restricts rooting and the downward movement of water. Scriba soils formed in glacial till derived mainly from dark-colored shale, sandstone, and limestone.

Less extensive in this association are the Angola, Lordstown, and Varick soils, which are moderately deep over bedrock. Other soils of minor extent are the Arnot soils, which are shallow over bedrock; the poorly drained Ilion soils; and small areas of the moderately well drained Mardin soils, which have a fragipan.

Many areas of the association are in dairy farms. The main crops are hay and pasture. A smaller acreage is in corn and grain. Many areas are good sites for ponds and lakes. The seasonal high water table and slow or very slow permeability are limitations to farming and many nonfarm uses.

17. Burdett-Scriba-Ilion association, gently sloping

Deep, somewhat poorly drained and poorly drained soils that have a moderately fine textured or medium textured subsoil; on uplands

This association is on a smooth, gently sloping till plain that has broad flats and depressional areas, mainly in the western and southern parts of Schenectady County. Slopes range from 0 to 8 percent.

The association makes up about 7.2 percent of the counties. It is about 50 percent Burdett and Scriba soils, 20 percent Ilion soils, and 30 percent less extensive soils.

Burdett soils are deep, are somewhat poorly drained, and have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till. Scriba soils are deep and somewhat poorly drained and have a medium-textured subsoil. They have a dense, very firm fragipan that restricts rooting and the downward movement of water. Scriba soils formed in glacial till derived mainly from dark-colored shale, sandstone, and limestone. Ilion soils are deep and poorly drained and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, and sandstone. Ilion soils occupy the more nearly level areas or depressions.

Less extensive in this association are the shallow to bedrock Arnot soils and the moderately deep to bedrock Hornell, Lordstown, and Manlius soils. The deep, moderately well drained Nunda soils occupy the higher positions on the landscape.

Part of the association is in dairy farms. The main crops are hay and pasture. Some areas are idle, and some are wooded. Many areas are good sites for ponds and lakes. Seasonal wetness and slow or very slow permeability are limitations to farming and many nonfarm uses.

18. Burdett-Scriba-Ilion association, extremely stony, gently sloping

Deep, somewhat poorly drained and poorly drained soils that have a moderately fine textured or medium textured subsoil; on uplands

This association is on a smooth, gently sloping till plain that has flat or depressional areas, mainly in the western part of Schenectady County. Surface stones are a prominent feature of the landscape. Slopes range from 0 to 8 percent.

The association makes up about 0.8 percent of the counties. It is about 70 percent Burdett and Scriba soils, 20 percent Ilion soils, and 10 percent less extensive soils.

Burdett soils are extremely stony, deep, and somewhat poorly drained and have a moderately fine textured subsoil. They formed in two layers of glacial till. The upper layer is an acid silty and channery deposit. The lower layer is calcareous, gravelly, compact till. Scriba soils are extremely stony, deep, and somewhat poorly drained and have a medium-textured subsoil. They have a dense, very firm fragipan that restricts rooting and the downward movement of water. Scriba soils formed in glacial till derived mainly from dark-colored shale, sandstone, and limestone. Ilion soils are extremely stony, deep, and poorly drained and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, and sandstone. Ilion soils occupy the more nearly level areas in the landscape.

Less extensive in this association are the extremely stony, moderately well drained Nunda soils and small areas of nonstony soils.

Most of the association is wooded. A few small areas

are idle or in permanent pasture. The extreme stoniness prevents use of this association for crops or hay. Seasonal wetness, slow or very slow permeability, and stoniness are limitations for many nonfarm uses.

Dominantly Deep, Poorly Drained and Very Poorly Drained Soils That Formed in Glacial Till; on Uplands

The single soil association in this group is on nearly level till plains and in depressions on lake-laid plains. The association makes up about 2.5 percent of the counties. The soils are deep. They formed in medium-textured and moderately fine textured glacial till and fine textured lacustrine sediment. Most of this area is wooded, because the soils are kept wet for long periods by a high water table.

19. Ilion-Fonda association, nearly level

Deep, poorly drained and very poorly drained soils that have a moderately fine textured and fine textured subsoil; on broad flats and in depressions

This association is on a nearly level till plain that has flat or depressional areas of lake-laid material, mainly in the southern part of Montgomery County. Slopes range from 0 to 3 percent.

This association makes up about 2.5 percent of the counties. It is about 70 percent Ilion soils, 20 percent Fonda soils, and 10 percent less extensive soils.

Ilion soils are deep, are poorly drained, and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, and sandstone. Fonda soils are deep, are very poorly drained, and have a fine-textured subsoil. They formed in clayey, lake-laid deposits.

Less extensive in this association are the somewhat poorly drained Burdett and Darien soils and the poorly drained and very poorly drained Madalin soils.

Most of this association is wooded. The slow or very slow permeability and the excessive wetness resulting from a prolonged high water table are limitations to farming and nonfarm uses.

Dominantly Deep, Somewhat Poorly Drained to Well Drained Soils That Have a Fragipan and Formed in Glacial Till; on Uplands

The single soil association in this group is on gently sloping till plains that have a few nearly level areas. The association makes up about 1.1 percent of the counties. The soils are deep. They formed in moderately coarse textured and medium-textured glacial till. They are nearly level and gently sloping. Most areas are in dairy farms.

20. Mosherville-Broadalbin association, gently sloping

Deep, somewhat poorly drained to well-drained soils that have a fragipan and a medium-textured and moderately coarse textured subsoil; on uplands

This association is on a gently sloping till plain that has smaller, nearly level areas, mainly in the northern part of Montgomery County near Amsterdam. Slopes range from 0 to 15 percent.

The association makes up about 1.1 percent of the counties. It is about 50 percent Mosherville soils, 40 percent Broadalbin soils, and 10 percent less extensive soils.

Mosherville soils are deep, are somewhat poorly drained, and have a medium-textured and moderately coarse textured subsoil. Broadalbin soils are deep, are well drained and moderately well drained, and have a medium-textured and moderately coarse textured subsoil. Both Mosherville and Broadalbin soils have a dense, very firm fragipan that restricts rooting and the downward movement of water. They formed in firm glacial till derived from granite, gneiss, limestone, sandstone, and dark shale. Broadalbin soils occupy the higher positions in the landscape.

Less extensive in this association are the somewhat poorly drained Appleton, Darien, and Churchville soils. Other soils of minor extent are the poorly drained Ilion soils and the poorly drained and very poorly drained Sun soils.

This association is in dairy farms. The main crops are corn, grain, hay, and pasture. The seasonal high water table and slow permeability are limitations to farming and many nonfarm uses.

Dominantly Moderately Deep and Shallow, Excessively Drained to Moderately Well Drained Soils That Formed in Thin Glacial Till Deposits over Bedrock; on Uplands

The soil associations in this group are on bedrock-controlled till plains throughout the counties. The eight associations in this group make up about 11.5 percent of the counties. The soils are moderately deep and shallow over bedrock. They formed in thin deposits of medium-textured and moderately fine textured glacial till. Some soils have only a few coarse fragments, but other soils are gravelly or channery. The soils are dominantly nearly level to moderately steep, but areas of steep and very steep soils are on escarpments. Most areas are wooded or idle. A few areas are in dairy farms.

21. Palatine association, sloping

Moderately deep, well-drained and somewhat excessively drained soils that have a medium-textured subsoil; on bedrock-controlled uplands

This association is on gently sloping to moderately steep hillsides on bedrock-controlled till plains, mainly south of the Mohawk River in the western part of Montgomery County. Slopes range from 3 to 25 percent.

The association makes up about 0.5 percent of the counties. It is about 80 percent Palatine soils and 20 percent less extensive soils.

Palatine soils are moderately deep, are well drained and somewhat excessively drained, and have a medium-textured subsoil. They formed in thin glacial till 20 to 40 inches thick over dark calcareous shale bedrock.

Less extensive in this association are the well-drained Lansing soils, the well drained and moderately well drained Mohawk soils, and the somewhat poorly drained Angola soils. Also of minor extent are a few small areas of gravelly Phelps soils and Cut and fill land.

This association has been cleared and is mainly in dairy farms. Corn, grain, hay, and pasture are grown in the less sloping areas. The hazard of erosion and the shallow depth to bedrock are limitations to farming and many nonfarm uses.

22. *Palatine-Angola association, gently sloping*

Moderately deep, somewhat excessively drained to somewhat poorly drained soils that have a medium-textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a gently sloping and sloping, bedrock-controlled till plain, mainly in the northern half of Montgomery County. Slopes range from 0 to 15 percent.

The association makes up about 3.4 percent of the counties. It is about 60 percent Palatine soils, 20 percent Angola soils, and 20 percent less extensive soils.

Palatine soils are moderately deep, are well drained and somewhat excessively drained, and have a medium-textured subsoil. Angola soils are moderately deep and somewhat poorly drained and have a medium-textured and moderately fine textured subsoil. Both Palatine and Angola soils formed in thin glacial till 20 to 40 inches thick over dark, calcareous shale bedrock (fig. 5).

Less extensive in this association are the poorly drained and very poorly drained Madalin soils, the Madalin variant soils, and the very poorly drained Fonda soils. All these soils are clayey. Other soils of minor extent are the well-drained Lansing soils, the somewhat poorly drained Appleton and Darien soils, and the poorly drained Ilion soils. All these soils are in areas of glacial till. Small areas of Farmington soils, where the soil is only 10 to 20 inches thick over limestone bedrock, are also in this association.

Figure 5.—**Hayfield on Palatine-Angola association, gently sloping Calcareous shale bedrock is at a depth of 20 to 40 inches.**

Most of the acreage has been cleared and is in dairy farms. The main crops are corn, grain, hay, and pasture.

The hazard of erosion and bedrock at a depth of 20 to 40 inches are limitations to farming and many nonfarm uses. Angola soils have a seasonal high water table.

23. *Wassaic-Angola association, gently sloping*

Moderately deep, well-drained to somewhat poorly drained soils that have a medium-textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a nearly level and gently sloping, bedrock-controlled till plain, mainly in the northern part of Montgomery County. Slopes range from 0 to 15 percent.

The association makes up about 2.2 percent of the counties. It is about 70 percent Wassaic soils, 15 percent Angola soils, and 15 percent less extensive soils.

Wassaic soils are moderately deep, are well drained and moderately well drained, and have a medium-textured and moderately fine textured subsoil. Angola soils are moderately deep, are somewhat poorly drained, and have a medium-textured and moderately fine textured subsoil. Both Wassaic and Angola soils formed in thin glacial till 20 to 40 inches thick over bedrock. Wassaic soils occupy the higher positions on the landscape. Angola soils occupy the more nearly level landforms.

Less extensive in this association are the somewhat poorly drained Churchville soils, the poorly drained and very poorly drained Madalin soils, the Madalin variant, and the very poorly drained Fonda soils. All these soils are clayey. Other soils of minor extent are the well drained Lansing and Nellis soils, the well drained and moderately well drained Mohawk soils, and the somewhat poorly drained Darien and Appleton soils. All these soils occupy areas of deep glacial till. Small areas of shallow-to-bedrock Farmington soils are also in this association.

A large part of the association is in dairy farms. Some areas are idle, and others are wooded. The main crops are pasture and hay, but corn and grain are grown in places. Seasonal wetness and bedrock at a depth of 20 to 40 inches are the main limitations to farming and many nonfarm uses.

24. *Farmington-Wassaic association, gently sloping*

Shallow and moderately deep, well drained and moderately well drained soils that have a medium-textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a nearly level to sloping, bedrock-controlled till plain, mainly in the north-central part of the counties. Outcrops of limestone are throughout the association. Slopes range from 0 to 15 percent.

The association makes up about 0.8 percent of the counties. It is about 60 percent Farmington soils, 20

percent Wassaic soils, and 20 percent less extensive soils.

Farmington soils are shallow, are well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over limestone bedrock. Wassaic soils are moderately deep, are well drained and moderately well drained, and have a medium-textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over limestone bedrock.

Less extensive in this association are the well drained and moderately well drained Broadalbin and Mohawk soils, the somewhat poorly drained Angola soils, and the poorly drained Ilion soils.

Much of this association has been cleared and is in farms. In areas where soils are too shallow to cultivate, it is wooded. A large part of the association is in hay or improved pasture. Corn and small grain are grown, but the shallow depth to bedrock makes this association droughty. The shallow or moderate depth to hard limestone is the main limitation for many nonfarm uses.

25. *Nassau association, undulating*

Shallow, somewhat excessively drained soils that have a medium-textured subsoil; on bedrock-controlled uplands

This association is on a nearly level to moderately steep, bedrock-controlled till plain, mainly in the central part of Schenectady County. The surface is wavy and bumpy because the underlying shale or slate bedrock is tilted. Slopes range from 0 to 25 percent.

The association makes up about 0.2 percent of the counties. It is about 90 percent Nassau soils and 10 percent less extensive soils.

Nassau soils are shallow, are somewhat excessively drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over shale or slate bedrock.

Less extensive in this association are the shallow, well drained and moderately well drained Arnot soils, the somewhat poorly drained Brockport soils, the somewhat poorly drained and moderately well drained Hornell soils, and the well drained to excessively drained Manlius soils.

Most of the association is wooded or is idle. Some of the cleared areas are in native pasture. Many of the higher lying areas provide excellent scenic views. The shallow depth to bedrock, the slope, and droughtiness are limitations to farming and many nonfarm uses.

26. *Arnot association, sloping*

Shallow, well drained and moderately well drained soils that have a medium-textured subsoil; on bedrock-controlled uplands

This association is on a sloping and moderately steep, bedrock-controlled till plain. It is mainly at high elevations in the southern part of Montgomery County, east and west of Schoharie Creek. Slopes range from 8 to 25 percent.

The association makes up about 1.2 percent of the counties. It is about 85 percent Arnot soils and 15 percent less extensive soils.

Arnot soils are shallow, are well drained and moderately well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock.

Less extensive in this association are the somewhat poorly drained Angola and Burdett soils. Also in the association are a few areas of the poorly drained Varick soils.

Most of the association is wooded. Some areas are idle, and a few areas are in pasture. The shallow depth to bedrock, droughtiness, and slope are limitations to farming and many nonfarm uses.

27. *Arnot-Lordstown association, gently sloping*

Shallow and moderately deep, well drained and moderately well drained soils that have a medium-textured subsoil; on bedrock-controlled uplands

This association is in nearly level areas and on gently sloping to moderately steep hillsides on bedrock-controlled till plains. It is in the northern and western parts of Schenectady County. Slopes range from 0 to 25 percent.

The association makes up about 1.1 percent of the counties. It is about 45 percent Arnot soils, 40 percent Lordstown soils, and 15 percent less extensive soils.

Arnot soils are shallow, are well drained and moderately well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. Lordstown soils are moderately deep and well drained and have a medium-textured subsoil. They formed in thin glacial till 20 to 40 inches thick over sandstone and shale bedrock.

Less extensive in this association are the somewhat poorly drained Angola, Brockport, and Burdett soils and the somewhat poorly drained and moderately well drained Hornell soils. Other soils of minor extent are the somewhat poorly drained and poorly drained Tuller soils, the moderately well drained Nunda soils, and the well drained to excessively drained Manlius soils.

Most of the association is wooded. Many of the cleared areas are idle, but a few are in hay or pasture. Slope and the closeness of the underlying bedrock are limitations to farming and nonfarm uses.

28. *Arnot-Angola-Tuller association, gently sloping*

Shallow and moderately deep, well-drained to poorly drained soils that have a medium-textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a nearly level and gently sloping, bedrock-controlled till plain, mainly east and west of Schoharie Creek in Montgomery County. Slopes range from 0 to 8 percent.

The association makes up about 2.1 percent of the counties. It is about 60 percent Arnot and Angola soils, 20 percent Tuller soils, and 20 percent less extensive soils.

Arnot soils are shallow, are well drained and moderately well drained, and have a medium-textured sub-

soil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. Angola soils are moderately deep and somewhat poorly drained and have a medium-textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over dark, calcareous shale bedrock. Tuller soils are shallow, are somewhat poorly drained and poorly drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock in the more nearly level or depressional areas.

Less extensive in this association are the somewhat poorly drained Burdett soils, the somewhat poorly drained or moderately well drained Hornell soils, and the poorly drained Varick soils. All these soils formed in glacial till. Other soils of minor extent are the very poorly drained Fonda soils. They formed in lake-laid material.

Most of the association is wooded or is idle. A few areas are in native pasture. Shallow depth to bedrock and seasonal wetness are limitations to farming and many nonfarm uses.

Dominantly Moderately Deep and Shallow, Somewhat Poorly Drained Soils That Formed in Thin Glacial Till Deposits over Bedrock; on Uplands

The soil associations in this group are on gently sloping, bedrock-controlled till plains throughout the counties. The four associations in this group make up about 8.2 percent of the counties. The soils are moderately deep and shallow over bedrock. They formed in thin deposits of medium-textured to fine-textured glacial till. Some soils have only a few coarse fragments, but other soils are gravelly or channery. The soils are dominantly nearly level or gently sloping, but some are sloping. Most of the acreage is wooded or is idle. A few areas are in hay or pasture.

29. Angola-Tuller-Varick association, nearly level

Moderately deep and shallow, somewhat poorly drained and poorly drained soils that have a medium-textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a nearly level and gently sloping, bedrock-controlled till plain, mainly in the southwestern part of Schenectady County. Slopes range from 0 to 8 percent.

The association makes up about 2.2 percent of the counties. It is about 30 percent Angola soils, 20 percent Tuller soils, 15 percent Varick soils, and 35 percent less extensive soils.

Angola soils are moderately deep, are somewhat poorly drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. Tuller soils are shallow, are somewhat poorly drained and poorly drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock in the more nearly level or depressional areas. Varick soils are moderately deep and poorly drained and have a medium-textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over interbedded sandstone and shale, siltstone, limestone, and calcareous black shale.

Less extensive in this association are the moderately well drained Nunda and Mardin soils, the well drained and moderately well drained Arnot soils, and the somewhat poorly drained Burdett and Scriba soils. All these soils formed in glacial till.

Much of the association is wooded or is idle. In cleared areas, the main crops are hay and pasture. Shallow depth to bedrock and seasonal wetness are limitations to farming and many nonfarm uses.

30. Hornell-Arnot-Manlius association, gently sloping

Moderately deep and shallow, somewhat poorly drained to excessively drained soils that have a fine-textured to medium-textured subsoil; on bedrock-controlled uplands

This association is on sloping hillsides and in gently sloping areas on a bedrock-controlled till plain. It is mainly in the southwestern part of Montgomery County. Slopes range from 0 to 15 percent.

The association makes up about 1.0 percent of the counties. It is about 55 percent Hornell soils, 15 percent Arnot soils, 15 percent Manlius soils, and 15 percent less extensive soils.

Hornell soils are moderately deep, are somewhat poorly drained and moderately well drained, and have a fine textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock. They occupy the lower positions in the landscape. Arnot soils are shallow, are well drained and moderately well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. They occupy the higher positions in the landscape. Manlius soils are moderately deep, are well drained to excessively drained, and have a medium-textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock.

Less extensive in this association are the somewhat poorly drained Darien soils, the somewhat poorly drained and poorly drained Tuller soils, and the poorly drained Ilion and Varick soils. All these soils formed in glacial till. Other soils of minor extent are the poorly drained and very poorly drained Madalin soils. They formed in lake-laid material.

Most of the association is idle or is wooded. Shallow depth to bedrock and seasonal wetness are limitations to farming and many nonfarm uses.

31. Hornell-Brockport association, gently sloping

Moderately deep, somewhat poorly drained and moderately well drained soils that have a fine textured and moderately fine textured subsoil; on bedrock-controlled uplands

This association is on a broad, nearly level and gently sloping, bedrock-controlled till plain, mainly in the west-central part of Montgomery County. Slopes range from 0 to 15 percent.

The association makes up about 0.3 percent of the counties. It is about 50 percent Hornell soils, 30 percent Brockport soils, and 20 percent less extensive soils.

Hornell soils are moderately deep, are somewhat poorly drained and moderately well drained, and have a fine textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock. Brockport soils are moderately deep and somewhat poorly drained and have a fine textured and moderately fine textured subsoil. They formed in the less sloping areas in the same kind of material as that in which Hornell soils formed.

Less extensive in this association are the somewhat poorly drained Burdett soils, the poorly drained Ilion soils, and the well drained and moderately well drained Arnot soils. All these soils formed in glacial till. Other soils of minor extent are the poorly drained and very poorly drained Madalin soils and the very poorly drained Fonda soils. Both these soils formed in lake-laid deposits.

The association is wooded or is idle. Prolonged wetness, very slow permeability, and shallow depth to bedrock are limitations to farming and many nonfarm uses.

32. Tuller-Brockport-Hornell association, nearly level

Shallow and moderately deep, poorly drained to moderately well drained soils that have a medium-textured to fine-textured subsoil; on bedrock-controlled uplands

This association is on a nearly level and gently sloping, bedrock-controlled till plain, mainly in the northeastern and central parts of Schenectady County. Many broad flats and depressional areas are in the association. Slopes range from 0 to 8 percent.

The association makes up about 4.7 percent of the counties. It is about 35 percent Tuller and Brockport soils, 30 percent Hornell soils, and 35 percent less extensive soils.

Tuller soils are shallow, are somewhat poorly drained and poorly drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. Brockport soils are moderately deep and somewhat poorly drained and have a fine textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock. Hornell soils are moderately deep, are somewhat poorly drained and moderately well drained, and have a fine textured and moderately fine textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock.

Less extensive in this association are the well drained and moderately well drained Arnot soils, the well-drained Lordstown soils, the well drained to excessively drained Manlius soils, the moderately well drained Nunda soils, and the somewhat poorly drained Burdett and Scriba soils. All these soils formed in glacial till.

Many areas of this association are wooded. Other areas are idle or are in hay or pasture. Shallow depth to bedrock and prolonged wetness are limitations to farming and many nonfarm uses.

Dominantly Shallow and Moderately Deep, Well Drained to Excessively Drained Soils That Formed in Thin Glacial Till Deposits over Bedrock; on Uplands; Many Rock Outcrops

The soil associations in this group are on bedrock-controlled till plains that have many outcrops of rock. The five associations in this group make up about 5.2 percent of the counties. The soils are moderately deep and shallow over bedrock. They formed in thin deposits of moderately coarse textured and medium-textured glacial till. Some soils have only a few coarse fragments, but other soils are gravelly or channery. The soils are gently sloping to very steep. Most of the area is wooded. A few areas are in permanent pasture.

33. Farmington-Rock outcrop association, moderately steep

Shallow, well-drained soils that have a medium-textured subsoil and outcrops of limestone; on bedrock-controlled uplands

This association is on a gently sloping to moderately steep, bedrock-controlled till plain, mainly in the northern part of Montgomery County. Many outcrops of bedrock are in the association. Slopes range from 3 to 25 percent.

The association makes up about 2.7 percent of the counties. It is about 65 percent Farmington soils and Rock outcrop and 35 percent less extensive soils.

Farmington soils are shallow, are well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over limestone bedrock. Rock outcrop consists of exposures of bare bedrock.

Less extensive in this association are the well-drained Lansing and Nellis soils and the well drained and moderately well drained Wassaic soils. All these soils formed in glacial till. Other soils of minor extent are the somewhat poorly drained Angola soils, the poorly drained Ilion soils, and a few small areas of the poorly drained and very poorly drained Madalin variant, which formed in lake-laid material.

Most of this association is wooded. A few areas have been cleared and are in pasture. Exposed bedrock or bedrock within a depth of 20 inches are limitations to farming and nonfarm uses.

34. Arnot-Rock outcrop association, very steep

Shallow, well drained and moderately well drained soils that have a medium-textured subsoil and outcrops of sandstone and shale; on bedrock-controlled uplands

This association is on steep and very steep hillsides on bedrock-controlled till plains. It is at high elevations, mainly east and west of Schoharie Creek in the southern part of the counties. Many outcrops of bedrock are in the association. Slopes range from 25 to 50 percent.

The association makes up about 0.5 percent of the

counties. It is about 75 percent Arnot soils and Rock outcrop and 25 percent less extensive soils.

Arnot soils are shallow, are well drained and moderately well drained, and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over sandstone and shale bedrock. Rock outcrop consists of exposures of bare bedrock.

Less extensive in this association are the less sloping, somewhat poorly drained and poorly drained Tuller soils, the somewhat poorly drained Angola and Burdett soils; the well-drained Lordstown soils, and the moderately well drained Nunda soils. All these soils formed in glacial till. Small areas of Fluvaquents, loamy, are along the small streams in the association.

The association is wooded, because it is too steep and rocky for farming. Slope, outcrops of bedrock, and shallow depth to rock are limitations for many nonfarm uses.

35. Manlius-Rock outcrop association, steep

Moderately deep, well-drained to excessively drained soils that have a medium-textured subsoil and outcrops of shale; on bedrock-controlled uplands

This association is on steep and very steep hillsides on bedrock-controlled till plains. Many outcrops of shale are in the association. The largest areas are in the western part of Schenectady County near the Mohawk River. Slopes range from 25 to 50 percent.

The association makes up about 0.7 percent of the counties. It is about 75 percent Manlius soils and Rock outcrop and 25 percent less extensive soils.

Manlius soils are moderately deep, are well drained to excessively drained, and have a medium-textured subsoil. They formed in thin glacial till 20 to 40 inches thick over shale bedrock. Rock outcrop consists of exposures of bare shale rock.

Less extensive in this association are the well drained and moderately well drained Arnot soils, the somewhat poorly drained and moderately well drained Hornell soils, the somewhat poorly drained Brockport soils, and the somewhat poorly drained and poorly drained Tuller soils. All these less sloping soils formed in glacial till.

The association is wooded, because it is too steep for farming. The many outcrops of rock, shallow depth to bedrock, and slope are limitations for nonfarm uses.

36. Hollis-Rock outcrop association, sloping

Shallow, somewhat excessively drained soils that have a moderately coarse textured subsoil and outcrops of granite; on bedrock-controlled uplands

This association is on gently sloping to moderately steep hillsides on bedrock-controlled till plains, mainly northwest of Fonda in Montgomery County. Many outcrops of granite are in the association. Slopes range from 3 to 25 percent.

The association makes up about 0.1 percent of the counties. It is about 90 percent Hollis soils and Rock outcrop and 10 percent less extensive soils.

Hollis soils are shallow, are somewhat excessively drained, and have a moderately coarse textured subsoil. They formed in thin glacial till 10 to 20 inches thick over granite bedrock. Rock outcrop consists of exposures of bare granite rock.

Less extensive in this association are the well-drained Lansing and Farmington soils, the well drained and moderately well drained Wassaic soils, the somewhat poorly drained Darien soils, and the poorly drained Varick soils. All these soils formed in glacial till. Other soils of minor extent are the somewhat poorly drained Churchville soils and the poorly drained and very poorly drained Madalin soils. Both these soils formed in lake-laid material.

Most of the association is wooded. A few small areas are in permanent pasture. Shallow depth to bedrock and many outcrops of rock are limitations to farming and many nonfarm uses.

37. Rock outcrop-Farmington association, very steep

Outcrops of limestone and shallow, well-drained soils that have a medium-textured subsoil; on bedrock-controlled uplands

This association is on steep and very steep hillsides on bedrock-controlled till plains, mainly adjacent to the Mohawk River in the central part of Montgomery County. Many outcrops of limestone bedrock are in the association. Slopes range from 25 to 50 percent.

The association makes up about 1.2 percent of the counties. It is about 65 percent Rock outcrop and Farmington soils and 35 percent less extensive soils.

Rock outcrop consists of exposures of bare limestone rock. Farmington soils are shallow and well drained and have a medium-textured subsoil. They formed in thin glacial till 10 to 20 inches thick over limestone bedrock.

Less extensive in this association are small areas of the less sloping Farmington soils, the well-drained Lansing soils, and the well drained and moderately well drained Mohawk and Wassaic soils. All these soils formed in glacial till.

The association is wooded. Many outcrops of rock, shallow depth to bedrock, and slope are limitations to farming and many nonfarm uses.

Dominantly Deep, Moderately Well Drained and Somewhat Poorly Drained Soils That Formed in Silty or Clayey Glacio-Lacustrine Sediments; on Lake Plains and in Valleys

The soil associations in this group are on lake-laid plains that are interspersed in areas of till plains throughout the counties. The four associations in this group make up about 5.1 percent of the counties. The soils are deep. They formed in water-deposited material that consists mainly of silt and clay but also includes some sand and gravel. They generally are nearly level and gently sloping but are steeper along the larger drainageways. Some areas are in dairy farms. Other areas that are too wet or too steep for farming are wooded.

38. Hudson-Howard association, sloping

Deep, moderately well drained to somewhat excessively drained soils that have a fine-textured to moder-

ately coarse textured subsoil; on lake plains and in valleys

This association is in sloping valley areas of lake-laid sediment and glacial outwash deposits. It is mainly north of the Mohawk River in the northwestern part of Montgomery County. Slopes range from 3 to 15 percent.

The association makes up about 0.3 percent of the counties. It is about 40 percent Hudson soils, 30 percent Howard soils, and 30 percent less extensive soils.

Hudson soils are deep, are moderately well drained and well drained, and have a fine textured and moderately fine textured subsoil. They formed in lake-laid deposits of silt and clay. Howard soils are deep, are well drained to excessively drained, and have a moderately coarse textured and medium-textured subsoil. They formed in gravelly glacial outwash deposits derived from sandstone, limestone, shale, and granite. Howard soils occupy the higher positions in the landscape.

Less extensive in this association are the well drained Lansing soils, the well drained and moderately well drained Mohawk soils, the somewhat poorly drained Churchville and Rhinebeck soils, and the excessively drained Plainfield soils.

39. Hudson-Howard association, steep

Deep, moderately well drained to somewhat excessively drained soils that have a fine-textured to moderately coarse textured subsoil; on lake plains in valleys

This association is in moderately steep to very steep valley areas of lake-laid sediment and glacial outwash deposits. It is on valley walls, mainly north of the Mohawk River and west of Fonda in Montgomery County. Slopes range from 15 to 50 percent.

The association makes up about 0.3 percent of the counties. It is about 65 percent Hudson soils, 20 percent Howard soils, and 15 percent less extensive soils.

Hudson soils are deep, are moderately well drained and well drained, and have a fine textured and moderately fine textured subsoil. They formed in lake-laid deposits of silt and clay. Howard soils are deep, are well drained to excessively drained, and have a moderately coarse textured and medium-textured subsoil. They formed in gravelly glacial outwash deposits derived from sandstone, limestone, shale, and granite. Howard soils occupy the higher positions in the landscape.

Less extensive in this association are the less sloping Hudson and Howard soils. Other soils of minor extent are the less sloping, somewhat poorly drained Churchville soils; the poorly drained and very poorly drained Madalin soils; Phelps, fans, at the bases of slopes; small areas of Rock outcrop; and the excessively drained Plainfield soils.

The association is wooded, because the soils are too steep for farming. Slope and the hazard of erosion are the main limitations to use. Mass slippage is a hazard, especially in areas where slopes are more than 25 percent.

40. Churchville-Madalin-Rhinebeck association, nearly level

Deep, somewhat poorly drained to very poorly drained soils that have a moderately fine textured and fine textured subsoil; on lake plains

This association is on nearly level and gently sloping lake plains that have broad flats and depressional areas. It is mainly in the central part of the counties. Slopes range from 0 to 8 percent.

The association makes up about 4.2 percent of the counties. It is about 40 percent Churchville soils, 25 percent Madalin soils, 15 percent Rhinebeck soils, and 20 percent less extensive soils.

Churchville soils are deep, are somewhat poorly drained, and have a moderately fine textured and fine textured subsoil. They formed in lacustrine silt and clay underlain by loamy, calcareous glacial till. Churchville soils occupy the more gently sloping areas on the landscape. Madalin soils are deep, nearly level, and poorly drained and very poorly drained and have a fine-textured subsoil. They formed on broad flats and in depressions in lacustrine silt and clay. Rhinebeck soils are deep and somewhat poorly drained and have a fine-textured subsoil. They formed in lacustrine silt and clay.

Less extensive in this association are the moderately well drained and well drained Hudson soils. These soils formed in material similar to that in which Madalin and Rhinebeck soils formed. A few small areas of the well-drained Lansing soils; the somewhat poorly drained Appleton, Burdett, and Darien soils; and the poorly drained Ilion soils are also in the association. All these soils formed in glacial till. A few areas of Fluvaquents, loamy, are along the small streams. Other soils of minor extent are the well-drained to excessively drained Colonie soils and the moderately well drained Claverack soils.

Most of the association is in dairy farms. The main crops are hay and pasture. Corn and grain are also grown but in smaller amounts. The slow or very slow permeability hinders internal drainage and causes surface water to drain slowly. Excess wetness is a main limitation to farming. A seasonal high water table and slow or very slow permeability are limitations for many nonfarm uses.

41. Scio-Raynham association, nearly level

Deep, moderately welldrained to poorly drained soils that have a medium-textured subsoil; on lake plains and terraces

This association is on nearly level and gently sloping lake plains and terraces that have flat areas and depressions. It is mainly in the eastern part of Schenectady County. Slopes range from 0 to 8 percent.

The association makes up about 0.3 percent of the area. It is about 50 percent Scio soils, 45 percent Raynham soils, and 5 percent less extensive soils.

Scio soils are deep, are moderately well drained, and have a medium-textured subsoil. They formed in water-laid deposits of silt and very fine sand. Raynham soils are deep, nearly level, and poorly drained and somewhat poorly drained and have a medium-

textured subsoil. They formed in water-laid deposits of silt and very fine sand. Raynham soils occupy the more nearly level areas and depressions.

Less extensive in this association are the well-drained to excessively drained Colonie soils, the excessively drained Plainfield soils, the somewhat poorly drained Rhinebeck soils, and the poorly drained and very poorly drained Madalin soils.

Most of the association is in dairy farms or is idle. The main crops are corn, oats, hay, and pasture. The hazard of erosion and a seasonal high water table are the main limitations to farming and many nonfarm uses.

Dominantly Deep, Poorly Drained and Very Poorly Drained Soils That Formed in Silty or Clayey Glacio-Lacustrine Sediments; on Lake Plains and in Valleys

The single soil association in this group is on nearly level lake plains that have protruding islands of glacial till. It makes up about 2 percent of the survey area. The soils are deep. They formed in water-deposited material that is mainly silt and clay. Most of the acreage is wooded. The cleared areas are in hay or pasture.

42. Madalin-Fonda-Ilion association, nearly level

Deep, poorly drained and very poorly drained soils that have a fine textured and moderately fine-textured subsoil; on lake plains

This association is on a nearly level lake plain that has a few small areas of glacial till. It is mainly scattered throughout Montgomery County.

The association makes up about 2.0 percent of the counties. It is about 40 percent Madalin soils, 20 percent Fonda soils, 20 percent Ilion soils, and 20 percent less extensive soils.

Madalin soils are deep, are poorly drained and very poorly drained, and have a fine-textured subsoil. They formed in lacustrine silt and clay. Fonda soils are deep and very poorly drained and have a fine-textured subsoil. They formed in material similar to that in which Madalin soils formed. Ilion soils are deep, are poorly drained, and have a moderately fine textured subsoil. They formed in firm glacial till derived from limestone, black shale, and sandstone.

Less extensive in this association are the somewhat poorly drained Churchville, Rhinebeck, Burdett, Appleton, and Darien soils, a few small areas of the very poorly drained Palms muck soils, and the poorly drained and somewhat poorly drained Raynham soils.

Some areas have been cleared and are in dairy farms. Other areas are wooded. The main crops are hay and pasture. Water ponds on the surface in the spring, and prolonged wetness is the main limitation to farming. The high water table and slow or very slow permeability are limitations for many nonfarm uses.

Dominantly Deep, Excessively Drained to Moderately Well Drained Soils That Formed in Sandy Deltaic and Glacio-Lacustrine Sediments; on Lake Plains and in Valleys

The soil associations in this group are on nearly level deltas, lake plains, terraces, and outwash plains. The three associations in this group make up about 5.5 percent of the counties. The soils are deep. They formed in coarse-textured, water-deposited sandy sediment. They are dominantly nearly level but are nearly level to sloping in places. Most of this group has been cleared and is in urban industrial uses. Market gardening crops are grown in a few areas.

43. Plainfield association, nearly level

Deep, excessively drained soils that have a coarse-textured subsoil; on deltas and terraces

This association is on nearly level and gently sloping deltas and terraces, mainly in the Mohawk River Valley. Slopes range from 0 to 8 percent.

The association makes up about 2.0 percent of the counties. It is about 65 percent Plainfield soils and 35 percent less extensive soils.

Plainfield soils are deep, are excessively drained, and have a coarse-textured subsoil. They formed in water-deposited sand derived mainly from granite and sandstone. Little or no gravel is present.

Less extensive in this association are the moderately well drained Elnora soils and the poorly drained and very poorly drained Granby soils. Both these soils formed in material similar to that in which Plainfield soils formed. Other soils of minor extent are the well-drained to excessively drained Colonie soils; the excessively drained Otisville soils; the well drained and moderately well drained Herkimer soils; the moderately well drained Scio soils; and a few small areas of Hamlin and Teel soils that formed on narrow flood plains.

Most of the association has been cleared. Some areas are farmed. The main crops are corn, truck crops, grain, hay, and pasture. The main truck crops are beans and squash. Droughtiness is the main limitation to farming. The association is well suited to many nonfarm uses, but the very rapid permeability is a limitation. Many urban and industrial developments are in the association.

44. Colonie association, nearly level

Deep, well-drained to excessively drained soils that have a coarse-textured subsoil; on deltas

This association is on a nearly level delta, mainly in and near the city of Schenectady. The soils are nearly level to sloping. Slopes range from 0 to 15 percent.

The association makes up about 2.9 percent of the counties. It is about 80 percent Colonie soils and 20 percent less extensive soils.

Colonie soils are deep, are well drained to excessively drained, and have a coarse-textured subsoil. They formed in lacustrine and eolian deposits of fine and very fine sand. Little or no gravel is in the associa-

tion. The sand has a high content of quartz and a low content of weatherable minerals.

Less extensive in this association are the moderately well drained Elnora soils, the poorly drained and somewhat poorly drained Junius soils, and the poorly drained and very poorly drained Granby soils. All these soils formed in material similar to that in which Colonie soils formed. Other soils of minor extent are the excessively drained Plainfield soils, the moderately well drained Claverack soils, the poorly drained and very poorly drained Cheektowaga soils, a few small areas of moderately well drained and well drained Hudson soils, and the somewhat poorly drained Rhinebeck soils that formed in silt and clay.

Most of the association has been cleared and is used for urban and industrial development. A small area is in truck farms. The soils are droughty and need supplemental irrigation and large amounts of fertilizer. Limitations for nonfarm uses are few. The rapid permeability is a limitation for some uses.

45. Elnora-Junius association, nearly level

Deep, moderately well drained to poorly drained soils that have a coarse-textured subsoil; on deltas and lake plains

This association is on a nearly level delta or lake plain, mainly in the southeastern part of Schenectady County. Slopes range from 0 to 3 percent.

The association makes up about 0.6 percent of the counties. It is about 50 percent Elnora soils, 20 percent Junius soils, and 30 percent less extensive soils.

Elnora soils are deep, are moderately well drained, and have a coarse-textured subsoil. They formed in water- or wind-deposited sand in the slightly higher lying positions. Junius soils are deep, are poorly drained and somewhat poorly drained, and have a coarse-textured subsoil. They formed in water-deposited sand in low lying areas.

Less extensive in this association are the well-drained to excessively drained Colonie soils and the poorly drained and very poorly drained Granby soils. Both these soils formed in material similar to that in which the dominant soils formed. Other soils of minor extent are the moderately well drained Claverack soils and the poorly drained and very poorly drained Cheektowaga soils. Both these soils formed in sand underlain by clay. The somewhat poorly drained Rhinebeck soils and the poorly drained and very poorly drained Madalin soils are in the association. These soils formed in silt and clay. A few small areas of somewhat poorly drained and poorly drained, gravelly Fredon soils are also in the association.

Many areas of the association are in hay and pasture, and some areas are idle. A few areas are wooded. The seasonal or prolonged wetness caused by a high water table is the main limitation to farming and many nonfarm uses.

Dominantly Deep, Excessively Drained to Poorly Drained Soils That Formed in Gravelly and Sandy Outwash; on Old Alluvial Fans, Terraces, and Kames in Valleys

The soil associations in this group are on outwash terraces, old alluvial fans, and kames, mainly along the Mohawk River. The three associations in this group make up about 3.5 percent of the counties. The soils are deep. They formed in gravelly, moderately coarse textured and medium-textured water-deposited sediment. The soils are nearly level to very steep. The better drained, less sloping areas are cropland and urban and industrial sites. The steeper areas are wooded. Many gravel pits are in this group.

46. Howard association, gently sloping

Deep, well-drained to excessively drained soils that have a moderately coarse textured to moderately fine textured subsoil; on outwash terraces

This association is on nearly level to sloping outwash terraces mainly north and south of the Mohawk River. Slopes range from 0 to 15 percent.

The association makes up about 2.4 percent of the counties. It is about 70 percent Howard soils and 30 percent less extensive soils.

Howard soils are deep, are well drained to excessively drained, and have a moderately coarse textured to moderately fine textured subsoil. They formed in gravelly, calcareous glacial outwash derived mainly from sandstone, limestone, shale, and granite.

Less extensive in this association are the moderately well drained Phelps soils and the somewhat poorly drained and poorly drained Fredon soils. Both these soils formed in material similar to that in which Howard soils formed. Other soils of minor extent are the well-drained to excessively drained Palmyra soils, the well drained and moderately well drained Herkimer soils, a few small areas of the well-drained to excessively drained Colonie soils, and the excessively drained Plainfield soils.

Nearly all of the association has been cleared of trees. About half is in farms, and the other half is in urban or industrial use. The main crops are corn, grain, hay, and pasture. The association is well suited to most nonfarm uses. Many gravel pits are in the association.

47. Howard-Lansing association, very steep

Deep, well-drained to excessively drained soils that have a moderately coarse textured to moderately fine textured subsoil; on outwash terraces and till plains

This association is on moderately steep to very steep outwash terraces and till plains on valley walls. It is mainly adjacent to the Mohawk River. Slopes range from 15 to 50 percent.

The association makes up about 0.3 percent of the counties. It is about 50 percent Howard soils, 25 percent Lansing soils, and 25 percent less extensive soils.

Howard soils are deep, are well drained to excessively drained, and have a moderately coarse textured to moderately fine textured subsoil. They formed in gravelly, calcareous glacial outwash derived mainly from sandstone, limestone, shale, and granite. Lansing

soils are deep and well drained and have a medium-textured subsoil. They formed in firm glacial till derived mainly from black shale, limestone, and sandstone.

Less extensive in this association are the less sloping Howard and Lansing soils; the sandy, excessively drained Plainfield soils; and small areas of Cut and fill land and Gravel pits.

A few areas are in permanent pasture; the rest are wooded. Slope is a limitation to farming and many nonfarm uses.

48. Fredon-Phelps association, nearly level

Deep, poorly drained to moderately well drained soils that have a moderately coarse textured to moderately fine textured subsoil; on outwash terraces

This association is on a smooth, nearly level outwash terrace that has gently sloping, higher lying areas and some depressions. It is mainly north and south of the Mohawk River. Slopes range from 0 to 8 percent.

The association makes up about 0.8 percent of the counties. It is about 50 percent Fredon soils, about 35 percent Phelps soils, and 15 percent less extensive soils.

Fredon soils are deep, are somewhat poorly drained and poorly drained, and have a moderately coarse textured and medium-textured subsoil. They formed in gravelly glacial outwash derived mainly from limestone, shale, sandstone, and granite. Phelps soils are deep and moderately well drained and have a moderately coarse textured to moderately fine textured subsoil. They formed in material similar to that in which the Fredon soils formed.

Less extensive in this association are the well-drained to excessively drained Howard soils. They formed in material similar to that in which the dominant soils formed. Other soils of minor extent are the excessively drained Plainfield soils; the moderately well drained and well drained Hudson soils; the somewhat poorly drained Churchville soils; and the poorly drained and very poorly drained Granby, Cheektowaga, Madalin, and Wayland soils.

Only a small part of the association is in farms. The main crops are corn, grain, hay, and pasture. Drainage is needed for maximum crop response. Suitable drainage outlets are difficult to locate. The seasonal high water table is the main limitation for nonfarm uses.

Dominantly Deep, Well Drained to Very Poorly Drained Soils Formed in Recent Alluvial Deposits; on Flood Plains

The soil associations in this group are on flood plains adjacent to the larger streams in the counties. The two associations in this group make up about 4 percent of the counties. The soils are deep. They formed in medium-textured alluvial sediment. They are dominantly nearly level. Most areas are in farms. A large acreage has been used for the development of transportation systems.

49. Hamlin-Wayland-Teel association, nearly level

Deep, well-drained to very poorly drained soils that have a medium-textured and moderately fine textured subsoil; on flood plains

This association is on nearly level flood plains mainly along the larger streams, such as the Mohawk River and Schoharie Creek.

The association makes up about 3.0 percent of the counties. It is about 25 percent Hamlin soils, 20 percent Wayland soils, 15 percent Teel soils, and 40 percent less extensive soils.

Hamlin soils are deep, are well drained, and have a medium-textured subsoil. Hamlin, Wayland, and Teel soils formed in recent alluvium that is high in silt and very fine sandy loam and is derived mainly from sandstone, siltstone, shale, and limestone. Wayland soils are deep, are very poorly drained and poorly drained, and have a medium-textured and moderately fine textured subsoil. They formed in material similar to that in which Hamlin soils formed. Teel soils are deep, are moderately well drained and somewhat poorly drained, and have a medium-textured subsoil. They formed in recent alluvium similar to that in which Hamlin soils formed.

Less extensive areas in the association are mainly Cut and fill land. Also of minor extent are the well-drained to excessively drained Howard and Copake soils; the well-drained Unadilla soils; the moderately well drained Phelps soils; and Fluvaquents, loamy.

Nearly all of this association has been cleared and is in dairy farms. The association has some of the best soils in the counties for farming. The main crops are corn and grain. Truck crops of beans and squash are grown in places. Highways, railroads, and the Erie Canal have disturbed much of the original flood plain. The hazard of flooding is a limitation to farming and many nonfarm uses. It is most severe in early spring, but flooding can occur during any period of heavy rainfall.

50. Fluvaquents, loamy-Phelps, fan, association, nearly level

Deep, well-drained to poorly drained soils that have a medium-textured to coarse-textured subsoil; on flood plains

This association is on narrow flood plains along the smaller streams. The soils are nearly level to gently sloping. Slopes range from 0 to 8 percent.

The association makes up about 1.0 percent of the counties. It is about 60 percent Fluvaquents, loamy; 20 percent Phelps, fan; and 20 percent less extensive soils (fig. 6).

Fluvaquents, loamy, is generally poorly drained, but ranges to well drained. The soil formed in variable deposits of recent alluvium that is stratified and contains gravel and cobblestones. The soil material is deep, and the subsoil is medium textured to coarse textured. Phelps, fan, soils are deep and moderately well drained and have a medium-textured subsoil. They formed in gently sloping, gravelly outwash that is 5 to 10 feet higher than the flood plains.

Less extensive in this association are the well-

Figure 6.—Valley areas of Fluvaquents, loamy-Phelps, fan, association and steeper areas of Lansing-Mohawk association in background.

drained to somewhat excessively drained Alton soils, the well-drained to excessively drained Howard and Palmyra soils, the well drained and moderately well drained Herkimer soils, the moderately well drained Phelps soils, and the somewhat poorly drained and poorly drained Fredon soils. All these soils formed in gravelly outwash material.

Most of the association has been cleared and is in dairy farms. The lower lying areas are wet and are subject to frequent flooding. They are suited to permanent pasture and wildlife cover. The higher lying areas of Phelps, fan, soils are subject to less flooding. They are suited to corn, grain, hay, and pasture. The hazard of flooding is a limitation for nonfarm use.

Dominantly Deep, Very Poorly Drained Soils That Formed in Organic Deposits; on Lake Plains and Uplands and in Valleys

The single soil association in this group is in nearly level, depressional areas mainly in the southern part of the counties. It makes up 0.3 percent of the counties. The soils are deep. They formed in organic material that is more than 20 inches deep. Most areas are wooded. None are farmed.

51. Carlisle-Palms association, nearly level

Deep, very poorly drained organic soils; on uplands and outwash terraces

This association is in bogs and swamps on till plains and outwash terraces. It is scattered throughout the counties.

The association makes up about 0.3 percent of the counties. It is about 70 percent Carlisle soils, 20 percent Palms soils, and 10 percent less extensive soils.

Carlisle soils are deep, very poorly drained, organic soils. They formed in waterlogged organic deposits that are more than 51 inches thick. Palms soils formed in organic deposits that are 16 to 51 inches thick over mineral material.

Less extensive in this association are the somewhat poorly drained Burdett soils and the poorly drained Ilion soils. Both these soils formed in glacial till. A few small areas of the silty and clayey, poorly drained and very poorly drained Madalin soils and the very poorly drained Fonda soils are also in the association.

Nearly all of the association is wooded. It generally is impractical to clear and drain these organic soils for farming. The high water table, ponding during wet periods, and the highly compressible organic matter are limitations for nonfarm uses.

Land Types In Which the Soil Material Has Been So Disturbed or Obscured by Manmade Structures That It Is Not Classified by Soil Series

This association is on a nearly level delta mainly in deltas, glaciolacustrine deposits, and alluvial sediment. They are in and near the city of Schenectady. The two associations in this group make up about 0.7 percent of the counties. They have had soil material removed or added, or both. They are under urban or industrial development.

52. Urban land-Colonie association, nearly level

Deep, well-drained to excessively drained soils that have a coarse-textured subsoil; on deltas and lake plains

This association is on a nearly level delta mainly in the city of Schenectady. The soils are dominantly nearly level, but are steep in places. Slopes range from 0 to 30 percent.

The association makes up about 0.3 percent of the counties. It is about 90 percent Urban land and Colonie soils and 10 percent less extensive soils.

Urban land consists of areas that have been so altered or obscured by urban works and structures that identification of the soils is not feasible. It is used for commercial buildings, industrial developments, shopping centers, parking lots, and houses. Colonie soils are deep, are well drained to excessively drained, and have a coarse-textured subsoil. They formed in lacustrine and eolian deposits of fine and very fine sand. Little or no gravel is in the association.

Less extensive in this association are the moderately well drained Elnora soils. They formed in material similar to that in which Colonie soils formed. Elnora soils occupy the nearly level depressional areas.

The association has been cleared and is in urban use. The soils are deep and sandy and are suited to most nonfarm uses.

53. Cut and fill land association, nearly level

Areas of variable depth and drainage; on flood plains

This association is on a nearly level flood plain mainly near the city of Schenectady. Slopes range from 0 to 15 percent.

The association makes up about 0.4 percent of the counties. It is about 90 percent Cut and fill land and 10 percent less extensive soils.

Cut and fill land consists of areas that have been disturbed by the removal or addition of soil material. The material and drainage are variable.

Less extensive in this association are mainly the well-drained Hamlin soils and the wetter Teel and Wayland soils. All formed in alluvial deposits.

The association is under urban and industrial development. The hazard of flooding is a limitation for many nonfarm uses.

Descriptions of the Soils

This section describes the soil series and mapping units in Montgomery and Schenectady Counties. The detailed description of each soil series is followed by a brief description of the mapping units in that series. Unless otherwise mentioned, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Unless otherwise stated, the color terms used in the descriptions are for moist soil. The profile described in the series is representative of mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, the differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Fluvaquents, loamy, for example, do not belong to a soil series. Nevertheless, they are listed in alphabetic order, along with the soil series.

Preceding the name of each mapping unit is a symbol that identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and woodland group in which the mapping unit has been placed. The capability units are described in the section "Capability grouping" and the woodland groups in table 3.

The approximate acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in the description of soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).

Alton Series

The Alton series consists of deep, gently sloping, well-drained and somewhat excessively drained, medium-textured gravelly soils on outwash fans. These soils formed in glacial outwash derived mainly from acid shale, sandstone, limestone, and granite.

In a representative profile the surface layer is 7 inches of dark-brown gravelly loam. The subsoil extends to a depth of 42 inches. The upper 7 inches is very friable, yellowish-brown, very gravelly fine sandy loam. The rest is brown or dark-brown, very friable, very gravelly sandy loam 28 inches thick. The substratum is dark-brown, very gravelly stratified sand to a depth of 66 inches and layers of calcareous silt and clay to a depth of 80 inches.

The water table fluctuates to within 3½ feet of the surface early in spring. Permeability is rapid in the

TABLE 1.—*Acreage and proportionate extent of the soils*

Soil or land type	Montgomery County		Schenectady County		Total acres
	Acres	Percent	Acres	Percent	
Alton gravelly loam, 3 to 8 percent slopes	320	0.1	0	0	320
Amenia loam, 0 to 3 percent slopes	160	(1)	0	0	160
Amenia loam, 3 to 8 percent slopes	480	.2	0	0	480
Angola silt loam, 3 to 8 percent slopes	4,470	1.7	0	0	4,470
Angola channery silt loam, 0 to 3 percent slopes	0	0	560	.4	560
Angola channery silt loam, 3 to 8 percent slopes	1,370	.5	2,400	1.8	3,770
Appleton silt loam, 0 to 3 percent slopes	850	.3	40	(1)	890
Appleton silt loam, 3 to 8 percent slopes	14,090	5.4	10	(1)	14,100
Arnot channery silt loam, 0 to 8 percent slopes	0	0	4,760	3.6	4,760
Arnot rocky silt loam, 8 to 15 percent slopes	2,770	1.1	0	0	2,770
Arnot rocky silt loam, 15 to 25 percent slopes	1,720	.6	0	0	1,720
Arnot-Angola channery silt loams, 3 to 8 percent slopes	5,090	1.9	0	0	5,090
Arnot-Rock outcrop association, very steep	1,770	.7	1,940	1.5	3,710
Broadalbin loam, 3 to 8 percent slopes	1,490	.6	150	.1	1,640
Broadalbin loam, 8 to 15 percent slopes	440	.2	100	.1	540
Broadalbin loam, 15 to 25 percent slopes	200	(1)	0	(1)	200
Brockport silt loam	1,010	.4	0	0	1,010
Burdett channery silt loam, 0 to 3 percent slopes	1,030	.4	0	0	1,030
Burdett channery silt loam, 3 to 8 percent slopes	19,630	7.5	0	0	19,630
Burdett channery silt loam, 8 to 15 per cent slopes	5,210	2.0	0	0	5,210
Burdett-Scriba channery silt loams, 0 to 3 percent slopes	10	(1)	3,840	2.9	3,850
Burdett-Scriba channery silt loams, 3 to 8 percent slopes	220	.1	21,490	16.1	21,710
Burdett-Scriba channery silt loams, 8 to 15 percent slopes	10	(1)	4,340	3.2	4,350
Burdett-Scriba association, extremely stony, gently sloping	0	0	2,220	1.7	2,220
Carlisle muck	520	.2	390	.3	910
Cheektowaga fine sandy loam	70	(1)	580	.4	650
Churchville silty clay loam, 0 to 3 percent slopes	1,840	.7	0	0	1,840
Churchville silty clay loam, 3 to 8 percent slopes	6,070	2.3	0	0	6,070
Claverack loamy fine sand, 0 to 3 percent slopes	0	0	140	.1	140
Claverack loamy fine sand, 3 to 8 percent slopes	130	(1)	170	.1	300
Colonie loamy fine sand, 0 to 3 percent slopes	0	0	7,290	5.5	7,290
Colonie loamy fine sand, 3 to 15 percent slopes	0	0	2,710	2.0	2,710
Colonie and Plainfield soils, steep	30	(1)	830	.6	860
Copake silt loam	360	.1	0	0	360
Darien silt loam, 0 to 3 percent slopes	1,630	.6	0	0	1,630
Darien silt loam, 3 to 8 percent slopes	25,600	10.0	0	0	25,600
Darien silt loam, 8 to 15 percent slopes	1,360	0.5	0	0	1,360
Elnora loamy fine sand	0	0	1,610	1.2	1,610
Farmington silt loam, 0 to 8 percent slopes	3,380	1.3	650	.5	4,030
Farmington-Rock outcrop association, moderately steep	6,570	2.5	620	.5	7,190
Fluvaquents, loamy	7,310	2.8	1,500	1.1	8,810
Fonda mucky silty clay loam	4,340	1.7	0	0	4,340
Fredon silt loam	1,480	.6	850	.6	2,330
Granby loamy fine sand	220	.1	370	.3	590
Hamlin silt loam	1,800	.7	1,550	1.2	3,350
Herkimer shaly silt loam, calcareous subsoil variant	350	.1	70	(1)	420
Hollis-Rock outcrop association, sloping	560	.2	0	0	560
Hornell silt loam, 0 to 3 percent slopes	0	0	570	.4	570
Hornell silt loam, 3 to 8 percent slopes	2,400	.9	4,790	3.6	7,190
Hornell silt loam, 8 to 15 percent slopes	0	0	880	.6	880
Howard gravelly silt loam, 0 to 3 percent slopes	470	.2	1,810	1.4	2,280
Howard gravelly silt loam, 3 to 8 percent slopes	2,700	1.0	1,250	.9	3,950
Howard gravelly silt loam, 8 to 15 percent slopes	430	.2	210	.2	640
Howard gravelly silt loam, 15 to 25 percent slopes	350	.1	140	.1	490
Howard soils, very steep	640	.2	350	.3	990
Hudson silty clay loam, 3 to 8 percent slopes	460	.2	260	.2	720
Hudson silty clay loam, 8 to 15 percent slopes	570	.2	240	.2	810
Hudson silty clay loam, 15 to 25 percent slopes	150	(1)	130	.1	280
Hudson soils, very steep	960	.4	190	.1	1,150
Ilion silt loam, 0 to 3 percent slopes	8,690	3.3	6,190	4.6	14,880
Ilion silt loam, 3 to 8 percent slopes	6,470	2.5	2,400	1.7	8,870
Ilion very stony silt loam, 0 to 8 percent slopes	110	(1)	330	.2	440
Joliet silt loam	450	.2	0	0	450
Junius loamy fine sand	10	(1)	620	.5	630
Lansing silt loam, 3 to 8 percent slopes	9,390	3.6	60	0	9,450
Lansing silt loam, 8 to 15 percent slopes	12,120	4.6	20	0	12,140
Lansing silt loam, 15 to 25 percent slopes	4,600	1.8	10	0	4,610
Lansing and Mohawk silt loams, very steep	10,900	4.2	30	0	10,930
Lordstown gravelly silt loam, 0 to 3 percent slopes	0	0	170	.1	170

TABLE 1.—*Acreage and proportionate extent of the soils*—Continued

Soil or land type	Montgomery County		Schenectady County		Total acres
	Acres	Percent	Acres	Percent	
Lordstown gravelly silt loam, 3 to 8 percent slopes	0	0	1,510	1.1	1,510
Lordstown gravelly silt loam, 8 to 15 percent slopes	0	0	1,300	1.0	1,300
Lordstown gravelly silt loam, 15 to 25 percent slopes	0	0	1,360	1.0	1,360
Lordstown-Rock outcrop association, steep	0	0	1,170	.9	1,170
Madalin silty clay loam	7,590	2.9	770	.6	8,360
Madalin silty clay loam, moderately shallow variant	350	0.1	0	0	350
Made land	310	.1	120	.1	430
Manheim silt loam, 0 to 3 percent slopes	250	.1	0	0	250
Manheim silt loam, 3 to 8 percent slopes	2,220	.9	100	.1	2,320
Manlius silt loam, 3 to 8 percent slopes	210	.1	270	.2	480
Manlius shaly silt loam, 8 to 15 percent slopes	990	.4	190	.1	1,180
Manlius shaly silt loam, 15 to 25 percent slopes	660	.3	150	.1	810
Manlius-Rock outcrop association, steep	0	0	2,130	1.6	2,130
Mardin gravelly silt loam, 3 to 8 percent slopes	0	0	250	.2	250
Mardin gravelly silt loam, 8 to 15 percent slopes	0	0	240	.2	240
Mardin gravelly silt loam, 15 to 25 percent slopes	0	0	140	.1	140
Mohawk silt loam, 3 to 8 percent slopes	3,520	1.3	210	.2	3,730
Mohawk silt loam, 8 to 15 percent slopes	3,830	1.5	330	.3	4,160
Mohawk silt loam, 15 to 25 percent slopes	1,530	.6	300	.2	1,830
Mosherville loam, 0 to 3 percent slopes	150	.1	0	0	150
Mosherville loam, 3 to 8 percent slopes	2,200	.8	0	0	2,200
Nassau shaly silt loam, 0 to 8 percent slopes	0	0	860	.6	860
Nassau shaly silt loam, 8 to 25 percent slopes	0	0	490	.4	490
Nellis loam, 3 to 8 percent slopes	1,290	.5	0	0	1,290
Nellis loam, 8 to 15 percent slopes	800	.3	0	0	800
Nellis loam, 15 to 25 percent slopes	340	.1	0	0	340
Nunda channery silt loam, 3 to 8 percent slopes	1,190	.5	4,240	3.2	5,430
Nunda channery silt loam, 8 to 15 percent slopes	3,050	1.2	3,610	2.7	6,660
Nunda channery silt loam, 15 to 25 percent slopes	1,940	.7	3,160	2.3	5,100
Nunda soils, very steep	170	.1	3,110	2.3	3,280
Nunda extremely stony soils, sloping	0	0	1,100	.8	1,100
Odessa silt loam, 3 to 8 percent slopes	0	0	480	.4	480
Otisville gravelly loamy sand, 0 to 8 percent slopes	0	0	230	.2	230
Palatine silt loam, 3 to 8 percent slopes	5,050	1.9	0	0	5,050
Palatine silt loam, 8 to 15 percent slopes	3,220	1.2	0	0	3,220
Palatine silt loam, 15 to 25 percent slopes	1,720	.7	0	0	1,720
Palms muck	200	.1	270	.2	470
Palmyra gravelly silt loam, 0 to 3 percent slopes	150	(1)	0	0	150
Palmyra gravelly silt loam, 3 to 8 percent slopes	740	.3	0	0	740
Palmyra gravelly silt loam, 8 to 15 percent slopes	110	(1)	0	0	110
Phelps gravelly loam, 0 to 3 percent slopes	200	.1	360	.3	560
Phelps gravelly loam, 3 to 8 percent slopes	1,060	.4	240	.2	1,300
Phelps gravelly loam, fan	2,010	.8	60	(1)	2,070
Plainfield loamy sand, 0 to 3 percent slopes	370	.1	2,700	2.0	3,070
Plainfield loamy sand, 3 to 10 percent slopes	1,440	.6	1,110	.8	2,550
Raynham silt loam	80	(1)	610	0.5	690
Rhinebeck silty clay loam, 0 to 3 percent slopes	730	.3	530	.4	1,260
Rhinebeck silty clay loam, 3 to 8 percent slopes	2,200	.8	130	.1	2,330
Rock outcrop-Farmington association, very steep	2,960	1.1	130	.1	3,090
Saprists and Aquents	390	.1	160	.1	550
Scio silt loam, 0 to 3 percent slopes	10	(1)	210	.2	220
Scio silt loam, 3 to 8 percent slopes	80	(1)	500	.4	580
Sun loam	690	.3	0	0	690
Teel silt loam	1,280	.5	610	.5	1,890
Tuller channery silt loam	1,000	.4	2,170	1.6	3,170
Tuller-Brockport complex, 0 to 3 percent slopes	0	0	4,730	3.5	4,730
Tuller-Brockport complex, 3 to 8 percent slopes	0	0	1,970	1.5	1,970
Unadilla silt loam, 0 to 8 percent slopes	0	0	290	.2	290
Unadilla silt loam, 8 to 15 percent slopes	110	(1)	60	(1)	170
Unadilla silt loam, 15 to 25 percent slopes	290	.1	0	0	290
Urban land-Colonie complex	0	0	1,100	.8	1,100
Varick silt loam, 0 to 3 percent slopes	620	.2	880	.7	1,500
Varick silt loam, 3 to 8 percent slopes	480	.2	230	.2	710
Wassaic silt loam, 0 to 3 percent slopes	10	(1)	150	.1	160
Wassaic silt loam, 3 to 8 percent slopes	5,920	2.3	360	.3	6,280
Wassaic silt loam, 8 to 15 percent slopes	770	.3	70	(1)	840
Wayland silt loam	1,500	.6	1,270	1.0	2,770
Cut and fill land	5,110	2.0	2,090	1.6	7,200
Quarries	290	.1	30	(1)	320
Gravel pits	350	.1	490	.4	840
Water	200	.1	600	.4	800
Total	261,760	100.0	133,760	100.0	395,520

[1] Less than 0.1 percent.

surface layer and subsoil. It is rapid in the upper part of the substratum and slow in the lower part. Root growth is not restricted but is mainly in the upper 30 inches of the soil. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low. The content of lime is low. Unless limed, the surface layer is strongly acid.

Applied lime and fertilizer are readily leached from these soils. Small, frequent applications generally give better response than large applications. Lack of moisture is the main limitation in farming. Gravel in the surface layer interferes with precision tillage and harvesting of root crops.

Representative profile of Alton gravelly loam, 3 to 8 percent slopes, in an alfalfa field, 125 feet west of State Highway 10 and 500 yards north of Latimer Hill Road, in Canajoharie:

Ap—0 to 7 inches, dark-brown (10YR 3/3) gravelly loam; moderate, medium and fine, granular structure; very friable; many roots; porous; 20 percent gravel; neutral; abrupt, smooth boundary.

B21—7 to 14 inches, yellowish-brown (10YR 5/4) very gravelly fine sandy loam; moderate, fine, subangular blocky structure; very friable; many roots; porous; 40 percent gravel; neutral; gradual, wavy boundary.

B22—14 to 28 inches, brown (10YR 5/3) very gravelly sandy loam; moderate, medium, subangular blocky structure; very friable; many roots; porous; 60 percent gravel; slightly acid; gradual, wavy boundary.

B23—28 to 42 inches, dark-brown (10YR 4/3) very gravelly sandy loam; strong, thick, platy structure parting to strong, medium, subangular blocky; very friable; common roots; many medium and fine pores; 60 percent gravel; medium acid; abrupt, smooth boundary.

IIC—42 to 66 inches, dark-brown (10YR 4/3) very gravelly stratified sand; single grained; loose; few roots; porous; 55 percent gravel; slightly acid.

IIIC—66 to 80 inches, thin layers of silt and clay that are olive gray (5Y 5/2), dark gray (N 4/0), dark grayish brown (10YR 4/2), and brown (10YR 4/3); very firm; moderately alkaline; calcareous.

Thickness of the solum ranges from 30 to 60 inches. Depth to carbonates is more than 40 inches. The content of coarse fragments in the upper 40 inches averages more than 35 percent. The fragments are mainly gravel and many angular shale fragments. The solum is strongly acid to neutral.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. The content of coarse fragments ranges from 20 to 30 percent. The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 5. The fine earth fraction is loam or fine sandy loam in the upper part and sandy loam below a depth of 20 inches. The C horizon is mainly dark-brown or brown stratified sand and gravel that overlies layers of silt or clay at a depth of about 5 feet.

Alton soils are in a drainage sequence with the moderately well drained Phelps soils and the somewhat poorly drained or poorly drained Fredon soils. They are similar to Palmyra soils, but do not have the Bt horizon that is characteristic of those soils.

AlB—Alton gravelly loam, 3 to 8 percent slopes. This gently sloping soil occupies outwash fans that are underlain by deposits of silt and clay at a depth of about 5 feet. Some areas are fan shaped, some are large and broad, and others are narrow. Areas range from less than 10 acres to more than 40 acres in size.

Included with this soil in mapping are small areas of nearly level and sloping Alton soils and a few areas of soils that have a surface layer of silt loam or channery loam. Also included are small depressional areas of the wetter Phelps and Fredon soils.

This Alton soil is suited to row crops, hay, pasture, and woodland. It is well suited to most crops grown in the area, and deep-rooted crops do especially well. The soil can be tilled early, but tends to be droughty. Because the soil is porous and is subject to leaching, applications of nitrogen fertilizer should be light and should be made at frequent intervals when plant demand is at its peak. Capability unit IIs–1; woodland group 3o1.

Amenia Series

The Amenia series consists of deep, nearly level or gently sloping, moderately well drained, medium-textured soils on till plains. These soils formed in calcareous glacial till derived mainly from limestone and calcareous black shale.

In a representative profile the surface layer is 10 inches of very dark grayish-brown loam. The upper 8 inches of the subsoil is brown, friable loam; the next 6 inches is mottled dark-brown, friable heavy loam; and the lower 9 inches is distinctly mottled dark-brown, friable loam. The substratum to a depth of 50 inches is friable, calcareous, dark grayish-brown gravelly fine sandy loam.

The water table fluctuates to within 18 inches of the surface during wet periods. Permeability is moderate in the solum and slow in the substratum. Root penetration is deep. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low. Unless limed, the surface layer is slightly acid or neutral.

Seasonal wetness is the main limitation in farming. Water remains for only a short period in spring or after prolonged rainfall.

Representative profile of Amenia loam, 0 to 3 percent slopes. in a meadow, 225 yards north of Crumb Creek Road and 500 yards east of Kennedy Road, in St. Johnsville:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) loam, light gray (10YR 7/2) when dry; moderate, medium and fine, granular structure; friable; many roots; porous; 5 percent coarse fragments; neutral; clear, smooth boundary.

B21—10 to 18 inches, brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; many roots; many fine and medium pores; 10 percent coarse fragments; neutral; gradual, wavy boundary.

B22—18 to 24 inches, dark-brown (10YR 4/3) heavy loam; few, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium and thick, platy structure; friable; common roots; many medium and fine pores; 10 percent coarse fragments; many weathered, very dark brown (10YR 2/2) fragments of shale; neutral; gradual, smooth boundary.

B23—24 to 33 inches, dark-brown (10YR 3/3) loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles and common, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, thick, platy structure; friable; common roots; many medium and fine pores; 15 percent coarse fragments; many

small, weathered, very dark brown (10YR 2/2) fragments of shale; mildly alkaline; calcareous; abrupt, smooth boundary.

C—33 to 50 inches, dark grayish-brown (10YR 4/2) gravelly fine sandy loam; common, medium, distinct, very dark gray (10YR 3/1) mottles and many, fine and medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, very thick, platy structure; friable; few fine roots; many large and medium pores; 25 percent coarse fragments that have many, very dark brown (10YR 2/2), weathered fragments of shale; moderately alkaline; calcareous.

Thickness of the solum and depth to carbonates range from 18 to 34 inches. The solum is commonly friable throughout, but the lower part of the B horizon and the C horizon are firm in places. The content of coarse fragments ranges from 5 to 30 percent and typically increases with increasing depth. The solum is slightly acid to mildly alkaline.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (2.4Y 4/2). The B horizon has hue of 7.5YR or 10YR, value of 4 and 5, and chroma of 2 to 4. It ranges from very friable to firm fine sandy loam to loam. The C horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (2.5Y 5/2). It is massive or has a thick platy structure and is friable to firm.

Amenia soils formed in similar material and are in a drainage sequence with the well-drained Nellis soils and the poorly drained Ilion soils. They are also near the shallow to bedrock Farmington soils.

AmA—Amenia loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies glacial till plains. Areas are small and irregularly shaped. In places the surface layer is silt loam.

Included with this soil in mapping are small depressional areas of the wetter and finer textured Ilion soils. Also included are a few small areas of the somewhat poorly drained Manheim soils.

This Amenia soil is suited to row crops, hay, pasture, and woodland. Most deep-rooted crops respond to adequate drainage. Slight seasonal wetness interferes with tillage when these soils are not drained. Crop residue, minimum tillage, and cover crops are needed to maintain good tilth. Drainage of wet spots is needed for more uniform tillage. Capability unit IIw–3; woodland group 3o1.

AmB—Amenia loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but in places it has a thinner subsoil. This soil occupies undulating and smoothly sloping landforms. Areas are irregularly shaped and range from 5 to 20 acres in size. In places the surface layer is silt loam. Included in mapping are small areas of the wetter Manheim soils and Ilion soils in depressions and along drainageways.

This Amenia soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness and slope are the main limitations for use. Crops respond well to adequate drainage. Slight seasonal wetness may interfere with tillage when the soil is not drained. Crop residue, minimum tillage, and cover crops are needed to maintain tilth and to help control runoff and erosion. Contour planting and diversions also help to control runoff and erosion. Drainage of wet spots is needed. Capability unit IIw–3; woodland group 3o1.

Angola Series

The Angola series consists of moderately deep, nearly level and gently sloping, somewhat poorly drained, medium-textured soils on bedrock-controlled landforms of glacial till plains. These soils formed in glacial till derived from limestone, sandstone, and calcareous black shale. The soils are 20 to 40 inches deep over rock.

In a representative profile the surface layer is very dark grayish-brown silt loam 9 inches thick. The subsoil is mottled dark grayish-brown, friable loam to a depth of 15 inches. Below this it is mottled very dark grayish-brown, firm light silty clay loam. Hard, calcareous, black shale bedrock is at a depth of 24 inches.

Seasonally the water table is perched on the slowly permeable subsoil and the hard shale bedrock, and ground water is within 6 to 12 inches of the surface during wet periods. Root growth is restricted by the slowly permeable subsoil and the bedrock. Available water capacity is moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is medium to high. Unless limed, the surface layer is medium acid or slightly acid.

Seasonal wetness is the main limitation in farming. Shallowness greatly interferes with installation of drainage systems. Seasonal wetness and shallowness are the main limitations in town and country planning.

Representative profile of Angola silt loam, 3 to 8 percent slopes, in a meadow, 500 feet north of Pickle Hill Road and 700 feet northeast of State Highway 80, in Minden:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish-gray (10YR 6/2) when dry; moderate, medium and coarse, granular structure; friable; many roots; many medium and large pores; 5 percent coarse fragments; neutral; abrupt, smooth boundary.

B21—9 to 15 inches, dark grayish-brown (10YR 4/2) loam; common, medium, distinct, dark-brown (7.5YR 4/4) mottles and common, medium and fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; many roots; common fine and medium pores; 5 percent coarse fragments; neutral; clear, wavy boundary.

B22tg—15 to 24 inches, very dark grayish-brown (10YR 3/2) light silty clay loam; many (40 percent), medium, distinct, dark-brown (7.5YR 4/4) and strong-brown (7.5YR 5/6) mottles and common, medium, faint, dark grayish-brown (10YR 4/2) mottles; moderate, coarse, subangular blocky structure; firm; common, very dark gray (10YR 3/1) clay films on faces of peds and clay linings in pores; 5 percent gravel and shale fragments; neutral; abrupt, smooth boundary.

IIR—24 inches, black (10YR 2/1) hard shale bedrock in horizontal beds; no roots; moderately alkaline; calcareous.

Thickness of the solum ranges from 20 to 30 inches, and depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from 5 to 20 percent in the surface horizon to as much as 50 percent in the horizon above the bedrock. The solum is strongly acid to neutral.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 3. It is silt loam, shaly silt loam, or channery silt loam. The B horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 4. It is loam to light silty clay loam or their channery or shaly analogs. The B horizon has many distinct mottles that have value of 4 or

5 and chroma of 3 to 6. A dark grayish-brown (2.5Y 4/2) or very dark grayish-brown (10YR 3/2) C horizon occurs in places. Bedrock is brittle, soft, slightly acid or calcareous shale, hard limestone, or thin-bedded sandstone.

Angola soils formed in similar material and are in a drainage sequence with the well-drained to somewhat excessively drained Palatine soils. They are also associated with the deeper, somewhat poorly drained Appleton, Darien, and Burdett soils.

AnB—Angola silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies bedrock-controlled till plains. Areas are generally long and narrow, but many are large and broad. Most are less than 10 acres in size, but a few areas approach 50 acres.

Included with this soil in mapping are small areas of well-drained Palatine soils on slight rises or knolls and small areas of deeper, wetter Ilion soils in depressions. Also included are small depressional areas of lacustrine material, such as Brockport soils and Madalin variant soils.

This Angola soil is suited to row crops, hay, pasture, and woodland. It is better suited to pasture and hay than to other uses because drainage is impractical in most areas. Seasonal wetness, a slowly permeable or very slowly permeable subsoil, and bedrock at a depth of 20 to 40 inches are limitations for all uses of Angola soils. Where drainage is feasible, a surface drainage system is the most practical. Selection of water-tolerant species or short-season crops should be considered when planting. Contour planting and diversions should be used in gently sloping areas to help control runoff and erosion. Capability unit IIIw–5; woodland group 3w3.

AoA—Angola channery silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but the surface layer and the upper part of the subsoil are channery and generally are strongly acid, and in places the surface layer is lighter in color. This soil occupies very smooth, bedrock-controlled till plains at high elevations in the southwestern part of Schenectady County. Areas are irregularly shaped and generally are less than 25 acres in size. A few areas are larger.

Included with this soil in mapping are small areas of gently sloping Burdett or Darien soils on knolls and small depressional areas of the wetter Varick or Ilion soils.

This Angola soil is better suited to hay, pasture, and woodland than to row crops. Seasonal wetness, bedrock at a depth of 20 to 40 inches, and a slowly permeable subsoil limit its use. Where drainage is feasible, a surface drainage system is the most practical. Subsurface drainage is not practical in most areas. If hay, pasture, or woodland is grown, the species should be tolerant of wetness. Capability unit IIIw–5; woodland group 3w3.

AoB—Angola channery silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but the surface layer and the upper part of the subsoil are channery and generally are strongly acid, and in places the surface layer is lighter in color. This soil occupies undulating and smoothly sloping areas on bedrock-controlled glacial till plains at high elevations along the southern border of the survey area. Areas are irregularly shaped and range from 5 to 50 acres in size.

Included with this soil in mapping are small depressional areas of Varick or Ilion soils. Also included are Ilion soils along drainageways, small areas of the deeper Burdett and Darien soils, and a few small, scattered areas of Manlius soils on short, steeper breaks.

This Angola soil is better suited to hay, pasture, and woodland than to row crops. Seasonal wetness, bedrock at a depth of 20 to 40 inches, and the hazard of erosion limit its use. Subsurface drainage is not practical. Species used for hay, pasture, or woodland should be shallow rooted and tolerant of wetness. Capability unit IIIw–5; woodland group 3w3.

Appleton Series

The Appleton series consists of deep, nearly level and gently sloping, somewhat poorly drained, medium-textured soils on till plains. These soils formed in calcareous glacial till derived mainly from limestone, calcareous black shale, and some granites and sandstones.

In a representative profile the surface layer is 11 inches of dark grayish-brown silt loam. The subsurface layer is 6 inches of distinctly mottled grayish-brown, friable silt loam. The subsoil is mottled dark grayish-brown, firm silt loam 9 inches thick. The substratum to a depth of 50 inches is dark grayish-brown, firm gravelly silt loam.

The water table is within 6 to 12 inches of the surface early in spring or during prolonged wet periods. Permeability is moderate in the solum and slow in the substratum. Root growth is affected by the water table and is mainly in the upper 18 inches in spring. Available water capacity is moderate to high. The capacity of these soils to supply phosphorus and potassium is medium. The content of lime is medium to high. Unless limed, the surface layer is slightly acid to neutral.

Seasonal wetness and the slowly permeable substratum are the main limitations in farming and many nonfarm uses. Appleton soils respond to drainage. Unless drained, selection of shallow-rooted and water-tolerant species should be considered for these soils.

Representative profile of Appleton silt loam, 3 to 8 percent slopes, in a pasture, 200 feet east of Broden Road and 700 feet east of Argersinger Road, in Glen:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish-gray (10YR 6/2) when dry; moderate, medium and fine, granular structure; friable; many roots; porous; 5 percent coarse fragments; neutral; clear, smooth boundary.

A2—11 to 17 inches, grayish-brown (10YR 5/2) silt loam; many, fine and medium, distinct, yellowish-brown (10YR 5/4) mottles, common, medium, distinct, graty (10YR 6/1) mottles, and few, coarse, distinct, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; friable; common roots; many fine pores; 5 percent gravel

and small, black (10YR 2/1), weathered fragments of shale; neutral; gradual, smooth boundary.

B2t—17 to 26 inches, dark grayish-brown (10YR 4/2) silt loam; many (30 percent), fine and medium, distinct, yellowish-brown (10YR 5/4) mottles and common (15 percent), medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium and coarse, subangular blocky structure; firm; common roots; many fine and medium pores and few coarse pores that have clay linings; thin, continuous clay films on faces of peds, thin, discontinuous in lower part; 15 percent gravel and small, weathered, black (10YR 2/1) fragments of shale; neutral; clear, wavy boundary.

C—26 to 50 inches, dark grayish-brown (2.5Y 4/2) gravelly silt loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles and common, coarse, distinct, gray (10YR 5/1) mottles; weak, very thick, platy structure in the upper part, massive in the lower part; firm; few roots; many medium and large pores; 20 percent gravel; small, weathered, black (10YR 2/1) fragments of shale; moderately alkaline; calcareous.

Thickness of the solum ranges from 25 to 36 inches. Depth to carbonates ranges from 20 to 32 inches. The content of coarse fragments in the upper part of the solum ranges from 5 to 20 percent. In the B and C horizons the content of gravelly coarse fragments ranges from 15 to 30 percent. The A horizon is slightly acid or neutral, and the B horizon is neutral or mildly alkaline. The C horizon is generally calcareous.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (2.5Y 4/2). Dry value is 6 or 7. The A2 horizon is grayish brown (10YR 5/2) or light grayish brown (10YR 6/2).

The B horizon ranges from dark grayish brown (2.5Y 4/2) to brown (10YR 5/3). It is mottled with yellowish red, yellowish brown, brown, or gray. The B horizon has many small fragments of dark-colored shale. It is loam to heavy silt loam that has a clay content of 18 to 27 percent.

The C horizon ranges from dark grayish brown (2.5Y 4/2) to very dark grayish brown (10YR 3/2). The fine earth fraction is loam or silt loam. The C horizon has common low- and high-chroma mottles and many small, dark-colored fragments of shale.

Appleton soils formed in similar material and are in a drainage sequence with the well-drained Lansing soils and the poorly drained Ilion soils. They have a coarser textured Bt horizon than the Churchville, Darien, and Madalin soils.

ApA—Appleton silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but in places it has a thicker subsoil. This soil occupies broad flats and a few very slightly depressional areas. Areas are small and irregularly shaped and generally are less than 20 acres in size.

Included with this soil in mapping are very small depressional areas of Ilion soils that are indicated on the map in many places by wet spot symbols. Also included are very narrow bands of Ilion soils along small drainageways, small areas of Churchville and Madalin soils that are indicated on the map as clay spots, and Darien soils that have a more clayey subsoil.

This Appleton soil is suited to row crops, hay, pasture, and woodland. It is better suited to crops than to other uses when adequately drained. Crops respond well to subsurface or surface drainage. Selection of water-tolerant species or short-season crops should be considered when planting if drainage is not used. Seasonal wetness and excessive runoff received from higher areas limit the use of this soil. Capability unit IIIw–1; woodland group 3w3.

ApB—Appleton silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies glacial till plains. Broad to narrow bands of this soil extend on both sides of the Mohawk River above the valley walls throughout Montgomery County. Areas vary in size and shape. Most range from 20 to 200 acres in size.

Included with this soil in mapping are small depressional areas of Ilion soils and common areas of Ilion soils in narrow bands along drainageways. Also included are areas of better drained soils on the crests of small undulations, small depressional areas of Churchville or Madalin soils that formed in lacustrine material and generally are indicated on the map by clay spot symbols, and areas of Darien soils that have a more clayey subsoil.

This Appleton soil is suited to row crops, hay, pasture, and woodland. When drainage is improved, this soil is better suited to crops than to other uses. Crops respond well to surface and subsurface drainage. Excessive runoff from higher adjacent areas contributes to wetness. Undrained areas are generally better suited to water-tolerant species than to other species. When used intensively, the sloping areas need stripcropping, contour planting, diversions, and other measures to control runoff and erosion. Capability unit IIIw–1; woodland group 3w3.

Arnot Series

The Arnot series consists of nearly level to very steep, shallow, well drained and moderately well drained, medium-textured soils on bedrock-controlled till plains. These soils formed in channery, acid glacial till that is less than 20 inches thick over sandstone, siltstone, and shale.

In a representative profile the surface layer is dark grayish-brown channery silt loam 7 inches thick. The subsoil is yellowish-brown, very friable channery silt loam. Gray siltstone is at a depth of 16 inches. A thin layer at the bedrock contact has many pale-brown or yellowish-brown mottles.

The water table is perched on the bedrock during wet periods, but normally it is deep. Permeability is moderate. Root growth is restricted by bedrock within 20 inches of the surface. Available water capacity is low or very low in the root zone. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low or very low. Unless limed, the surface layer is strongly acid.

Shallowness over bedrock, acidity, and slope are the main limitations in farming. Other limitations are channery fragments and lack of moisture during the growing season. Shallowness and slope are the main limitations in town and country planning.

Representative profile of Arnot channery silt loam, 0 to 8 percent slopes, in an old meadow, 50 yards east of junction of Ridge and Church Roads, in Glenville:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, very fine and fine, granular structure; very friable; many roots; 20 percent

coarse fragments; strongly acid; abrupt, smooth boundary.

B2—7 to 16 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, fine and medium, subangular blocky structure; very friable; many roots, many pores; mottled pale-brown (10YR 6/3) channery silt loam ½ to 1 inch thick that has many fine, faint, yellowish-brown (10YR 5/6) mottles at the bedrock contact; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

IIR—16 inches, gray siltstone bedrock.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. The solum is 20 to 35 percent coarse fragments. The fine earth part is mainly silt loam. The solum is strongly acid or very strongly acid.

The Ap horizon has hue of 7.5 YR to 2.5Y, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 or 4. A thin layer containing high-chroma mottles is common above the bedrock. A thin C horizon of rock fragments and silt loam occurs in places. The underlying bedrock ranges from massive sandstone to interbedded sandstone, siltstone, and shale.

Unlike other soils of the Arnot series, these soils are less than 35 percent coarse fragments. This difference, however, does not affect their use and management.

Arnot soils formed in similar material and are in a drainage sequence with the moderately deep, well-drained Lordstown soils and the somewhat poorly drained or poorly drained Tuller soils. Arnot soils are similar to Nassau soils, which formed in material weathered from slate and shale. They are also associated with Brockport and Varick soils, both of which have a finer textured solum.

ArB—Arnot channery silt loam, 0 to 8 percent slopes. This nearly level to gently sloping soil has the profile described as representative of the series. It occupies bedrock-controlled glacial till plains or plateaus. Areas range from less than 15 to more than 50 acres.

Included with this soil in mapping are small areas of Tuller, Brockport, and Varick soils, all of which are in depressional areas or at the base of sharp slope breaks and are wetter than this Arnot soil. Also included are small areas of Lordstown soils, which are deeper than this Arnot soil, and areas of the shallow, shaly Nassau soils.

This Arnot soil is best suited to hay, pasture, and woodland. It tends to be droughty because it is shallow. For this reason it is better suited to shallow-rooted crops that mature early than to other crops. Tillage should be restricted to only the amount needed to reestablish hay or pasture. Capability unit IIIe–3; woodland group 4d1.

AtC—Arnot rocky silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but it contains more coarse fragments and in places has a thinner subsoil, and areas are 2 to 10 percent rock outcrop. Slopes are smooth and short. They are mainly breaks from the plateau above. Areas are generally long and narrow and irregular in shape and average 15 acres or less in size.

Included in mapping are small areas of short, steep slopes that were too narrow to be shown separately at the scale mapped.

This Arnot soil is best suited to hay, pasture, and woodland. Many areas are idle or reforested. Acidity, strong slope, rock fragments, rock outcrop, and bedrock, which is within a depth of 20 inches, limit farm and nonfarm uses. Bedrock outcrops interfere with tillage. Tillage should be restricted to only the amount needed to reestablish hay or pasture. Capability unit IVe–3; woodland group 4d1.

AtD—Arnot rocky silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it contains more coarse fragments and has a thinner subsoil. It is on bedrock-controlled slopes. Areas are 2 to 10 percent rock outcrop. They are narrow and very long and are irregular in shape. They average 15 acres or less in size, but some areas west of Schoharie Creek are more than 50 acres.

Included in mapping are small areas of the steeper Arnot soils and a few small areas of the moderately deep Manlius soils.

This soil is best suited to pasture and woodland. Many areas are idle or reforested. Slope, bedrock within a depth of 20 inches, and exposure of bedrock severely limit farm and nonfarm uses. Bedrock outcrops interfere with tillage. Tillage should be restricted to only the amount needed to reestablish pasture. Grazing can begin early in spring, but it should be controlled. A good plant cover is needed as protection against erosion. Capability unit VIe–1; woodland group 4x1.

AvB—Arnot-Angola channery silt loams, 3 to 8 percent slopes. This mapping unit is about 60 percent Arnot soils and 40 percent Angola soils. The Arnot soil is shallow over bedrock. The Angola soil is somewhat poorly drained and moderately deep over bedrock.

These gently sloping soils occupy bedrock-controlled till plains at high elevations. Bedrock is at a depth of 10 to 36 inches. Areas are broad and irregularly shaped. Some are between 50 and 100 acres in size.

Included with this unit in mapping are many very small areas of the wetter Varick, Tuller, and Brockport soils. Many of these areas are indicated on the map by wet spot symbols. Also included are a few areas of the finer textured Hornell soils.

The soils in this mapping unit are best suited to hay, pasture, and woodland. Seasonal wetness, the hazard of erosion, rock fragments, and depth to bedrock limit farm and nonfarm uses. Depth to bedrock ranges from 10 to 36 inches and makes installation of drainage systems impractical. Tillage should be restricted to only the amount needed to reestablish hay or pasture. Capability unit IIIe–3; woodland group 4d1.

AZF—Arnot-Rock outcrop association, very steep. This mapping unit is about 50 percent Arnot soil, 40 percent Rock outcrop, and 10 percent less extensive soils. It occupies very steep areas adjacent to small streams and other upland areas. Slope ranges from 35 to 60 percent. Many outcrops of shale and sandstone cover about 40 percent of the surface. Areas are long and narrow and are generally less than 20 acres, but some areas approaching 100 acres in size are west of Schoharie Creek.

The Arnot soil in this mapping unit has a profile similar to the one described as representative of the series, but it has more coarse fragments. It is shallow, well drained, and medium textured. Bedrock is at a

depth of 10 to 20 inches. Intermingled throughout the area are exposures of bedrock that make up the Rock outcrop part of the unit. The less extensive soils are the less sloping Arnot soils.

This mapping unit is suited to woodland or wildlife habitat. The very steep slopes and shallowness to bedrock limit farm and nonfarm uses. Grazing animals should be restricted from areas of these soils. Capability unit VIIs–2. Arnot soil in woodland group 5x2; Rock outcrop not assigned.

Broadalbin Series

The Broadalbin series consists of deep, gently sloping to strongly sloping, well drained and moderately well drained, medium-textured soils on glacial till plains. These soils have a firm fragipan. They formed in two different kinds of parent material. The upper 20 inches formed in eolian material, and the lower part in firm glacial till derived from granite, gneiss, limestone, sandstone, and dark shale.

In a representative profile the surface layer is 10 inches of dark grayish-brown loam. The upper part of the subsoil is 5 inches of friable, yellowish-brown loam. The next layer is distinctly mottled brown, friable loam 5 inches thick. The subsoil from a depth of 20 to 47 inches is a firm, dark grayish-brown gravelly loam fragipan. The substratum to a depth of 52 inches is olive-brown, firm gravelly loam.

Seasonally the water table is perched on the slowly permeable fragipan, and ground water is within 18 to 30 inches of the surface during wet periods. Root growth is often restricted to the upper 2 feet of this soil, because roots cannot penetrate the fragipan. Roots below this depth are few and fine or very fine. Available water capacity is moderate. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is low. The content of lime is low. Unless limed, the surface layer is strongly acid.

Slope and seasonal wetness are the main limitations in farming. Crops may lack moisture during dry periods. Slope and slow permeability in the fragipan are the main limitations in town and country planning.

Representative profile of Broadalbin loam, 3 to 8 percent slopes, in a meadow, 50 feet west of Droms Road and 100 yards northeast of Onderonk Road, in Glenville:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) loam; weak, very fine and fine, granular structure; very friable; many roots; porous; 10 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B2—10 to 15 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; very friable; common roots; common fine pores; 10 percent coarse fragments; strongly acid; clear, wavy boundary.

A'2—15 to 20 inches, brown (10YR 5/3) loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles and few, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, thin and medium, platy structure; friable; common roots; many fine pores; light brownish-gray (2.5Y 6/2) coatings on peds; 10 percent coarse fragments; strongly acid; clear, irregular boundary.

IIB'x—20 to 47 inches, dark grayish-brown (10YR 4/2) gravelly loam; weak, very coarse, prismatic structure parting to moderate, medium, platy; firm, brittle; few roots; common fine pores; 20 percent coarse fragments; strongly acid; gradual, wavy boundary.

IIC—47 to 52 inches, olive-brown (2.5Y 4/4) gravelly loam; weak, medium and thick, platy structure; firm; few fine pores; 20 percent coarse fragments; neutral.

Thickness of the solum ranges from 40 to 60 inches. Depth to the fragipan ranges from 18 to 36 inches. The content of coarse fragments ranges from 5 to 15 percent in the upper 20 inches and from 10 to 30 percent in the fragipan. The solum is acid in the upper part and ranges to slightly acid or neutral with increasing depth. The C horizon is neutral or mildly alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. The B2 horizon has hue of 10YR, value of 5, and chroma of 3 to 6. It ranges from fine sandy loam to silt loam. The A'2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The B'x horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3. It is firm and brittle. The fine earth fraction is loam or fine sandy loam. The C horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 4. The fine earth fraction is loam or fine sandy loam.

Broadalbin soils are in a drainage sequence with the somewhat poorly drained Mosherville soils and the poorly drained or very poorly drained Sun soils. These soils all formed in similar material. Broadalbin soils are also near Lansing and Appleton soils, which formed in glacial till and have a Bt horizon.

BoB—Broadalbin loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies narrow, convex hilltops on glacial till plains. Areas are long and narrow and seldom are larger than 20 acres in size.

Included with this soil in mapping are areas of soils that have a calcareous substratum at a depth of 50 inches or more. Also included are small depressional areas of Mosherville and Sun soils.

This Broadalbin soil is suited to row crops, hay, pasture, and woodland. The hazard of erosion, a slowly permeable subsoil, and slight seasonal wetness limit farm and nonfarm uses. Moderate to high applications of lime and fertilizer are needed for good crop production. Contour planting and stripcropping should be used to control erosion if this soil is intensively row cropped. Diversions or terraces also help to reduce erosion and sedimentation. Minimum tillage and returning crop residue to the soil are useful alternative measures. Capability unit IIe–5; woodland group 3o1.

BoC—Broadalbin loam, 8 to 15 percent slopes. This sloping soil occupies small, dome-shaped hillsides on till plains. Drainageways are at the base of many of the hills. Areas are long and narrow and irregularly shaped. They generally range from 15 to 25 acres in size.

Included with this soil in mapping are small areas of eroded soils. Also included are a few areas of gently sloping or moderately steep Broadalbin soils and a few areas of Lansing soils in the southernmost part of the survey area where the upper deposit is thin.

This Broadalbin soil is suited to row crops, hay, pasture, and woodland. The hazard of erosion is severe, and conservation measures are needed when the soil is cropped and not protected. Liming is needed to control acidity. Moderate to high applications of ferti-

lizer are also needed for crop production. Contour planting and stripcropping are needed to control erosion and sedimentation. Crop residue, minimum tillage, and diversions or terraces break up long slopes and reduce erosion and sedimentation. Capability unit IIIe–7; woodland group 3o1.

BoD—Broadalbin loam, 15 to 25 percent slopes. This moderately steep soil occupies hillsides on glacial till plains. Areas are long and narrow and are adjacent to drainageways. They seldom are more than 20 acres in size.

Included with this soil in mapping are small areas of Lansing soils. Also included are small areas of eroded soils.

This Broadalbin soil is suited to hay, pasture, and woodland. Steep slopes make the use of farm machinery difficult and hazardous and also limit nonfarm uses. The hazard of erosion is severe. Where possible, contour or cross-slope tillage should be used when hay or pasture is reestablished. Old pastures are improved by application of fertilizer and in places lime, but periodic renovation of pasture sods provides higher quality feed and better erosion control. Capability unit IVe–6; woodland group 3r1.

Brockport Series

The Brockport series consists of moderately deep, nearly level, somewhat poorly drained, medium-textured soils on bedrock-controlled till uplands. These soils formed in glacial till derived mainly from weathered, soft shale bedrock. They are 20 to 40 inches deep. Lacustrine sediments overlie the rock in some areas.

In a representative profile the surface layer is 8 inches of very dark gray heavy silt loam. The subsoil is 14 inches of gray, firm silty clay. It has many prominent strong-brown mottles. The substratum from a depth of 22 to 28 inches is gray. It has silty clay loam material interspersed with thin beds of weathered shale. Below this is fractured, dark-gray shale bedrock.

The water table is perched on the very slowly permeable subsoil and bedrock, and ground water is within 6 to 10 inches of the surface during wet periods. Root growth is mainly in the surface layer and extends into the subsoil during dry periods. Available water capacity of this zone, which is approximately 20 inches deep, is moderate. The capacity of these soils to supply nitrogen and phosphorus is generally medium and their capacity to supply potassium is high. The content of lime is medium or low. Unless limed, the surface layer is neutral or slightly acid.

Seasonal wetness, slow permeability, and shallowness to bedrock are the main limitations in farming and nonfarm uses. It is not feasible to drain this soil because of the shallowness to bedrock. Shallow-rooted and water-tolerant species should be considered for these soils.

Representative profile of Brockport silt loam, in an idle field, 50 yards north of Glenridge Road and ⅕ mile east of State Highway 50, in Glenville:

Ap—0 to 8 inches, very dark gray (10YR 3/1) heavy silt loam; moderate, fine and medium, granular structure; friable; many roots; porous; 2 percent coarse fragments; neutral; abrupt, smooth boundary.

B2gt—8 to 22 inches, gray (10YR 5/1) silty clay; many (45 percent), medium, prominent, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic structure parting to moderate, medium, subangular blocky; firm; common roots on faces of prisms and of peds; few fine pores; patchy, dark-gray (5Y 4/1) clay films on faces of prisms; 2 percent coarse fragments; slightly acid; clear, wavy boundary.

IIC—22 to 28 inches, gray (10YR 5/1) very shaly silty clay loam; fine earth material between layers of partly weathered shale averages ⅛ to ⅜ inch in thickness; few roots; 60 percent fragments of shale; neutral; clear, wavy boundary.

IIR—28 to 34 inches, shattered, dark-gray shale bedrock with thin, horizontal sandstone strata; neutral.

Thickness of the solum and depth to bedrock both range from 20 to 40 inches. The content of soft fragments of shale ranges from few to 20 percent in the A horizon and increases with increasing depth to as much as 30 percent in the B horizon. Most profiles have gravel in a few places. The Ap horizon is commonly medium acid. The B horizon is medium acid to neutral.

The Ap horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. It is silt loam to silty clay loam. A thin A2 horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2 occurs in many profiles. The A2 horizon is generally destroyed by deep plowing.

The B horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 3. Coatings on faces of peds have chroma of 2 or less. The B horizon has many strong-brown and yellowish-brown mottles. The underlying bedrock is a neutral shale or sandstone that has some calcium carbonate as a cementing agent.

Brockport soils are closely associated with the more acid, somewhat poorly drained to moderately well drained Hornell soils, which do not have a Bt horizon. They are similar in drainage to the moderately deep Angola soils and the shallow Tuller soils. They have a finer textured solum than Angola soils. They are also near the shallow, well drained and moderately well drained Arnot soils and the poorly drained Varick soils, which are moderately deep over bedrock.

Br—Brockport silt loam. This nearly level soil occupies bedrock-controlled, flat to slightly concave areas. Areas are broad and irregularly shaped. Most areas average less than 20 acres in size. A few are larger than 50 acres.

Included with this soil in mapping are spots of poorly drained soils that are very similar to Brockport soils. Also included are areas of gently sloping Brockport soils, small, dome-shaped knolls of the moderately well drained Hornell soils, a few depressional areas of the poorly drained Varick soils, and small areas of the coarser textured Tuller soils.

This Brockport soil is best suited to water-tolerant grasses and legumes for hay and pasture, to short-season crops, and to woodland. Seasonal wetness, bedrock at a depth of 20 to 40 inches, and slow permeability limit its use. Subsurface drainage is not practical. Capability unit IIIw–5; woodland group 3w1.

Burdett Series

The Burdett series consists of deep, nearly level to sloping, somewhat poorly drained, medium-textured soils on glacial till plains. These soils formed in two layers of glacial till. The upper layer is an acid silty

deposit. The lower layer is calcareous, gravelly, compact silty clay loam till.

In a representative profile the surface layer is 9 inches of dark-brown channery silt loam. The upper part of the subsoil is 7 inches of light olive-brown, friable channery silt loam. It has many yellowish-brown mottles. The middle part of the subsoil is mottled light brownish-gray, firm gravelly silty clay loam 10 inches thick. The lower part of the subsoil from a depth of 26 to 44 inches is mottled gray, firm gravelly silty clay loam. The substratum to a depth of 54 inches is calcareous, olive-brown and grayish-brown, very firm gravelly silty clay loam.

The water table is within 8 inches of the surface early in spring or during prolonged wet periods in summer. Root growth is often restricted by the water table, but during dry periods roots penetrate to a depth of 30 inches and more. Available water capacity is moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low to medium. Unless limed, the surface layer is strongly acid.

Seasonal wetness, slow permeability, slope, and channery fragments are the main limitations in farming. Seasonal wetness and slow permeability are the main limitations in town and country planning.

Representative profile of Burdett channery silt loam, 3 to 8 percent slopes, in a hayfield, 500 feet northwest of Begley Road and 900 feet southwest of Esperance Road, in Charleston:

Ap—0 to 9 inches, dark-brown (10YR 3/3) channery silt loam; weak, medium and fine, granular structure; very friable; many roots; many small pores; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B21—9 to 16 inches, light olive-brown (2.5Y 5/4) channery silt loam; many (40 percent), medium and fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, platy structure parting to weak, very fine, subangular blocky; friable; common fine roots; common fine pores; 20 percent coarse fragments; strongly acid; clear, wavy boundary.

IIB22t—16 to 26 inches, light brownish-gray (2.5Y 6/2) gravelly silty clay loam; many, medium and coarse, prominent, strong-brown (7.5YR 5/6) mottles; moderate, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; few roots; many fine pores that have clay linings; distinct, continuous clay films on faces of peds; 30 percent coarse fragments; medium acid; gradual, wavy boundary.

IIB23t—26 to 44 inches, gray (10YR 5/1) gravelly silty clay loam; many (45 percent), medium and coarse, prominent, olive-brown (2.5Y 4/4) mottles; weak, coarse, prismatic structure; firm; few roots; few fine pores; distinct, continuous, gray (10YR 6/1) clay films on faces of peds, thin, discontinuous, or patchy at greater depths; few manganese stains; 40 percent coarse fragments; medium acid; gradual, wavy boundary.

IIC—44 to 54 inches, olive-brown (2.5Y 4/4) and grayish-brown (2.5Y 5/2) gravelly silty clay loam; weak, very thick, platy structure; very firm; thin, discontinuous, patchy clay films on faces of cleavages; 35 percent coarse fragments; moderately alkaline; calcareous.

Thickness of the solum ranges from 30 to 50 inches. The solum ranges from strongly acid in the A horizon to neutral. Acidity decreases with increasing depth. Thickness of the upper deposit ranges from 13 to 25 inches. The content of coarse fragments ranges from 15 to 25 percent. In the lower horizons the content of gravel and fragments of shale ranges from 15 to 40 percent.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The B21 horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 3 or 4. Mottles range from strong brown to yellowish brown.

The IIB horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 in the upper part and 1 in the lower part. Mottles range from strong brown to olive brown. The IIB horizon is silty clay loam or clay loam..

The IIC horizon ranges from dark grayish brown to olive brown. It is commonly mottled with olive brown and dark gray. The fine earth fraction ranges from silt loam to silty clay loam.

Burdett soils are in a drainage sequence with the moderately well drained Nunda soils and the poorly drained Ilion soils, which formed in similar material. Burdett soils are closely associated with the somewhat poorly drained Darien soils, but, unlike Darien soils, they formed in glacial till that has a more acid and channery upper mantle. They are also near Churchville soils, which have a finer textured solum and formed in lacustrine sediment.

BuA—Burdett channery silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but in places the upper part of the profile is slightly grayer. This soil occupies broad flats and slightly depressional areas that are generally adjacent to the gently sloping Burdett soil. Areas are irregularly shaped and average about 25 acres in size.

Included with this soil in mapping are small depressional areas of Ilion soils. Also included are areas of Darien soils that have an upper silty mantle less than 12 inches thick.

This Burdett soil is suited to row crops, hay, pasture, and woodland. Unless the soil is adequately drained, selection is limited to plants that are tolerant of wetness. Because this soil dries out slowly in spring, crops are generally planted late. Corn responds better in years that are drier than normal. Surface drainage is generally more effective than tile drainage because the subsoil is slowly permeable. Capability unit IIIw–3; woodland group 3w3.

BuB—Burdett channery silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies broad, undulating till plains. Areas are long and irregularly shaped. Most areas range from 25 to 50 acres in size. Some are larger than 200 acres.

Included with this soil in mapping are long, narrow, depressional areas of wetter Ilion soils along the smallest streams. Also included are spots of Darien soils on similar landscapes and a few small knolls of the better drained Nunda soils.

This Burdett soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness, slow permeability, a moderate hazard of erosion, and rock fragments limit most uses. Plant selection is limited to species that are tolerant of wetness unless an adequate drainage system is installed. Surface drainage is generally more effective than tile drainage because the subsoil is slowly permeable. Where practical, contour farming and diversions should be used to help reduce the hazard of erosion. Capability unit IIIw–3; woodland group 3w3.

BuC—Burdett channery silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but in places it has a thinner surface layer and subsoil, and the surface layer contains more channery fragments. This soil occupies the sides of long, east-west drumloidal hills. Areas are large, long and wide, and irregularly shaped. They range from 25 to 150 acres in size.

Included with this soil in mapping are small, narrow, dome-shaped areas of Nunda soils at the tops of hills. Also included are small, wet seep areas of the wetter Ilion soils.

This Burdett soil is suited to row crops, hay, pasture, and woodland. The hazard of erosion is severe, and erosion-control measures are needed. Seasonal wetness, slow permeability, the hazard of erosion, and rock fragments limit most uses. Unless drained, wetness delays planting and limits selection of crops primarily to sod crops that are tolerant of wetness. When the soil is row cropped, contour farming, stripcropping, diversions, and other practices are needed to control erosion. Minimum tillage and returning crop residue and green manure are also needed. Capability unit IIIe–5; woodland group 3w3.

BvA—Burdett-Scriba channery silt loams, 0 to 3 percent slopes. The soils in this nearly level mapping unit occur on till plains in such intricate patterns that they are not mapped separately. This mapping unit is about 65 percent Burdett soils and 35 percent Scriba soils. The Scriba soils have the profile described as representative of the Scriba series. Areas of this mapping unit are broad and irregularly shaped. They vary in size but generally average more than 30 acres.

Included with this unit in mapping are small depressional areas of the wetter Varick and Ilion soils. Also included are spots of channery Angola soils.

The soils of this mapping unit are suited to row crops, hay, pasture, and woodland. Water-tolerant, shallow-rooted crops do best if the soils do not have adequate drainage. Seasonal wetness, slow permeability, and rock fragments limit most uses. Capability unit IIIw–3; woodland group 3w3.

BvB—Burdett-Scriba channery silt loams, 3 to 8 percent slopes. These gently sloping and undulating soils occur on till plains in such intricate patterns that they are not mapped separately. This mapping unit is 65 percent Burdett soils and 35 percent Scriba soils. Areas are broad and elongated and are irregularly shaped. Most areas are large and average about 30 to 50 acres in size. Some are more than 100 acres.

Included with this unit in mapping are small depressional areas of the wetter Ilion and Varick soils. Also included are areas of Darien soils that have an upper silty deposit less than 12 inches thick and areas of the channery Angola soils that have bedrock at a depth of 20 to 40 inches.

The soils of this mapping unit are suited to row crops, hay, pasture, and woodland. Seasonal wetness, a moderate hazard of erosion, slow permeability, and rock fragments limit most uses. Unless the soil is adequately drained, water-tolerant, shallow-rooted grasses and legumes are better suited than other species. Where practical, contour farming and diversions should be used to help reduce erosion. Differential settlement and frost-heaving occur in places where proper construction methods are not used for foundations (fig. 7). Capability unit IIIw–3; woodland group 3w3.

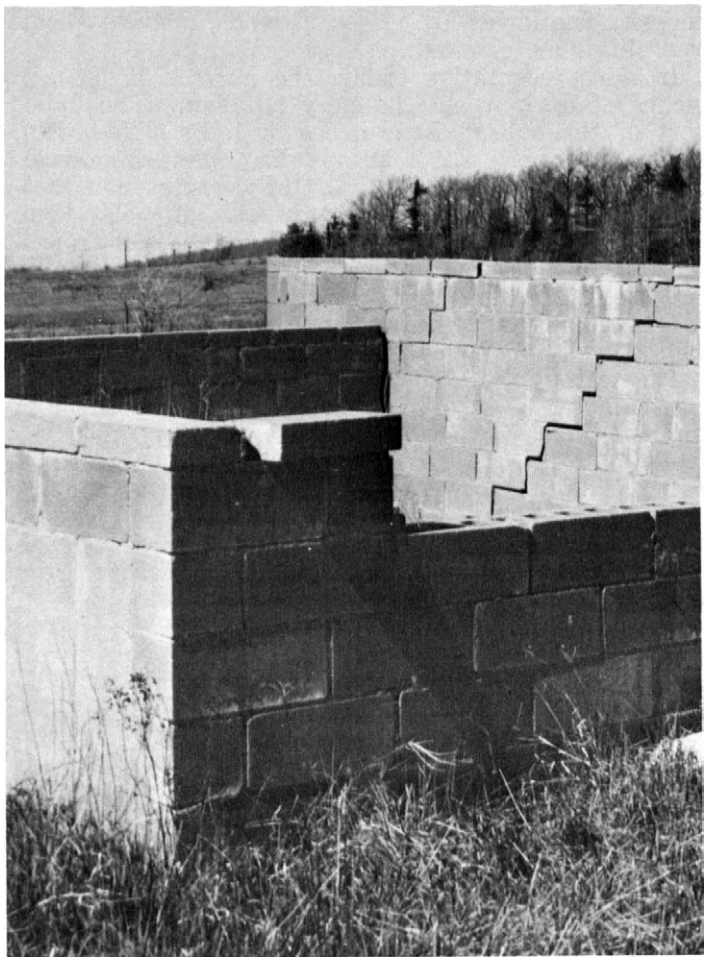

Figure 7.—**Foundation cracks caused by differential settlement and frost-heaving in Burdett-Scriba channery silt loams.**

BvC—Burdett-Scriba channery silt loams, 8 to 15 percent slopes. These soils have profiles similar to the ones described as representative of their respective series, but they have a thinner subsoil and are brighter in color. They occur in such intricate patterns that they are not mapped separately. This mapping unit is 65 percent Burdett soils and 35 percent Scriba soils. It occupies hillsides. Areas are long and broad and irregularly shaped. Most areas average about 25 acres in size.

Included with this unit in mapping are small areas of better drained Nunda soils. Also included are small areas of Darien soils that have an upper silty deposit less than 12 inches thick and Ilion soils along drainageways or in small seep areas.

The soils of this mapping unit are suited to row crops, hay, pasture, and woodland. Crops generally do better on these soils than on others, because they are steep enough to have more rapid runoff and be slightly

drier. Seasonal wetness, a severe hazard of erosion, slow permeability, and rock fragments limit most uses. Unless the soil is drained, wetness delays planting and limits selection of crops primarily to sod crops that are tolerant of wetness. When the soils are row cropped, contour farming, stripcropping, diversions, and other practices are needed to control erosion. Mininum tillage and returning crop residue and green manure are also beneficial. Capability unit IIIe–5; woodland group 3w3.

BXB—Burdett-Scriba association, extremely stony, gently sloping. These nearly level to sloping soils have profiles similar to the ones described as representative of their respective series, but the surface is 3 to 15 percent stones. They occur in such intricate patterns that they are not mapped separately. This mapping unit is 65 percent Burdett soils and 35 percent Scriba soils. It occupies till plains. Areas are irregularly shaped. They vary in size. Some areas are more than 25 acres.

Included with this unit in mapping are small areas of wetter Ilion soils that are generally indicated on the map by a wet spot symbol. Also included are very stony areas of Angola, Varick, Nunda, and Darien soils.

The soils of this association are suited to limited grazing, woodland, and wildlife habitat. They are too stony for cultivated crops or for the use of farm machinery. Capability unit VIIs–2; woodland group 3x1.

Carlisle Series

The Carlisle series consists of deep, level, very poorly drained muck in bogs and swamps on till plains at high elevations. These soils formed in deep organic deposits.

In a representative profile the surface layer is 10 inches of very dark gray organic material. The next layer is black organic material about 4 inches thick. These two layers contain more than 50 percent mineral material by weight. The third layer is 32 inches of dark reddish-brown organic material that contains some decomposed fragments of wood. Between depths of 46 and 56 inches is a dark reddish-brown layer of organic material that is 5 percent fiber. Partly decomposed fragments of wood total about 20 percent of this layer.

Carlisle soils are ponded most of the year, and during the driest season the water table is generally within 8 to 10 inches from the surface. Root growth is restricted by the water table. Available water capacity is high.

The capacity of this soil material to supply plant nutrients is variable. Nitrogen reserves are high. Unless limed, the surface layer is strongly acid.

Prolonged wetness or ponding is the main limitation in farming. Most vegetation grows on hummocks within the area.

Representative profile of Carlisle muck, in a forest, 1,000 feet south of Esperance Road and ¾ mile east of State Highway 30A, in Charleston:

Oa1—0 to 10 inches, very dark gray (10YR 3/1) sapric material, very dark brown (10YR 2/2) when rubbed; moderate, medium, granular structure; friable; 65 percent mineral; 2 percent fiber; medium acid; abrupt, smooth boundary.

Oa2—10 to 14 inches, black (N 2/0) sapric material, black (10YR 2/1) when rubbed; weak, coarse, granular structure; friable; 65 percent mineral; 2 percent fiber; medium acid; clear, smooth boundary.

Oa3—14 to 46 inches, dark reddish-brown (5YR 2/2) sapric material, black (5YR 2/1) when rubbed and pressed; massive; some breakage along bedding planes; friable; 5 percent fiber, 1 percent when rubbed; 8 percent mineral; 20 percent partly decomposed fragments of wood as much as 10 inches in diameter; medium acid; clear, smooth boundary.

Oa4—46 to 56 inches, dark reddish-brown (5YR 3/3) sapric material, dark reddish brown (5YR 2/2) when rubbed and pressed; massive; friable; 20 percent fiber, 5 percent when rubbed; 20 percent partly decomposed fragments of wood 2 to 10 inches in diameter; medium acid.

The organic deposits are more than 51 inches thick. Reaction is medium acid or slightly acid. The upper tier contains mineral material. In places the soil is 10 to 30 percent woody fragments consisting of twigs, logs, and stumps.

The surface tier is black or very dark gray sapric material. The subsurface tiers also are mainly sapric material. They range from black (N 2/0) to dark reddish brown (5YR 3/4) and have hue of 5YR to 10YR, value of 2 or 3, and chroma of 0 to 4. Chroma and value often change when the soil is rubbed, and broken faces darken when exposed to air. The unrubbed, highly decomposed organic material in the lower tiers resembles woody plant tissue. The bottom tiers are commonly massive. Fiber content is 5 to 20 percent, and color is similar to that of the tier above.

Carlisle soils are closely associated with Palms soils, which formed in moderately deep organic deposits over glacial till. They are near the poorly drained Ilion soils of the glacial till plains.

Ca—Carlisle muck. This level soil occupies bogs and swamps on the upland till plains. There are only a few areas of this soil. Areas are large and broad. Most are more than 50 acres, and some as large as 150 acres.

Included with this soil in mapping are small, narrow areas of Palms muck at the margins of bogs where they grade into the poorly drained Ilion soils or other upland soils. These narrow bands of soil at the margins of bogs could not be separated at the scale mapped.

This soil is suited only to woodland unless drainage is installed. Where the soil is drained, it is suited to specialty crops such as vegetables. Capability unit IIIw–7; woodland group 5w1.

Cheektowaga Series

The Cheektowaga series consists of deep, low-lying, nearly level, poorly drained and very poorly drained, moderately coarse textured soils in slightly depressional areas. These soils formed in sandy deposits underlain by lake-laid silt and clay.

In a representative profile the surface layer is very dark gray fine sandy loam 9 inches thick. The subsoil is distinctly mottled grayish-brown, very friable loamy fine sand to a depth of 26 inches. The substratum to a depth of 52 inches is grayish-brown, very firm silty clay that has strong-brown and yellowish-brown mottles.

The water table is perched on the slowly permeable substratum, and ground water is at the surface early in spring. Root growth is restricted by the high water

table to the upper 18 inches of the soil. Available water capacity is normally low, but it is moderate to high where artificial drainage is installed. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is low. The content of lime is low to medium. Unless limed, the surface layer is medium acid or slightly acid.

Prolonged wetness is the main limitation in farming. Water-tolerant, shallow-rooted crops do better on these soils than deep-rooted crops. Artificial drainage is feasible for many areas. Wetness and the slowly permeable substratum are the main limitations in town and country planning.

Representative profile of Cheektowaga fine sandy loam, in a pasture, 300 yards north of County Line Road and 75 yards west of railroad track crossing, in Rotterdam:

Ap—0 to 9 inches, very dark gray (10YR 3/1) fine sandy loam, grayish-brown (10YR 5/2) when dry; weak, very fine and fine, granular structure; very friable; many roots; neutral; abrupt, smooth boundary.

B21—9 to 18 inches, grayish-brown (10YR 5/2) loamy fine sand; common fine mottles and many, medium and coarse, strong-brown (7.5YR 5/6) mottles; weak, thin and medium, platy structure; very friable; common fine roots; common pores; neutral; clear, wavy boundary.

B22—18 to 26 inches, grayish-brown (10YR 5/2) loamy fine sand; few, medium, faint, grayish-brown (2.5Y 5/2) mottles; common, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles and many, medium and coarse, distinct, strong-brown (7.5YR 5/6) mottles (45 percent); weak, medium and thick, platy structure; very friable; few fine roots; common pores; neutral; clear, wavy boundary.

IIC—26 to 52 inches, grayish-brown (2.5Y 5/2) silty clay; common, medium, distinct, strong-brown (7.5YR 5/6) mottles and many, medium and coarse, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and thick, platy structure; very firm; few fine roots; common fine and medium pores; gray (5Y 5/1) silt coatings on faces of plates; neutral.

Thickness of the solum and of the upper sandy deposit both range from 20 to 40 inches. The IIC horizon generally has carbonates at a depth of 40 to 60 inches. The solum and substratum generally have no coarse fragments. The horizons above a depth of 20 inches range from medium acid to neutral. The horizons below a depth of 20 inches are slightly acid or neutral.

The Ap horizon ranges from very dark gray (10YR 3/1) to very dark grayish brown (2.5Y 3/2). The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. It ranges from loamy fine sand to fine sand. Grayish-brown strong-brown, or yellowish-brown mottles range from few to many. The IIC horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2, 3, or 4. The IIC horizon ranges from heavy silty clay loam to clay. It is layered or massive.

The Cheektowaga series is in a drainage sequence with the moderately well drained Claverack soils. Cheektowaga soils are near the well-drained to excessively drained Colonie soils, the moderately well drained Elnora soils, and the somewhat poorly drained and poorly drained Junius soils, which formed in deeper sandy deposits.

Ce—Cheektowaga fine sandy loam. This level and nearly level soil occupies low-lying, nearly level to slightly depressional areas of lake plains. Areas are broad and saucer shaped and range from 5 to 20 acres in size. In a few small areas the subsoil is fine sandy loam.

Included with this soil in mapping are areas of a similar soil that is drier. Also included are small dome-shaped areas of the better drained Claverack soils, depressional areas of the finer textured Madalin soils, and a few small areas of Junius and Granby soils that formed in deep sand.

This Cheektowaga soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness limits production of most row crops. Drainage is feasible in some areas, and corn can be grown in drained areas. If the soil is not drained, selection is limited to water-tolerant, shallow-rooted species. Where outlets are available, the soil can generally be effectively drained by either surface or subsurface drains or both. Row crops can be grown year after year without significantly damaging the soil under management that includes minimum tillage, cover crops, crop residue, and green manure. Capability unit IVw–6; woodland group 5w1.

Churchville Series

The Churchville series consists of deep, nearly level and gently sloping, somewhat poorly drained, moderately fine textured soils on glacial lake plains within the till uplands. These soils formed in calcareous, lake-laid silt and clay that overlies glacial till.

In a representative profile the surface layer is 7 inches of dark grayish-brown silty clay loam. The upper part of the subsoil is 6 inches of mottled dark-brown, very firm silty clay. The middle part of the subsoil is mottled brown, very firm, plastic clay 8 inches thick. The lower part of the subsoil from a depth of 21 to 32 inches is dark yellowish-brown and yellowish-brown, very firm clay. From a depth of 32 to 41 inches are calcareous layers of brown, olive-brown, and very dark grayish-brown shaly silty clay loam, shaly loam, and shaly fine sandy loam. Below this, to a depth of 84 inches is dark grayish-brown and olive-brown, firm, shaly loam glacial till.

The water table is within 6 inches of the surface early in spring or during prolonged wet periods. Root growth is mainly in the upper 20 inches of the soil. Available water capacity is moderate. The capacity of these soils to supply nitrogen is high, phosphorus, medium, and potassium, high. Unless limed, the surface layer is slightly acid.

Seasonal wetness and slow permeability are the main limitations in farming. Good tilth is difficult to maintain in this clayey soil. This soil clods and puddles easily if tilled when moisture content is too high. Seasonal wetness, slow permeability, and instability of the soil are the main limitations in town and country planning.

Representative profile of Churchville silty clay loam, 0 to 3 percent slopes, in a meadow, 100 feet north of Logtown Road and 800 feet west of Olmstead Road, in Glen:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, medium and fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B21t—7 to 13 inches, dark-brown (7.5YR 4/2) silty clay; many (30 percent), fine, distinct, yellowish-brown

(10YR 5/6) mottles; strong, coarse, prismatic structure parting to moderate, medium, subangular blocky; very firm; common roots; common fine pores; thin, discontinuous clay films on faces of prisms; neutral; clear, wavy boundary.

B22t—13 to 21 inches, brown (7.5YR 5/2) clay; many (30 percent), medium, distinct, yellowish-brown (10YR 5/6) mottles; strong, coarse, prismatic structure parting to strong, coarse, angular blocky; very firm; plastic; common roots; common fine pores; thick clay films on faces of peds and linings of pores; mildly alkaline; gradual, wavy boundary.

B23t—21 to 32 inches, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) clay; strong, coarse, prismatic structure parting to weak, thick, platy; very firm; few roots on faces of prisms; thin, continuous clay films on faces of peds; light-gray (10YR 7/1) horizontal streaks of precipitated lime; brown (7.5YR 5/2) faces on peds; moderately alkaline; calcareous; clear, wavy boundary.

IIC1—32 to 41 inches, brown (7.5YR 5/2), light olive-brown (2.5Y 5/6), olive-brown (2.5Y 4/4), and very dark grayish-brown (2.5Y 3/2) layers of shaly silty clay loam, shaly loam, and shaly fine sandy loam; moderate, thick, platy structure; firm; thin, discontinuous, patchy clay films on surfaces of plates in silty clay loam layer; 15 percent coarse fragments; moderately alkaline; calcareous; clear, smooth boundary.

IIIC2—41 to 84 inches, dark grayish-brown (2.5Y 4/2) and olive-brown (2.5Y 4/4) shaly loam; weak, thick, platy structure; firm; 30 percent coarse fragments; moderately alkaline; calcareous.

Thickness of the solum and depth to the IIC horizon both range from 20 to 36 inches. The content of coarse fragments ranges from 15 to 35 percent in the IIC horizon. The solum generally has no coarse fragments.

The Ap horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. A thin A2 horizon is generally destroyed by deep plowing. The Ap horizon is slightly acid or neutral.

The B horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 2 to 4. Coatings on peds have chroma of 2 or less. The B horizon ranges from silty clay loam to clay that has an average clay content of 35 to 55 percent. It ranges from slightly acid to moderately alkaline.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6.

Churchville soils are associated with the somewhat poorly drained Rhinebeck soils and the poorly drained and very poorly drained Madalin soils, which formed in deeper lacustrine deposits of silt and clay. Churchville soils are often adjacent to the somewhat poorly drained Darien soils, which formed in glacial till.

ChA—Churchville silty clay loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies small lake plains within till plains of uplands. Areas are generally long and narrow and irregularly shaped. Many areas average about 10 acres in size, others are 5 acres or less, and a few are more than 50 acres.

Included with this soil in mapping are areas of similar Rhinebeck soils that formed in deeper deposits. Also included are areas of the wetter Madalin and Fonda soils in small depressions and along drainageways. Darien soils that have a shallow silt and clay deposit are in areas where the lacustrine deposit borders glacial till.

This Churchville soil is suited to row crops, hay, pasture, and woodland. Unless the soil is drained, selection of crops is limited by wetness, and legumes and grasses that are tolerant of wetness should be used for hay or pasture. Good tilth is difficult to maintain in these heavy soils unless long-term hay or pasture is used at regular intervals. Capability unit IIIw–4; woodland group 3w1.

ChB—Churchville silty clay loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but the subsoil is brighter in color and the surface layer is lighter in color. This soil occupies glacial lake plains on glacial till uplands. Areas are long and irregularly shaped and many are larger than 25 acres in size. Small areas are also common.

Included with this soil in mapping are small areas of similar Rhinebeck soils that formed in pockets of deeper lacustrine material. Also included are small, deep areas of the wetter Madalin soils and Fonda soils in depressions and along small drainageways. Darien soils are common where the lacustrine mantle thins adjacent to areas of glacial till.

This Churchville soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness, slow permeability, and a heavy surface layer limit its use Corn and small grain can be grown but are less suited in wet years unless the soil is drained. In undrained areas, water-tolerant grasses and legumes do best. Good tilth is difficult to maintain unless long-term hay or pasture is grown at frequent intervals. Capability unit IIIw–4; woodland group 3w1.

Claverack Series

The Claverack series consists of deep, nearly level and gently sloping, moderately well drained, coarse-textured soils on lake plains. These soils formed in sandy deltaic deposits over glacial lake deposits of silt and clay.

In a representative profile the surface layer is 11 inches of dark-brown loamy fine sand. The upper part of the subsoil is 7 inches of strong-brown, very friable loamy fine sand. The subsoil from a depth of 18 to 30 inches is distinctly mottled yellowish-brown, very friable loamy fine sand. The substratum to a depth of 50 inches is olive-brown, firm silty clay that has distinct yellowish-brown and grayish-brown mottles.

The water table is within 16 inches of the surface during wet periods. Root growth is mainly in the upper 24 inches of the soil, but a few roots penetrate the underlying clay. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen is medium and their capacity to supply phosphorus and potassium is low. Unless limed, the surface layer is medium acid.

Coarse texture in the solum and very slow permeability in the substratum are the main limitations in farming. During dry years lack of moisture in the upper sandy layers can also limit plant growth.

Representative profile of Claverack loamy fine sand, 0 to 3 percent slopes, in a cultivated field, 50 yards west of Lisha Kill Road and 20 yards north from Albany County line, in Niskayuna:

Ap—0 to 11 inches, dark-brown (10YR 4/3) loamy fine sand; weak, very fine, granular structure; very

friable; common roots; neutral; abrupt, smooth boundary.

B21—11 to 18 inches, strong-brown (7.5YR 5/6) loamy fine sand; very weak, fine and medium, subangular blocky structure; very friable; few roots; slightly acid; clear, wavy boundary.

B22—18 to 25 inches, yellowish-brown (10YR 5/6) loamy fine sand; few, medium, faint, brown (10YR 4/3) mottles and few, medium, distinct, yellowish-red (5YR 4/8) and grayish-brown (10YR 5/2) mottles; very weak, fine and medium, subangular blocky sturcture; very friable; few roots; slightly acid; clear, wavy boundary.

B23—25 to 30 inches, yellowish-brown (10YR 5/4) loamy fine sand; common, medium, distinct, dark-brown (7.5YR 4/4) and strong-brown (7.5YR 5/6) mottles; very weak, fine and medium, subangular blocky structure parting to weak, fine, granular; very friable; few roots; slightly acid; abrupt, wavy boundary.

IIC—30 to 50 inches, olive-brown (2.5Y 4/4) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles and common, medium, distinct, grayish-brown (2.5Y 5/2) mottles; moderate, medium and thick, platy structure; firm; few roots; neutral.

Depth to the underlying fine-textured material ranges from 20 to 40 inches. Coarse fragments are generally lacking. The solum ranges from strongly acid to neutral, and the IIC horizon ranges from neutral to moderately alkaline.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy fine sand or fine sand. The IIC horizon ranges from very dark grayish brown (10YR 3/2) to olive (5Y 5/4). The IIC horizon is silty clay or clay that has a very thick to medium platy structure or is massive.

Claverack soils are in a drainage sequence with the poorly drained Cheektowaga soils. Claverack soils are near the well-drained to excessively drained Colonie soils, the moderately well drained Elnora soils, and the somewhat poorly drained and poorly drained Junius soils, all of which formed in deeper sandy deposits.

ClA—Claverack loamy fine sand, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It formed in thin, deltaic deposits that are underlain by clayey, glacial lake sediment. Areas are broad and irregularly shaped. Most range from 10 to 25 acres in size. In a few places, the surface layer is fine sandy loam.

Included with this soil in mapping are small depressional areas of the wetter Cheektowaga soils. Also included are the moderately well drained Elnora soils in deeper sandy deposits, Colonie soils on small knolls of deeper sand, and a few small areas of the wetter, less acid, and deeper Junius soils.

This Claverack soil is suited to row crops, hay, pasture, and woodland. Slight seasonal wetness and very slow permeability in the clayey layer are the main limitations to its use. Minimum tillage, cover crops, returning crop residue, plowing under green manure, and other practices are needed to maintain organic-matter content and stabilize soil structure. Capability unit IIIw–6; woodland group 3s1.

ClB—Claverack loamy fine sand, 3 to 8 percent slopes. This undulating soil has a profile similar to the one described as representative of the series, but the subsoil is slightly brighter in color. In places the surface layer is fine sandy loam. This soil occupies undulating, deltaic deposits that are underlain by clayey, glacial lake sediment. Areas are broad and irregularly shaped. They range from 10 to 25 acres in size.

Included with this soil in mapping are small depressional areas of the wetter Cheektowaga soils and small areas of Elnora and Colonie soils. Also included are small areas of moderately well drained soils that have 20 to 40 inches of loamy fine sand over compact glacial till.

This Claverack soil is suited to row crops, hay, pasture, and woodland. Slight seasonal wetness and very slow permeability in the clayey layer limit its use. During very dry periods, lack of moisture may be a limitation. Minimum tillage, cover crops, crop residue, green manure, and other management are needed to maintain organic-matter content and stabilize soil structure. Capability unit IIIw–6; woodland group 3s1.

Colonie Series

The Colonie series consists of deep, nearly level to very steep, well-drained to excessively drained, coarse-textured soils on deltas and lake plains. These soils formed in lacustrine and eolian deposits that are dominantly fine sand and very fine sand.

In a representative profile the surface layer is 6 inches of dark grayish-brown loamy fine sand. The upper part of the subsoil is 30 inches of brown or yellowish-brown, friable or loose loamy fine sand. The lower part is yellowish-brown, brown, or grayish-brown, loose fine sand to a depth of 101 inches. It has thin, wavy, dark-brown bands of friable loamy fine sand. The substratum to a depth of 110 inches is brown, loose fine sand.

The water table is generally several feet below the surface, but in places it fluctuates to within 3½ feet of the surface. Permeability is rapid, except in the thin bands of the subsoil, where it is moderate to slow. Root growth is not restricted but mainly takes place in the upper 30 inches of the soil. Available water capacity is low. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low. Unless limed, the surface layer is very strongly acid or strongly acid.

Since Colonie soils are low in fertility, they need applications of lime and fertilizer. Because the lime and fertilizer are readily leached out, small and frequent applications generally give better response than one large application. Lack of moisture is a limitation in farming. Soil blowing is a hazard where the plant cover is not adequate. These soils are a good potential source of sand.

Representative profile of Colonie loamy fine sand, 3 to 15 percent slopes, in an abandoned field, 75 yards south of Campbell Road and ½ mile west of State Highway 55, in Rotterdam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, fine and very fine, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary.

B21—6 to 15 inches, brown (7.5YR 5/4) loamy fine sand; weak, fine and very fine, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary.

B22—15 to 36 inches, yellowish-brown (10YR 5/6) loamy

fine sand; single grained; loose; common roots; strongly acid; gradual, wavy boundary.

B23—36 to 55 inches, yellowish-brown (10YR 5/4) fine sand; single grained; loose; common roots; two wavy lamellae, ¼ inch thick, of dark-brown (7.5YR 4/4) loamy fine sand that is massive and friable; strongly acid; gradual, wavy boundary.

B24—55 to 70 inches, brown (10YR 5/3) fine sand; single grained; loose; common roots; four wavy lamellae, ½ inch thick, of dark-brown (7.5YR 4/4) loamy fine sand that is massive and friable; strongly acid; clear, wavy boundary.

B25—70 to 101 inches, grayish-brown (10YR 5/2) fine sand; single grained; loose; few roots; seven wavy lamellae, ½ to 1 inch thick, of dark-brown (7.5YR 4/4) loamy fine sand that is massive and friable; strongly acid; clear, wavy boundary.

C—101 to 110 inches, brown (10YR 5/3) fine sand; single grained; loose; medium acid.

Thickness of the solum ranges from 48 to 120 inches, and depth to bedrock or glacial till is more than 6 feet. There are no carbonates in the upper 72 inches. The solum is more than 15 percent sand coarser than very fine sand, but loamy fine sand and fine sand are dominant in 90 percent of the soil between depths of 10 and 40 inches. The solum ranges from very strongly acid to neutral, and acidity decreases with increasing depth.

The Ap horizon has hue of 7.5YR and 10YR, value of 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR and 10YR, value of 4 to 6, and chroma of 2 to 6. Chroma decreases with increasing depth. Texture ranges from loamy fine sand to fine sand, but some subhorizons are very fine sand in places. Lamellae between depths of 24 and 120 inches generally contain more clay than the surrounding material. They occur as horizontal wavy lines that are ⅛ inch to 3 inches thick and range from a few inches to several feet apart. They have hue of 5YR and 7.5YR, value of 3 to 5, and chroma of 3 or 4. Strata of silty material are in some places. The silty strata and lamellae combined make up no more than 6 inches of the upper 60 inches of the soil.

Colonie soils formed in similar material and are in a drainage sequence with the moderately well drained Elnora soils and the poorly drained and somewhat poorly drained Junius soils. They are also closely associated with the Howard, Plainfield, and Hudson soils. Their sandy solum is in contrast to the very gravelly solum of Howard soils. They have brown lamellae, which Plainfield soils do not have. They formed in sandy sediment, unlike the Hudson soils, which formed in clayey sediment.

CoA—Colonie loamy fine sand, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but it has a thicker subsoil. It occupies deltas and lake plains. Areas are large and broad. They range from less than 25 to more than 200 acres in size.

Included with this soil in mapping are small areas of the wetter Elnora, Junius, and Granby soils in slightly lower positions on the landscape. Also included are small areas of Plainville soils and areas of soils that are similar to this Colonie soil but have more bands in the subsoil.

This Colonie soil is suited to row crops, hay, pasture, and trees. It can be used for most vegetable crops, but needs supplemental irrigation and heavy fertilization. Soil blowing is a hazard where the plant cover has been removed. The soil can be tilled early but is droughty in summer. Minimum tillage, cover crops, returning crop residue, plowing under green manure, and other practices are needed to maintain organic-matter content and stabilize soil structure. Many areas of this soil are used or will be used for industrial and urban development. Capability unit IIIs–1; woodland group 4s1.

CoC—Colonie loamy fine sand, 3 to 15 percent slopes. This undulating and rolling soil has the profile described as representative of the series. It occupies deltas and lake plains at higher elevations than adjacent soils, which formed in lacustrine silt and clay. Nearly 65 percent of this soil has slopes of more than 8 percent. Areas are generally large and broad. They range from less than 15 to more than 100 acres in size.

Included with this soil in mapping are small areas of Plainfield soils and soils similar to Colonie soils that have more bands in the subsoil. Also included are areas of Burdett and Nunda soils in the town of Niskayuna and spots of sandy soils that are 20 to 40 inches thick over compact glacial till.

Unless irrigated, this Colonie soil is best suited to deep-rooted or early-maturing crops. Soil blowing is a severe hazard where the plant cover has been removed. Irrigation is generally not feasible on the steeper, rolling slopes where erosion is a hazard. Because frequent tillage contributes to soil blowing, it should be limited to the amount needed to reestablish hay or pasture. Most areas of this soil are in urban or industrial developments or are wooded. Capability unit IVs–1; woodland group 4s1.

CPE—Colonie and Plainfield soils, steep. These soils have profiles similar to the ones described as representative of their respective series, but most of the surface layer has been removed through erosion. This mapping unit occupies hilly sand dunes, escarpments, and the walls of drainageways in deltas. Slopes range from 15 to 50 percent. Areas are generally long and narrow. They range from less than 10 to more than 50 acres in size. Some areas, however, are irregularly shaped and mostly less than 50 acres in size. Areas are Colonie soils or Plainfield soils, or both. The surface layer ranges from loamy fine sand to sand.

Included with this unit in mapping are small areas of similar soils that have more bands in the subsoil. Also included are small areas of Hudson soils in the lower parts of drainageways.

This mapping unit is too steep for crops or hay. It is better suited to limited pasture or woodland. It is best left in native vegetation. The hazard of erosion is severe. Capability unit VIIe–1; woodland group 4s2.

Copake Series

The Copake series consists of deep, nearly level, well-drained, medium-textured soils on low terraces that are 5 to 10 feet higher than the adjacent flood plain. They formed in a loamy mantle of glacial outwash that is underlain by water-sorted sand and gravel.

In a representative profile the surface layer is 8 inches of dark-brown silt loam. It has few small pebbles. The upper part of the subsoil is 10 inches of dark yellowish-brown, friable loam that is 5 percent gravel. The lower part of the subsoil to a depth of 27 inches is dark-brown, friable loam that is 5 percent gravel. The substratum to a depth of 54 inches is very dark grayish-brown, loose very gravelly loamy sand.

The water table is generally below a depth of 4 feet, even during wet periods. Roots penetrate to a depth of 36 inches or more. Permeability is moderately rapid in the subsoil and very rapid in the substratum. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen is medium and their capacity to supply phosphorus and potassium is low. The content of lime is low. Unless limed, the surface layer is medium acid.

Since applied lime and fertilizer are readily leached from these soils, small frequent applications give better response than large applications. Limitations in farming are few. Droughtiness is a hazard in dry periods. Very rapid permeability and occasional flooding are limitations in town and country planning.

A representative profile of Copake silt loam, in a cultivated field, 300 feet north of house at end of Rothmeyer Road, in Glen:

Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; many roots; 2 percent gravel; slightly acid; abrupt, smooth boundary.

B21—8 to 18 inches, dark yellowish-brown (10YR 4/4) loam; weak, medium, subangular blocky structure; friable; many roots; many pores; 5 percent gravel; medium acid; gradual, smooth boundary.

B22—18 to 27 inches, dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure in upper 5 inches, weak, thick, platy in lower 4 inches; friable; many roots; many pores; 5 percent gravel; medium acid; abrupt, smooth boundary.

IIC—27 to 54 inches, very dark grayish-brown (10YR 3/2) very gravelly loamy sand; loose; few roots; porous; 50 percent gravel; medium acid.

Thickness of the solum above the IIC horizon ranges from 20 to 36 inches. Depth to carbonates ranges from 40 to 80 inches. The content of fine gravel in the solum seldom is more than 5 percent. The content of coarse fragments in the IIC horizon ranges from 30 to 50 percent. The fragments are mainly gravel and some black shale.

The Ap horizon ranges from grayish brown (10YR 5/2) to dark brown (7.5YR 3/2). The B horizon ranges from brown (10YR 4/3) to light olive brown (2.5Y 5/6). It ranges from fine sandy loam to loam. Reaction is slightly acid or medium acid. The IIC horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3.

Copake soils are associated with soils that formed in alluvium, such as the well-drained Hamlin soils, the moderately well drained and somewhat poorly drained Teel soils, and the very poorly drained and poorly drained Wayland soils.

Cr—Copake silt loam. This nearly level soil occupies glacial outwash terraces that are 5 to 10 feet higher than the soils that formed in alluvium along Schoharie Creek. Areas are broad and irregularly shaped. Most are more than 50 acres in size.

Included with this soil in mapping are small, gently sloping areas of soils that are terrace breaks. These soils are shallower than this Copake soil and have more gravel in the surface layer.

This Copake soil is suited to row crops, hay, pasture, and woodland. If the soil is intensively cropped, minimum tillage, returning crop residue, green manure, and other management are needed. Occasional flooding is a hazard in places. Capability unit I–1; woodland group 3o1.

Darien Series

The Darien series consists of deep, nearly level to sloping, somewhat poorly drained, medium-textured soils on till plains. These soils formed in calcareous glacial till derived from limestone, black shale, sandstone, and granite.

In a representative profile the surface layer is 7 inches of dark grayish-brown silt loam. The thin, leached subsurface layer is 3 inches of mottled grayish-brown, friable silt loam. The upper part of the subsoil is mottled dark grayish-brown, firm, slightly plastic silty clay loam 5 inches thick. The lower part of the subsoil from a depth of 15 to 31 inches is dark-gray firm, plastic mottled silty clay loam. The calcareous substratum to a depth of 56 inches is dark gray and light olive-brown, firm shaly silty clay loam.

The water table is within 6 inches of the surface during wet periods. Root growth is mainly in the upper 20 inches of the soil, but roots extend to greater depths in dry periods. Available water capacity is moderate to high. The capacity of these soils to supply phosphorus is medium and their capacity to supply potassium and nitrogen is high. The content of lime is medium. Unless limed, the surface layer is medium acid.

Seasonal wetness, slow permeability, and slope are the main limitations in farming. Unless adequately drained, the choice of crops is restricted to water-tolerant, shallow-rooted species. Seasonal wetness and a slowly permeable subsoil are the main limitations in town and country planning.

Representative profile of Darien silt loam, 3 to 8 percent slopes, in a meadow, 50 feet east of Salt Springville Road and 1,900 feet north of Dingman Road, in Minden:

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

A2—7 to 10 inches, grayish-brown (2.5Y 5/2) silt loam; many (40 percent), fine and medium, prominent, yellowish-brown (10YR 5/6) mottles and few, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; friable; common roots; few large pores; few patchy clay linings in pores; 10 percent coarse fragments; medium acid; clear, wavy boundary.

B21gt—10 to 15 inches, dark grayish-brown (10YR 4/2) silty clay loam; many, medium and fine, distinct, brown (10YR 4/3) mottles; moderate, coarse, prismatic structure parting to moderate, medium, subangular blocky; firm, slightly plastic; few roots along faces of peds; common fine pores; gray (10YR 5/1) faces on peds that have a few patchy clay films; 15 percent coarse fragments; slightly acid; clear, wavy boundary.

B22gt—15 to 31 inches, dark-gray (10YR 4/1) silty clay loam; many (45 percent), fine distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure parting to moderate, fine, subangular blocky; firm, plastic; few roots along faces of peds; common fine pores; thin, continuous clay films on faces of prisms, discontinuous, patchy clay films on faces of peds; 15 percent coarse fragments; neutral; gradual, wavy boundary.

C—31 to 56 inches, dark-gray (10YR 4/1) and light olive-brown (2.5Y 5/4) shaly silty clay loam; weak,

thick, platy structure; firm; few roots in upper part; few fine pores that have clay linings; 20 percent coarse fragments; moderately alkaline; calcareous.

Thickness of solum ranges from 30 to 40 inches. Depth to carbonates ranges from 25 to 48 inches. The content of coarse fragments ranges from 5 to 30 percent. The fragments are mainly soft shale and some gravel. The Ap and A2 horizons range from strongly acid to neutral. The upper part of the B horizon ranges from strongly acid to neutral, but the lower part is neutral or mildly alkaline. The C horizon is mildly or moderately alkaline. It is calcareous in places.

The Ap horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (2.5Y 4/2). The Bt horizon has hue of 10YR or 2.5Y, value of 3, 4, or 5, and chroma of 1 to 3. The clay content ranges from 28 to 35 percent. The C horizon ranges from dark gray (10YR 4/1) to very dark grayish brown (2.5Y 3/2) and light olive brown (2.5Y 5/4). The content of coarse fragments, mainly gravel, ranges from 20 to 35 percent.

Darien soils are similar to the somewhat poorly drained Appleton soils, but have a higher percentage of clay in the Bt horizon. They do not have the silty mantle that is typical of Burdett soils. They are associated with Churchville and Madalin soils, both of which are on nearby glacial lake plains and have a clay content of more than 35 percent in the Bt horizon.

DaA—Darien silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but the surface layer is darker in color. The southernmost areas of this soil have an acid silty mantle that contains some channery fragments. This mantle is 3 to 12 inches thick and is 2 to 15 percent coarse fragments. The soil occupies broad flats and slightly depressional areas. Areas are irregularly shaped. Most are more than 30 acres in size.

Included with this soil in mapping are the wetter Ilion soils along small drainageways and in small depressions. Also included are small areas of Appleton soils that have a less clayey subsoil and Rhinebeck and Madalin soils that have small pockets of lacustrine sediment.

This Darien soil is suited to hay, pasture, and woodland. Seasonal wetness and slow permeability limit most uses. Choice of row crops is limited unless the soil is adequately drained. This soil is best suited to short-season crops and water-tolerant species where undrained. Surface drainage is generally more effective than tile drainage because the subsoil is slowly permeable. Capability unit IIIw–3; woodland group 3w3.

DaB—Darien silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. Areas in the southern part of Montgomery County have an acid silty mantle that contains some channery fragments. This mantle is 3 to 12 inches thick and is 2 to 15 percent coarse fragments. The soil occupies glacial till plains on uplands. Areas vary in shape. Some are broad, but most are longer than they are wide. Most areas are more than 40 acres in size. Many are larger than 200 acres.

Included with this soil in mapping are small areas of nearly level Darien soils. Also included are small areas of the wetter Ilion soils in depressions and along drainageways; small pockets of Churchville and Madalin soils, which formed in lacustrine sediment; and in a few southern areas small dome-shaped areas of Burdett soils, which have an acid silty mantle more than 13 inches thick.

This Darien soil is suited to hay, pasture, and woodland. Seasonal wetness, a slight hazard of erosion, and slow permeability are the main limitations for all uses. Selection of row crops is limited unless drainage is adequate. In the undrained areas water-tolerant species are better suited than others. Short-season crops are generally planted because this soil dries slowly in spring. Surface drainage is generally more effective than tile drainage because the subsoil is slowly permeable. Where possible, contour farming and diversions should be used to reduce the hazard of erosion. Capability unit IIIw–3; woodland group 3w3.

DaC—Darien silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but the subsoil is brighter in color. The soil occupies side slopes leading from higher, gently sloping areas. Areas are long and narrow and a few are larger than 15 acres in size.

Included with this soil in mapping are small areas of Lansing soils. Also included are a few small areas of Nunda soils in the southernmost areas.

This Darien soil is suited to row crops, hay, pasture, and woodland. Slope is the main limitation to farming. The hazard of erosion is moderate or severe if the soil is cultivated and not protected. Seasonal wetness and slow permeability are also important limitations. Wetness delays planting and limits selection of crops to sod crops that are tolerant of water. Where drained, the soils are suited to row crops, but contour planting, stripcropping, diversions, and other practices are needed to help control erosion. Capability unit IIIe–5; woodland group 3w3.

Elnora Series

The Elnora series consists of deep, nearly level, moderately well drained, coarse-textured soils on glacial lakes or deltas. These soils formed in wind- or water-deposited sand.

In a representative profile the surface layer is dark grayish-brown loamy fine sand 9 inches thick. The subsoil is yellowish-brown, very friable loamy fine sand to a depth of 14 inches. Below this it is mottled yellowish-brown, very friable loamy fine sand to a depth of 48 inches. The substratum to a depth of 54 inches is mottled light brownish-gray, loose loamy fine sand.

The water table is within 18 inches of the surface during wet periods. Permeability is rapid. Root growth is mainly within the upper 20 inches of the soil, but it is deeper in dry periods. Available water capacity is low. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low. The content of lime is low or very low. Unless limed, the surface layer is strongly acid.

Seasonal wetness and sandy texture are the main limitations in farming. Moderate to large applications of lime and fertilizer are needed. Because these nutrients are readily leached, small, frequent applica-

tions give better response than large applications. A seasonal high water table is the main limitation in town and country planning.

Representative profile of Elnora loamy fine sand, in a meadow, 75 yards northwest of State Highway 146 and 1/8 mile southwest of Curry Road, in Rotterdam:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, very fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.

B21—9 to 14 inches, yellowish-brown (10YR 5/6) loamy fine sand; weak, coarse, subangular blocky structure parting to weak, very fine, granular; very friable; common roots; medium acid; clear, wavy boundary.

B22—14 to 22 inches, yellowish-brown (10YR 5/6) loamy fine sand; common, medium, distinct, reddish-brown (5YR 4/4) mottles; weak, coarse, subangular blocky structure parting to weak, very fine, granular; very friable; common roots; medium acid; clear, wavy boundary.

B23—22 to 48 inches, yellowish-brown (10YR 5/4) loamy fine sand; many, medium and coarse, distinct, reddish-brown (5Y 4/4) mottles and common, medium, distinct, light-gray (10YR 7/2) mottles; weak, very fine, granular structure; very friable; common roots; medium acid; clear, irregular boundary.

C—48 to 54 inches, light brownish-gray (10YR 6/2) loamy fine sand; many, medium, distinct, strong-brown (7.5YR 5/6) mottles and common, medium, prominent, reddish-brown (5YR 4/4) mottles; single grained, loose; few roots; medium acid.

Thickness of the solum ranges from 48 to 60 inches. Depth to distinct mottles ranges from 12 to 36 inches. Low-chroma mottles are within a depth of 20 to 36 inches. The soil ranges from very strongly acid to medium acid, and acidity decreases with increasing depth. Reaction is medium acid at a depth of 40 inches and is medium or slightly acid below a depth of 50 inches.

The Ap horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2). The B horizon is dominantly yellowish brown but has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is dominantly loamy fine sand to a depth of 48 inches. Mottles have value and chroma mainly within the range of 4/4 to 6/6, but light-gray mottles are common. In places below a depth of 20 inches are streaks and blotches of dark reddish-brown material that is more coherent than the matrix.

Elnora soils are associated with Claverack, Colonie, and Junius soils. They do not have the contrasting finer textured horizon at a depth of 20 to 40 inches that Claverack soils have. Elnora soils are not so well drained as Colonie soils, but they are better drained and more acid than the poorly drained and somewhat poorly drained Junius soils.

En—Elnora loamy fine sand. This nearly level soil occupies glacial lakes and deltas. Areas are broad and irregularly shaped. They are generally large and average more than 40 acres in size. Areas of soils near the town of Glenville contain more medium and coarse sand than others.

Included with this soil in mapping are small areas of the wetter Junius and Granby soils in slightly depressional areas. Also included are a few areas of Colonie soils.

This Elnora soil is suited to row crops, hay, pasture, and woodland. The water table is high during some periods of the year, but the soil is droughty during long, dry periods. Minimum tillage, cover crops, crop residue, green manure, and other management are needed to maintain organic-matter content and stabilize structure. Capability unit IIIw–6; woodland group 4s1.

Farmington Series

The Farmington series consists of shallow, nearly level to moderately steep, well-drained, medium-textured soils on bedrock-controlled till plains. These soils formed in a thin mantle of glacial till over limestone bedrock (fig. 8).

In a representative profile the surface layer is dark-brown silt loam 8 inches thick. The subsoil is 8 inches of dark yellowish-brown, very friable silt loam. A few mottles occur near the bedrock. Hard fractured limestone bedrock is at a depth of 16 inches.

Early in spring the water table is below a depth of 4 feet in the fractured bedrock. Permeability is moderate. Root growth is mainly restricted to a depth of 10 to 20 inches, but tree roots penetrate to great depths in the many vertical cracks in the bedrock. Available water capacity is low. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is high. The content of lime is medium. Unless limed, the surface layer is slightly acid to neutral.

Shallowness and slope are the main limitations for many uses.

Representative profile of Farmington silt loam, 0 to 8 percent slopes, in a cultivated field, 10 yards north of Potters Road and 300 yards east of Touareuna Road, in Glenville:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; many roots; porous; 5 percent coarse fragments; neutral; abrupt, smooth boundary.

B2—8 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam; few, fine, faint, strong-brown (7.5YR 5/6) and dark-brown (7.5YR 4/4) mottles in lower part; weak, fine and medium, subangular blocky structure; very friable; common roots; many pores; 5 percent limestone fragments; neutral; abrupt, wavy boundary.

IIR—16 inches, hard limestone bedrock; fractured; many vertical cracks.

Thickness of the solum and depth to limestone bedrock rock both range from 10 to 20 inches. The content of coarse fragments ranges from 5 to 35 percent. The solum is mainly silt loam, but it ranges from fine sandy loam to loam. It ranges from medium acid to neutral in the upper 12 inches. The reaction is more alkaline with increasing depth and is neutral above the rock.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Mottles are common above the rock.

Farmington soils formed in similar material and are closely associated with the well drained and moderately well drained Wassaic soils and the poorly drained Joliet soils. They are also near the somewhat poorly drained Angola soils, which have clay accumulations in the B horizon and are underlain mainly by black shale bedrock.

FaB—Farmington silt loam, 0 to 8 percent slopes. This nearly level and gently sloping soil has the profile described as representative of the series. It occupies bedrock-controlled landforms. Areas are irregularly shaped and are more than 25 acres in size.

Figure 8.—View of Farmington-Rock outcrop association showing bare rock and thin mantle of soil material.

Included with this soil in mapping are small areas of soils that are less than 10 inches deep over bedrock. Also included are depressional areas of Joliet soils and small areas of Wassaic soils that have bedrock at a depth of 20 to 40 inches.

This Farmington soil is suited to hay, pasture, and woodland. If row crops are grown, they should be tolerant of drought. Hard limestone bedrock within 20 inches of the surface limits most uses. Use of tillage equipment is difficult in some areas because of the concealed bedrock. Sod-forming crops should be favored on this soil. When the soil is row cropped, minimum tillage is a good practice. Capability unit IIIs–2; woodland group 5d1.

FBD—Farmington-Rock outcrop association, moderately steep. This mapping unit occupies bedrock-controlled uplands. Rock outcrops of limestone are a prominent feature. Areas are irregularly shaped and range from about 25 acres to more than 150 acres in size.

This mapping unit is 45 percent Farmington soils, about 30 percent Rock outcrop, and 25 percent less extensive soils.

Farmington soils in this unit have a profile similar to the one described as representative of the series, but depth to bedrock varies over a short distance and rock outcrops are common. Intermingled throughout are exposures of limestone bedrock that make up the Rock outcrop part of the unit. In places there are short, nearly vertical, escarpments of bedrock; but, in general, slope for both the Farmington and Rock outcrop parts ranges from 0 to 25 percent.

Less extensive in this mapping unit are areas of similar, well-drained, very shallow soils near the fringe areas of exposed bedrock. A few areas of the deeper Wassaic soils are intermingled with the Farmington soils. A few small spots of the wetter Joliet soils occur in depressional areas.

The soils of this mapping unit are best suited to woodland and wildlife habitat. A few areas are used for limited spring pasture. Shallowness, droughtiness, and many rock outcrops limit most uses. Capability unit VIIs–2. Farmington soil in woodland group 5x1; Rock outcrop not assigned.

Fluvaquents

FL—Fluvaquents, loamy. This mapping unit consists of recent deposits of alluvial material. The deposits are frequently flooded, are generally wet, and are

subject to frequent changes because of flooding. The mapping unit occupies flood plains, mainly along smaller streams, but in places it is near large streams. Many areas are cut by old drainage channels. The soil material is stratified. It ranges from medium to coarse and varies greatly over short distances. Gravel and cobblestones are common.

This mapping unit is not suited to crops because it is subject to flooding, is wet, and varies in texture. Some areas are in pasture or wildlife habitat. Capability unit Vw–1; woodland group not assigned.

Fonda Series

The Fonda series consists of deep, nearly level, very poorly drained, moderately fine textured soils in wet depressional areas of lake plains. These soils formed in calcareous, glacial lake deposits of clay and silt.

In a representative profile an organic layer of black granular humus and undecomposed leaves 4 inches thick is on the surface. The surface layer is 6 inches of black, mucky silty clay loam. The upper part of the subsoil is 8 inches of mottled dark-gray, firm, very plastic silty clay 20 inches thick that has many distinct yellowish-brown mottles. The substratum to a depth of 50 inches is dark-gray, very plastic silty clay.

The water table is at the surface early in spring and seldom drops below a depth of 12 inches during dry periods. Unless the soil is drained, root growth is restricted to the upper 6 inches throughout most of the growing season, although roots may penetrate to a depth of 18 inches during the driest month. Excess water is a hazard. Where the soil is drained, available water capacity is moderate to high. Permeability is slow or very slow. The capacity of these soils to supply nitrogen is high, but in spring wetness prevents the release of nitrogen. The capacity to supply phosphorus is medium and their capacity to supply potassium is high. The content of lime is medium. Unless limed, the surface laver is medium acid.

Prolonged wetness is the main limitation for all uses. These soils are used for wildlife habitat or woodland.

Representative profile of Fonda mucky silty clay loam, in a forest, 500 yards west of Frederick Street and 500 yards north of Marshville Road, in Canajoharie:

O1—4 inches to 3, undecomposed leaves and twigs.

O2—3 inches to 0, black (10YR 2/1), granular humus; many large, medium, and small tree roots; strongly acid; abrupt, wavy boundary.

A1—0 to 6 inches, black (10YR 2/1), mucky silty clay loam; strong, coarse, prismatic structure parting to moderate, fine and medium, platy; firm; common roots; common large and medium pores; cracks between prisms, ¼ to ⅜ inch wide; many medium to large patches of pale-brown (10YR 6/3) highly decomposed leaves; slightly acid; abrupt, smooth boundary.

B21g—6 to 14 inches, dark-gray (10YR 4/1) silty clay; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, very coarse, prismatic structure; firm, very plastic; common roots; few large and medium pores; few, thin, discontinuous clay films on faces of prisms; slightly acid; gradual, smooth boundary.

B22g—14 to 34 inches, gray (10YR 5/1) silty clay; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; strong, coarse, prismatic structure; firm, very plastic; common roots in upper part and few roots below a depth of 24 inches; few medium pores; few clay films on peds and lining pores; continuous, yellowish-brown (10YR 5/4) stains along root channels; neutral; gradual, smooth boundary.

Cg—34 to 50 inches, dark-gray (N 4/0) silty clay; strong, thick, platy structure; firm, very plastic; few medium pores; common dark reddish-brown (2.5YR 3/4) stains; moderately alkaline; calcareous.

The solum ranges from 24 to 40 inches in thickness. It has an average clay content of 35 to 55 percent. There are no coarse fragments. Undisturbed areas have a 2- to 4-inch black O2 horizon.

The A horizon is black (10YR 2/1) or very dark brown (10YR 2/2). It is slightly acid or neutral.

The Bg horizon is dark gray (10YR 4/1) or gray (10YR 5/1). It is plastic or very plastic silty clay or clay. It ranges from slightly acid to mildly alkaline. There are common or many distinct mottles of higher chroma.

The C horizon is silty clay or clay. Varves of silt and clay or silty clay and clay are within a depth of 50 inches.

Fonda soils are in a drainage sequence with the moderately well drained and well drained Hudson soils, the somewhat poorly drained Rhinebeck soils, and the poorly drained and very poorly drained Madalin soils that formed in similar material.

Fo—Fonda mucky silty clay loam. This nearly level soil occupies depressional areas on lake plains in the south-central part of Montgomery County. Areas are saucer-shaped, large, and broad and are longer than they are wide. Most areas are larger than 30 acres in size. Only a few are smaller. In places, the surface layer is silt loam. In the southern part of the survey area silty clay loam till is at a depth of 24 to 40 inches in places.

Included with this soil in mapping are small areas of Palms muck. Also included are a few small, dome-shaped areas of Madalin soils.

This Fonda soil is best suited to woodland and wildlife habitat. A few areas are suited to summer pasture. Ponding or prolonged wetness combined with difficulties in artificial drainage of the soil severely limit its use. Because complete and effective drainage is difficult, hay and pasture seeding mixtures that are tolerant of wetness are generally best suited. Livestock and equipment traffic should be avoided when the soil is wet. Capability unit IVw–2; woodland group 5w1.

Fredon Series

The Fredon series consists of deep, nearly level, somewhat poorly drained and poorly drained, medium-textured soils on glacial outwash terraces. These soils formed in gravelly glacial outwash derived mainly from limestone, shale, sandstone, and granite.

In a representative profile the surface layer is 9 inches of dark grayish-brown silt loam that has some gravel. The subsoil is mottled light brownish-gray, friable gravelly silt loam to a depth of 19 inches. Below this it is olive-gray, friable very gravelly loam to a depth of 31 inches. The substratum is olive-gray sand and gravel to a depth of 45 inches and is dark grayish-brown, very friable coarse silt and very fine sand to a depth of 51 inches.

The water table is at or near the surface during wet periods. Permeability is moderate in the subsoil and rapid in the substratum. Root growth is mainly within the upper 18 inches of the soil, but roots penetrate to greater depths during dry periods. Available water capacity is moderate, but plants seldom show moisture stress during periods of normal rainfall. The capacity of these soils to supply nitrogen is generally high and their capacity to supply phosphorus and potassium is low to medium. The content of lime is low. Unless limed, the surface layer is medium acid.

Prolonged wetness is the main limitation in farming. The content of gravel is a secondary limitation. Where soils are drained and fertilized, crops grow well. Prolonged wetness is the main limitation in town and country planning.

Representative profile of Fredon silt loam, in an idle field, 25 yards south of Creek Road and 1¼ miles east of Schoharie County line, in Duanesburg:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish-gray (10YR 6/2) when dry; many, fine, distinct, dark-brown (7.5YR 4/4) mottles and common, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, very fine and fine, subangular blocky structure; very friable; many roots; many pores; 10 percent gravel; medium acid; abrupt, smooth boundary.

B21—9 to 19 inches, light brownish-gray (2.5Y 6/2) gravelly silt loam; many (45 percent), fine and medium, distinct, yellowish-brown (10YR 5/8) mottles and fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; common roots; many pores; 15 percent gravel; slightly acid; clear, wavy boundary.

B22g—19 to 31 inches, olive-gray (5Y 5/2) very gravelly loam; weak, medium, subangular blocky structure; friable; few roots; many pores; grayish-brown (2.5Y 5/2) faces on peds; 35 percent gravel; neutral; clear, wavy boundary.

IIC—31 to 45 inches, olive-gray (5Y 4/2) stratified sand and gravel; single grained; loose; neutral; abrupt, wavy boundary.

IIIC—45 to 51 inches, dark grayish-brown (10YR 4/2) stratified coarse silt and very fine sand; massive; very friable; few roots; moderately alkaline; calcareous.

The solum ranges from 22 to 35 inches in thickness. It ranges from sandy loam to silt loam that has 30 percent or more fine sand or coarser sand. The content of coarse fragments ranges from 10 to 20 percent in the upper part and from 15 to 35 percent in the lower part. The C horizon has as much as 60 percent gravel. Carbonates are at a depth of 3½ to 6 feet.

The Ap horizon has hue of 10YR to 2.5Y, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2. Mottles have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 4.

Fredon soils are in a drainage sequence with the well-drained to excessively drained Howard soils and the moderately well drained Phelps soils, which formed in similar material. They are associated with the poorly drained Ilion soils on nearby glacial till deposits. They are near the poorly drained and very poorly drained Madalin soils, which formed in lacustrine sediment.

Fr—Fredon silt loam. This nearly level soil occupies glacial outwash plains and terraces and glacial outwash fans. Areas are broad and irregularly shaped. Most average 20 acres or more in size.

Included with this soil in mapping are small depressional areas of soils that have underlying silt and clay deposits above a depth of 2 feet. Also included are small areas of the better drained Phelps soils.

This Fredon soil is best suited to hay, pasture, and woodland in its natural condition. When the soil is adequately drained, prolonged wetness is not a concern and most crops can be grown. They respond well to surface and subsurface drainage. Capability unit IIIw–1; woodland group 3w3.

Granby Series

The Granby series consists of deep, nearly level, poorly drained and very poorly drained, coarse-textured soils on outwash plains, deltas, and lake plains. These soils formed in water-sorted sandy deposits.

In a representative profile the surface layer is black loamy fine sand 11 inches thick. The substratum is mottled dark-gray loamy fine sand to a depth of 26 inches. Below this it is mottled dark-gray, loose sand to a depth of 50 inches.

The water table is at or near the surface most of the year. Permeability is rapid. Root growth is mainly in the upper 6 inches of the soil, but roots penetrate deeper during dry periods. Excess water is a hazard for all plants grown. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is low. The content of lime is medium to low. Unless limed, the surface layer is medium or slightly acid.

Prolonged wetness is the main limitation in farming. Drainage of these depressional soils is often impractical, because suitable outlets are difficult to locate. Very long and deep ditches are needed to get sufficient fall for drainage. Prolonged wetness and the high water table are the main limitations in town and country planning.

Representative profile of Granby loamy fine sand, in an idle field, 50 yards south of Weise Road and 250 yards east of Swaggertown Road, in Glenville:

Ap—0 to 11 inches, black (10YR 2/1) loamy fine sand; weak, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

C1g—11 to 26 inches, dark-gray (5Y 4/1) loamy fine sand; few, medium, distinct, light brownish-gray (2.5Y 6/2) mottles; massive; very friable; few roots; 3 percent gravel; neutral; gradual, wavy boundary.

C2g—26 to 50 inches, dark-gray (5Y 4/1) sand; few, medium, distinct, light brownish-gray (2.5Y 6/2) mottles; single grained; loose; few roots; 5 percent gravel; neutral.

Depth to carbonates is generally less than 6 feet. The content of coarse fragments in the solum and in the C horizon is not more than 5 percent. The fragments are mainly small pebbles. The upper 30 inches ranges from medium acid to neutral, and the upper part of the substratum ranges from neutral to moderately alkaline.

The A horizon is dominantly black (10YR 2/1) or very dark gray (10YR 3/1). The C horizon has hue of 10YR, 2.5Y, or 5Y; value of 4, 5, or 6; and chroma of 1 or 2. It generally has few or common mottles that have chroma of 1 to 6. The C horizon is mainly sand but ranges to loamy fine sand.

Granby soils formed in similar material and are in a drainage sequence with the excessively drained Plainfield

soils. They also are closely associated with the well drained to excessively drained Colonie soils, the moderately well drained Elnora soils, and the poorly drained and somewhat poorly drained Junius soils. In some areas, Granby soils are near the poorly drained Cheektowaga soils, which have lacustrine sediment at a depth of 20 to 40 inches.

Gr—Granby loamy fine sand. This nearly level soil occupies depressional areas on outwash plains and lake plains. It is also in drainageways. Areas generally are saucer-shaped. Most average 5 to 25 acres in size. A few small, isolated areas are fine sandy loam throughout. Included in mapping are small areas of Junius and Cheektowaga soils.

This Granby soil is best suited to woodland unless drained. Prolonged wetness or ponding limits all uses. Soil blowing may be a hazard where the soil is drained and intensively cropped. Drainage systems can be installed, but in some cases they are very costly. Where outlets are available, the soil can generally be effectively drained by surface or subsurface drainage or both. Capability unit IVw–6; woodland group 4w2.

Hamlin Series

The Hamlin series consists of deep, nearly level, well-drained, medium-textured soils mainly along the larger streams. These soils formed in recent alluvium on flood plains.

In a representative profile the surface layer is very dark gray silt loam 10 inches thick. The subsoil is very dark grayish-brown, friable silt loam to a depth of 24 inches. Below this it is dark-brown, friable silt loam to a depth of 37 inches. The substratum to a depth of 70 inches is dark-brown, friable silt loam.

Hamlin soils are subject to flooding, but rarely during the growing season. The water table is 36 inches or more below the surface except during periods of flooding. Permeability is moderate. Root growth is mainly in the upper 40 inches of the soil. Available water capacity is high. The capacity of these soils to supply nitrogen is high to medium and their capacity to supply phosphorus and potassium is medium. The content of lime is medium. Unless limed, the surface layer is slightly acid or neutral.

Other than the rare flooding during the growing season, limitations in farming are few. Flooding is also a hazard in town and country planning.

Representative profile of Hamlin silt loam, in a cultivated field, 200 feet north of the Mohawk River and 300 feet west of Knauderack Creek, in Palatine:

Ap—0 to 10 inches, very dark gray (10YR 3/1) silt loam, light brownish-gray (10YR 6/2) when dry, very dark grayish-brown (10YR 3/2) when crushed; weak, coarse and medium, granular structure; friable; common roots; neutral; gradual, smooth boundary.

B21—10 to 24 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when crushed; weak, medium, prismatic structure parting to moderate, medium and fine, subangular blocky; friable; common roots; many medium fine pores; many earthworm channels; neutral; diffuse, wavy boundary.

B22—24 to 37 inches, dark-brown (10YR 3/3) silt loam, brown (10YR 4/3) when crushed; weak, medium, prismatic structure parting to moderate, coarse and medium, subangular blocky; friable; common roots; many fine and medium pores; many earthworm channels; neutral; diffuse, wavy boundary.

C—37 to 70 inches, dark-brown (10YR 3/3) silt loam; weak, thick, platy structure; friable; common roots; many medium and fine pores; neutral.

Thickness of the solum ranges from 24 to 40 inches. The content of coarse fragments ranges from none to few between depths of 10 and 40 inches. The upper 20 inches is slightly acid or neutral, and the next 20 inches is neutral or mildly alkaline.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1, 2, or 3. The B horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is mainly silt loam but ranges to very fine sandy loam. The C horizon has hue of 10YR or 7.5YR, value of 3, 4, or 5, and chroma of 2 or 3. It is mainly silt loam but ranges to fine sandy loam.

Hamlin soils formed in similar material and are in a drainage sequence with the moderately well drained to somewhat poorly drained Teel soils and the poorly drained and very poorly drained Wayland soils. The well-drained, gravelly Howard and Copake soils are on nearby terraces.

Ha—Hamlin silt loam. This nearly level soil occupies the better drained part of the flood plains along streams and creeks. Areas are long and irregularly shaped. Many areas are more than 25 acres in size. Some are much smaller or larger. In areas along streams in the uplands of Schenectady County, this soil is more acid than in other parts of the survey area.

Included with this soil in mapping are small depressional areas of the wetter Teel soils. Also included are small wet areas of Wayland soils that are indicated on the map by a wet spot symbol.

This Hamlin soil is suited to row crops, hay, pasture, and woodland. It is subject to flooding, particularly early in spring when blocks of ice clog the streams. Special measures are needed in places to prevent stream bank cutting. Continuous rowcropping is feasible without damage to the soil if minimum tillage, returning crop residue and green manure, and other management are used to maintain organic-matter content, good soil structure, and good water-intake rate. Capability unit I–1; woodland group 2o2.

Herkimer Variant

The Herkimer variant consists of deep, well drained and moderately well drained, medium-textured soils on alluvial fans. These soils formed in old alluvium derived from dark-colored, calcareous shale that is underlain by calcareous, stratified sand, shale, and gravel.

In a representative profile the surface layer is 9 inches of dark-brown shaly silt loam. The upper part of the subsoil is 9 inches of dark-brown, friable shaly silt loam. The lower part of the subsoil is very dark grayish-brown, friable shaly silt loam 11 inches thick. The substratum to a depth of 52 inches is brown and yellowish-brown, calcareous gravelly sand.

The water table is within 24 inches of the surface early in spring but recedes to greater depths during dry periods. Permeability is moderate in the solum and rapid in the substratum. Root growth is mainly in the upper 30 inches of the soil, but roots penetrate deeper. Available water capacity is low to moderate.

The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is high. Unless limed, the surface layer is slightly acid or neutral.

Limitations in farming are slight. Coarse fragments may interfere with precision tillage of some crops. Since nutrients are readily leached from this soil, crops respond better to small, frequent applications of fertilizer than to large applications. Rapid permeability in the substratum and coarse fragments are the main limitations in town and country planning.

Representative profile of Herkimer shaly silt loam, calcareous subsoil variant, 230 feet southwest of the junction of Gunnerson and Hickory Hill Roads, in Mohawk:

Ap—0 to 9 inches, dark-brown (10YR 3/3) shaly silt loam, light brownish-gray (10YR 6/2) when dry; moderate, medium and fine, granular structure; friable; many roots; porous; 20 percent coarse fragments; slightly acid; abrupt, smooth boundary.

B21—9 to 18 inches, dark-brown (10YR 3/3) shaly silt loam; moderate, medium and fine, granular structure; friable; many roots; many pores; 25 percent coarse fragments; slightly acid; gradual, smooth erately alkaline; calcareous.

B22—18 to 29 inches, very dark grayish-brown (10YR 3/3) shaly silt loam; moderate, fine, subangular blocky structure; friable; many roots; many large and medium pores; very few patchy clay films on peds and in pores; 30 percent coarse fragments; neutral; abrupt, wavy boundary.

IIC—29 to 52 inches, brown (10YR 5/3) and yellowish-brown (10YR 5/4) gravelly sand; stratified; single grained; loose; 70 percent coarse fragments, nearly half very dark gray (10YR 3/1) shale; moderately alkaline; calcareous.

Thickness of the solum ranges from 20 to 36 inches. Depth to carbonates is nearly the same. The content of coarse fragments ranges from 10 to 35 percent. The fine earth fraction is silt loam or loam. The solum is slightly acid or neutral.

The Ap horizon ranges from very dark grayish brown (2.5Y 3/2) to black (10YR 2/1) and dark brown (10YR 3/3). The B horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3. The C horizon ranges from very dark grayish brown (2.5Y 3/2) to dark yellowish brown (10YR 4/4) in deeper deposits. In shallower deposits where it is stratified sand, shale, and gravel, it is brighter colored. It ranges from dark grayish brown (2.5Y 4/2) to yellowish brown (10YR 5/4).

Herkimer soils in the survey area differ from Herkimer soils in other areas by being more alkaline in reaction and by having formed in coarse loamy, water-sorted deposits that average less than 40 inches in depth. These factors do not affect use and management of the soils.

Herkimer soils are associated with the gravelly and medium-textured Phelps, Fredon, and Granby soils and with the excessively drained Plainfield soils, which developed in coarse-textured sandy deposits. Herkimer soils do not have a Bt horizon, which the moderately well drained Phelps soils have. They are well drained and moderately well drained, unlike the Fredon and Granby soils, which are much wetter.

He—Herkimer shaly silt loam, calcareous subsoil variant. This gently sloping soil occupies shaly and gravelly alluvial fans on uplands. The surface layer has a high percentage of fragments of dark shale. Some areas have more gravel than shale fragments. Areas are broad and irregularly shaped. There are only a few areas of this soil. They range from 15 to 30 acres in size.

Included with this soil in mapping are a few small areas where the soil is less than 2 feet of outwash material over stratified sand, small areas of adjacent Plainfield soils, and areas of Fredon soils in a few small depressions.

This Herkimer soil is suited to row crops, hay, pasture, and woodland. Many dairy farms are on this soil (fig. 9). A moderate hazard of erosion and droughtiness are the main limitations to farming. Fragments of shale and gravel may interfere with precision tillage. When the soil is intensively row cropped, contour planting and stripcropping, minimum tillage, and crop residue are needed. Capability unit IIe–1; woodland group 2o1.

Hollis Series

The Hollis series consists of shallow, gently sloping to moderately steep, somewhat excessively drained, medium-textured soils. These soils formed in thin glacial till on bedrock-controlled till plains. Granite bedrock is within 10 to 20 inches of the surface.

In a representative profile the surface layer is very dark grayish-brown very fine sandy loam 4 inches thick. The upper 5 inches of the subsoil is very friable, dark yellowish-brown fine sandy loam. The lower 5 inches is yellowish-brown, very friable fine sandy loam. Granite bedrock is at a depth of 14 inches.

The water table is deep and is within the bedrock. Permeability is moderately rapid. Root growth is within a depth of 10 to 20 inches. Available water capacity is very low to low. The capacity of these soils to supply nitrogen is medium and their capacity to supply phosphorus and potassium is low. The content of lime is low. Unless limed, the surface layer is strongly acid.

Shallowness to bedrock and droughtiness are the main limitations in farming. This soil generally is better suited to woodland or wildlife habitat than to other uses. Bedrock at shallow depths is the main limitation in town and country planning.

Representative profile of Hollis very fine sandy loam, in an area of Hollis-Rock outcrop association, sloping; in an idle field, 200 feet west of Hinkle Road and ¼ mile north of Indian Road, in Palatine:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) very fine sandy loam, dark brown (10YR 3/3) when crushed; weak, fine, granular structure; very friable; many roots; 5 percent gravel; strongly acid; clear, smooth boundary.

B21—4 to 9 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; moderate, medium, granular structure; very friable; many roots; 8 percent gravel; strongly acid; clear, smooth boundary.

B22—9 to 14 inches, yellowish-brown (10 YR 5/6) fine sandy loam; weak, coarse, subangular blocky structure; very friable; common roots; 8 percent gravel; strongly acid; abrupt, smooth boundary.

IIR—14 inches, hard granite bedrock.

Thickness of the solum and depth to bedrock both range from 10 to 20 inches. The content of coarse fragments ranges from 2 to 10 percent in the upper 8 inches to as much as 15 percent in the lower part. The fragments are mainly gravel. The solum is dominantly fine sandy loam but is also light loam or sandy loam. It is strongly acid or very strongly acid throughout.

Figure 9.—Dairy farm on Herkimer soils.

The A1 horizon is generally very dark grayish brown (10YR 3/2) but has value of 2 to 4 and chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. All horizons are very friable or friable.

Hollis soils are associated with the adjacent Farmington and Wassaic soils. Hollis soils are coarse textured and are shallow over granite bedrock, whereas Farmington and Wassaic soils are medium textured and are shallow and moderately deep over limestone bedrock.

HGC—Hollis-Rock outcrop association, sloping. This gently sloping to moderately steep mapping unit occupies bedrock-controlled areas. It is about 60 percent Hollis soils and 40 percent Rock outcrop. Areas are large and irregularly shaped. Many are larger than 30 acres in size. The unit is mainly sloping, but ranges to gently sloping and moderately steep.

Included with this unit in mapping are small depressional areas of wetter soils that are indicated on the map by a wet spot symbol. Also included are areas of very shallow soils near bedrock outcrops and some adjacent areas that contain small amounts of Farmington or Wassaic soils.

The soils of this mapping unit are best suited to woodland. Some areas are suited to limited permanent pasture. Droughtiness, shallowness, and many rock outcrops limit most uses. Capability unit VIIs–2; Hollis soil in woodland group 5x1; Rock outcrop part not assigned.

Hornell Series

The Hornell series consists of moderately deep, nearly level to sloping, somewhat poorly drained or moderately well drained, medium-textured soils on bedrock-controlled uplands. These soils formed in acid glacial till derived from sandstone and shale that is underlain by shale bedrock at a depth of 20 to 40 inches.

In a representative profile the surface layer is 4 inches of very dark grayish-brown silt loam. The subsurface layer is 4 inches of friable, grayish-brown silt loam. The subsoil extends to a depth of 27 inches. The upper 6 inches is mottled yellowish-brown, firm silty clay loam. The next 8 inches is mottled strong-brown, firm, plastic silty clay. The lower 5 inches is mottled dark yellowish-brown, firm silty clay. The substratum extends to a depth of 32 inches. It is dark yellowish-brown and dark-gray, firm silty clay loam that has soft shale fragments. The underlying bedrock from a depth of 32 to 50 inches and below is very

dark gray to dark grayish-brown, soft, thin-bedded shale.

The water table is within 10 inches of the surface during wet periods. Root growth is mainly in the upper 18 inches of the soil. Available water capacity is moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low. Unless limed, the surface layer is very strongly acid.

Seasonal wetness, shallowness to bedrock, and very slow permeability are the main limitations in farming. Because bedrock is within a depth of 20 to 40 inches, areas of this soil are difficult to drain artificially. Seasonal wetness and shallowness to bedrock are the main limitations in town and country planning.

Representative profile of Hornell silt loam, 3 to 8 percent slopes, in a forest, 150 feet west of Anderson Road and 2,050 feet north of Yatesville Creek Road, in Root:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine and medium, granular structure; very friable; many roots; porous; no coarse fragments; very strongly acid; abrupt, smooth boundary.

A2—4 to 8 inches, grayish-brown (2.5Y 5/2) silt loam; weak, medium, granular structure; friable; many roots; porous; strongly acid; gradual, smooth boundary.

B21—8 to 14 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, faint, strong-brown (7.5YR 5/6) mottles and common, coarse, distinct, light brownish-gray (10YR 6/2) mottles; weak, coarse, prismatic structure parting to moderate, medium and coarse, subangular blocky; firm, plastic; common roots; many medium and fine pores; pale-brown (10YR 6/3) silt coatings on many faces of peds; strongly acid; gradual, smooth boundary.

B22—14 to 22 inches, strong-brown (7.5YR 5/6) silty clay; many, coarse, faint, yellowish-brown (10YR 5/6) mottles and common, coarse, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, prismatic structure; firm, plastic, and slightly sticky; few roots; many medium and fine pores; grayish-brown (10YR 5/2) silt coatings on faces of peds; strongly acid; gradual, wavy boundary.

B3—22 to 27 inches, dark yellowish-brown (10YR 4/4) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles and common, coarse, distinct, dark-gray (10YR 4/1) mottles; strong, very coarse, prismatic structure; firm, plastic; few fine and medium pores; dark-gray (10YR 4/1) silt coatings on faces of peds; strongly acid; abrupt, smooth boundary.

C—27 to 32 inches, dark-gray (10YR 4/1) and dark yellowish-brown, (10YR 4/4) highly weathered silty clay loam, arranged in very thin, parallel beds, seldom more than ¼ inch thick; firm; 10 to 15 percent weak, soft fragments of shale that disperse upon shaking; medium acid; abrupt, smooth boundary.

IIR—32 to 50 inches, very dark gray (10YR 3/1) and dark grayish-brown (10YR 4/2), thin-bedded, soft shale; individual beds seldom more then ¼ inch thick; strongly acid when powdered.

Thickness of the solum ranges from 20 to 36 inches, and depth to soft or hard shale bedrock ranges from 20 to 40 inches. The solum is strongly or very strongly acid. The B horizon has an average clay content of more than 35 percent. Soft weathered shale fragments are few in the A horizon and average 10 to 20 percent in the B horizon. Hard coarse fragments are less than 10 percent in all horizons.

The A horizon ranges from grayish brown (10YR 5/2) to very dark grayish brown (2.5Y 3/2). The B horizon ranges from olive (5Y 4/3) to strong brown (7.5YR 5/6). It has many distinct to prominent mottles of redder hue or higher chroma, as well as few to many distinct to prominent mottles of lower chroma. It is silty clay loam or silty clay that is slightly sticky or sticky and slightly plastic or plastic. A thin C horizon that has many gray colors and common mottles of higher chroma occurs in places. It ranges from silty clay loam to clay.

Hornell soils are closely associated with the somewhat poorly drained Brockport soils, which formed in similar material but have a slightly higher reaction and have clay accumulation in the B horizon. Hornell soils are finer textured and have fewer coarse fragments than the associated Angola, Arnot, Varnick, and Tuller soils.

HoA—Hornell silt loam, 0 to 3 percent slopes. This nearly level soil occupies bedrock-controlled landforms. Areas are broad and irregularly shaped and average 20 acres in size. Included in mapping are small depressional areas of Brockport and Tuller soils.

This Hornell soil is best suited to hay, pasture, and woodland. Water-tolerant crops do fairly well on this soil. Seasonal wetness and depth to bedrock are the main limitations for all uses. Drainage systems for the wettest areas are often impractical because the bedrock at a depth of 20 to 40 inches generally interferes with installation. When the soil is adequately drained, most row crops can be grown. Capability unit IIIw–5; woodland group 3w1.

HoB—Hornell silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies bedrock-controlled landforms on uplands. Areas are broad and irregularly shaped and range from 10 to 40 acres in size.

Included with this soil in mapping are small areas of Brockport and Tuller soils in depressions and along drainageways. Also included are small areas of Arnot and Manlius soils on steeper breaks and Angola and Varick soils that have a 20- to 40-inch smear of till over bedrock.

This Hornell soil is best suited to hay, pasture, and woodland. Seasonal wetness and depth to bedrock are the main limitations for use. When the soil is adequately drained, most row crops can be grown. Shallow-rooted, water-tolerant crops are best. Where the soil is row cropped, contour farming and diversions should be used where practical to reduce the hazard of erosion. Capability unit IIIw–5; woodland group 3w1.

HoC—Hornell silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but it is generally better drained. This soil occupies bedrock-controlled landforms on uplands. Areas are irregularly shaped. They range from less than 10 acres to more than 75 acres in size.

Included with this soil in mapping are small areas of Arnot, Manlius, and Lordstown soils. Also included are Brockport and Varick soils along a few drainageways.

This Hornell soil is best suited to hay, pasture, and woodland. The hazard of erosion is severe. This soil tends to be slightly droughty during long, dry periods.

Bedrock at a depth of 20 to 40 inches limits its use. Maintaining the soil in good sod cover and planting on the contour are needed for erosion control. Capability unit IIIe–9; woodland group 3w3.

Howard Series

The Howard series consists of deep, nearly level to very steep, well-drained to excessively drained, medium-textured gravelly soils on glacial outwash terraces and kames along the Mohawk River and its larger tributaries. These soils formed in calcareous glacial outwash derived mainly from sandstone, limestone, shale, and granite.

In a representative profile the surface layer is very dark grayish-brown gravelly silt loam 9 inches thick. The subsoil is friable, strong-brown very gravelly sandy loam to a depth of 19 inches. Below this it is friable and very friable, dark-brown very gravelly sandy loam to a depth of 60 inches. The substratum to a depth of 64 inches is loose, dark-brown very gravelly loamy sand.

The water table generally is several feet below the surface, but it sometimes fluctuates to within 3½ feet of the surface. Permeability is moderate to rapid in the subsoil and very rapid in the substratum. Root growth is not restricted but is mainly in the upper 30 inches of the soil. Available water capacity is very low to moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low to medium. Unless limed, the surface layer is strongly acid to slightly acid. Applied lime and fertilizer are readily leached from these soils.

Slope and lack of moisture are the main limitations in farming. The gravel or cobbles in the surface layer interfere with precision tillage and the harvesting of some crops, such as potatoes. These soils are a good source of sand and gravel.

Representative profile of Howard gravelly silt loam, 0 to 3 percent slopes, in an abandoned orchard on Vley Road, 100 yards southeast of State Highway 5, in Glenville:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) gravelly silt loam; moderate, fine and medium, granular structure; very friable; many roots; 25 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B21—9 to 19 inches, strong-brown (7.5YR 5/6) very gravelly sandy loam; weak, fine and medium, subangular blocky structure; friable; many roots; many pores; 70 percent coarse fragments; medium acid; gradual, wavy boundary.

B22t—19 to 50 inches, dark-brown (7.5YR 4/4) very gravelly sandy loam; very weak, medium, subangular blocky structure; friable; many roots; many pores; thin, patchy clay films in pores; very pale brown (10YR 7/3) coatings, 1 to 2 millimeters thick, on peds in upper part of horizon; 60 percent coarse fragments; slightly acid; gradual, wavy boundary.

B3—50 to 60 inches, dark-brown (10YR 3/3) very gravelly sandy loam; weak, very fine and fine, granular structure; very friable; many roots; many pores; thin, patchy clay films on pebbles; 65 percent coarse fragments; neutral; diffuse, wavy boundary.

C—60 to 64 inches, dark-brown (10YR 3/3) very gravelly loamy sand; single grained; loose; few roots; many pores; 60 percent coarse fragments; moderately alkaline; calcareous.

Thickness of the solum ranges from 30 to 60 inches. Depth to carbonates is the same. The solum ranges from strongly acid to neutral, and acidity generally decreases with increasing depth. Depth to contrasting material such as glacial till or bedrock is more than 4 feet. The content of coarse fragments ranges from 20 to 30 percent in the A horizon and averages more than 35 percent in the solum. The fragments are mainly gravelly and cobbly.

The A horizon ranges from dark grayish brown to brown. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B21 horizon ranges from strong brown to brown. It has hue of 7.5YR and 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth fraction ranges from sandy loam to loam. The B2t horizon is mainly brown or dark brown. It has hue of 10YR and 7.5YR, value of 3 to 5, and chroma of 2 to 4. The fine earth fraction ranges from sandy loam to light sandy clay loam.

The C horizon is mainly dark brown or dark grayish brown. It has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. It is mostly stratified sand or loamy sand and gravel, but it has thin layers of silt and very fine sand in places.

Howard soils formed in similar material and are in a drainage sequence with the moderately well drained Phelps soils and the somewhat poorly drained or poorly drained Fredon soils. They are also similar to Palmyra and Alton soils. In contrast with Palmyra soils they have a thicker solum and the Bt horizon is more than 35 percent coarse fragments. They have a Bt horizon, but Alton soils do not.

HrA—Howard gravelly silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies glacial outwash terraces and fans. Areas are long and narrow along the Mohawk River in Montgomery County and in the western part of Schenectady County. Larger and broader areas are in the eastern part of Schenectady County. Areas range from less than 15 to more than 100 acres in size.

Included with this soil in mapping are small areas of the wetter Phelps and Fredon soils in low areas that are adjacent to areas of soils that formed in glacial till. Also included are spots of similar Palmyra soils, mainly in Montgomery County; areas of sandy Colonie soils in Schenectady County, and small areas of a similar but more acid soil.

This Howard soil is suited to row crops, hay, pasture, and woodland. It is well suited to most crops grown in the area. Alfalfa does especially well. The soil can be tilled easily, but tends to be droughty during long, dry periods. In Schenectady County many areas of this soil have been developed for industrial and urban use. Where the soil is intensively row cropped, minimum tillage, returning crop residue and green manure, and other measures help to maintain good tilth. Capability unit IIs–1; woodland group 2o1.

HrB—Howard gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but in places it has a thinner subsoil. This soil occupies undulating and smoothly sloping areas on glacial outwash terraces. Areas are long and narrow or irregularly shaped and range from 10 to 50 acres in size.

Included with this soil in mapping are small areas of similar but wetter Phelps and Fredon soils in depressions and along drainageways. Also included are

spots of similar Palmyra soils, mainly in Montgomery County; sandy Colonie soils in Schenectady County; and areas of a similar but more acid soil.

This Howard soil is suited to row crops, hay, pasture, and woodland. It is well suited to most crops grown in the area. Alfalfa does especially well. The soil can be tilled early but tends to be droughty during long, dry periods. The hazard of erosion is slight if the soil is cultivated and not protected. Where practical, contour measures and diversions help to control erosion. Minimum tillage and returning crop residue and green manure help to maintain tilth. Capability unit IIs–1; woodland group 2o1.

HrC—Howard gravelly silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but in most places it has a thinner subsoil, and the surface layer contains more gravel. This soil occupies escarpments and kames on glacial outwash terraces. Areas are irregularly shaped or long and narrow. They range from 5 to 30 acres in size.

Included with this soil in mapping are small areas of eroded soils that have a surface layer of gravelly or very gravelly fine sandy loam or loam.

This Howard soil is suited to row crops, hay, pasture, and woodland. It is well suited to alfalfa. The hazard of erosion is moderate where the soil is cultivated and not protected. The soil is droughty during long, dry periods. If it is row cropped, contour farming and diversions are needed. Minimum tillage, green manure, and cover crops are also important. Capability unit IIIe–8; woodland group 2o1.

HrD—Howard gravelly silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but in some places it has a thinner subsoil, and the surface layer contains more gravel. This soil occupies escarpments and kames on glacial outwash terraces. Areas are irregularly shaped or long and narrow. They seldom are larger than 25 acres.

Included with this soil in mapping are small areas of eroded soils that have a surface layer of gravelly or very gravelly sandy loam or loam. Also included are spots of Lansing and Mohawk soils that formed in glacial till along valley sides.

This Howard soil is best suited to hay, pasture, and woodland. It is poorly suited to cultivated crops because slopes are moderately steep and the hazard of erosion is very severe. Also, the soil is droughty during long, dry periods. Contour or cross-slope tillage helps control erosion when renovating to reestablish hay or pasture. Periodic renovation to improve plant density helps to control erosion. Capability unit IVe–1; woodland group 2r2.

HTF—Howard soils, very steep. These steep and very steep soils occupy terrace escarpments and the sides of drainage cuts through glacial outwash terraces. Slopes range from 25 to 70 percent. Areas are long and narrow. They range from about 10 to more than 50 acres in size. These soils have a surface layer of cobbly, gravelly, or very gravelly fine sandy loam and loam.

Included with these soils in mapping are small areas of Lansing, Mohawk, and Nunda soils that formed in glacial till along valley sides. They occupy landscapes above, within, and at the bases of Howard soils.

These Howard soils are too steep for cropping. They are better suited to woodland. The less sloping soils are suited to limited early pasture. Runoff is very rapid. The hazard of erosion is severe if the soils are left without protective cover. The soils are very droughty, and it is difficult to establish vegetation. Capability unit VIIe–1; woodland group 2r5.

Hudson Series

The Hudson series consists of deep, gently sloping to very steep, moderately well drained and well drained, moderately fine-textured soils. These soils formed in calcareous, glacial lake deposits of silt and clay.

In a representative profile the surface layer is dark grayish-brown silty clay loam 6 inches thick. Below this layer is 6 inches of dark-brown, friable silty clay loam. The subsoil is mottled dark-brown, firm silty clay that extends to a depth of 26 inches. The substratum to a depth of 50 inches is layers of brown, calcareous silt and clay.

Seasonally the water table is perched on the slowly or very slowly permeable clayey subsoil and substratum, and ground water is at a depth of about 1 ½ to 2 feet. Root growth is somewhat restricted by the dense clayey subsoil. It is mainly in the upper 24 to 36 inches of soil where available water capacity is moderate to high. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is high. The content of lime is medium to high. Unless limed, the surface layer is medium acid.

Slope and slow or very slow permeability are the main limitations in farming. The gentle slopes are subject to slight seasonal wetness. It is difficult to maintain tilth. Long-term rotations and a cropping system in which stands of hay or pasture are maintained help to keep the soil in good tilth. Slope, unstable soil material, and slow or very slow permeability are the main limitations in town and country planning.

Representative profile of Hudson silty clay loam, 8 to 15 percent slopes, in a pasture, 75 yards north of State Highway 5 and 100 yards west of Liska Kill, in Nishayuna:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silty clay loam; moderate, medium and coarse, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B&A—6 to 12 inches, dark-brown (10YR 4/3) silty clay loam; few, medium, faint, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; many roots; many fine pores; brown (10YR 5/3) coatings on peds, light-gray (10YR 7/2) when dry; medium acid; clear, wavy boundary.

B21t—12 to 19 inches, dark-brown (10YR 4/3) silty clay; few, medium, distinct, brown (7.5YR 4/4) mottles; strong, fine and medium, subangular blocky structure; firm; common roots; many fine pores; pale-brown (10YR 6/3) silt coatings, 1 to 2 millimeters thick, on faces of peds in upper part of horizon; medium acid; clear, wavy boundary.

B22t—19 to 26 inches, dark-brown (10YR 4/3) silty clay; many, medium and coarse, distinct, brown (7.5YR

4/4) mottles; strong, fine and medium, subangular blocky structure; firm, plastic; common roots; many fine pores; patchy clay films on faces of peds; neutral; abrupt, wavy boundary.

C—26 to 50 inches, brown (10YR 5/3) layers of clay and silt; moderately alkaline; calcareous.

Thickness of the solum ranges from 24 to 40 inches. Depth to carbonates ranges from 30 to 48 inches. The solum ranges from medium acid to neutral.

The Ap horizon is generally dark grayish brown (10YR 4/2) but in places is brown (10YR 5/3). The B horizon has hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4. It is silty clay, clay, or silty clay loam. The B horizon has a clay content of more than 35 percent. The C horizon is brown (10YR 5/3) or dark grayish-brown (2.5Y 4/2) layers of clay and silt. Varves are evident below a depth of 40 inches.

Hudson soils formed in similar material and are in a drainage sequence with the somewhat poorly drained Rhinebeck soils, the poorly drained and very poorly drained Madalin soils, and the very poorly drained Fonda soils.

HuB—Hudson silty clay loam, 3 to 8 percent slopes. This gently sloping soil occupies small knolls and dome-shaped areas of lake sediment. Areas are small and are scattered throughout the survey area. Most are 5 to 10 acres in size. In a few places the surface layer is silt loam or silty clay. Included in mapping are a few small, depressional areas of Rhinebeck soils.

This Hudson soil is suited to row crops, hay, pasture, and woodland. Slow permeability and slight seasonal wetness are the main limitations to its use. Desirable soil structure is difficult to maintain. Minimum tillage, returning crop residue and green manure, and other measures should be used to maintain desirable soil structure and control erosion. On long uniform slopes, contours and diversions are also helpful. Capability unit IIe–4; woodland group 2o1.

HuC—Hudson silty clay loam, 8 to 15 percent slopes. This sloping soil has the profile described as representative of the series. It occupies side slopes that extend from the tops of lacustrine knolls to the wetter lacustrine plains. Areas are long and narrow and a few are larger than 20 acres in size. Some small areas of redder soils occur along Schoharie Creek.

Included with this soil in mapping are small areas of eroded soils. Also included are areas of steeper soils that are of limited extent.

This Hudson soil is suited to row crops, hay, pasture, and woodland. Row crops can be grown occasionally. Control of erosion and runoff are the main concerns of management. Contour farming and stripcropping used with sod waterways help control runoff and erosion. Diversions may also be needed to break up long slopes. Minimum tillage, crop residue, and cover crops are important in management. Capability unit IIIe–6; woodland group 2r2.

HuD—Hudson silty clay loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner surface layer, it is shallower to the substratum, and the subsoil is slightly brighter in color. This soil occupies side slopes leading from less sloping soils. Areas are generally long and narrow. They average 15 to 20 acres in size.

Included with this soil in mapping are small areas of less eroded soils. Also included are areas of Lansing soils at the bases of some units, especially where the lacustrine mantle is thin, and similar soils that are redder in color adjacent to Schoharie Creek.

This Hudson soil is best suited to hay, pasture, and woodland. The hazard of erosion is very severe. Erosion and unstable soil material limit its use. Tillage should be restricted mainly to the amount needed to reestablish hay or pasture. When preparing a seedbed, minimum tillage helps to control erosion. Capability unit IVe–5; woodland group 2r4.

HVF—Hudson soils, very steep. These soils occupy mainly the walls of deep cuts in the lake plain. The surface layer ranges from silty clay loam to clay. Most areas are adjacent to the alluvial soils along the Mohawk River. Areas are long and narrow. Most range from 10 to 50 acres in size.

Included with these soils in mapping are small areas of lake-laid silt near the tops of slopes. Near the bases of slopes are small areas of soils that have a thin mantle of silt over the glacial till. Also included are Lansing soils near the bases of many of these slopes and areas of soils adjacent to Schoharie Creek that are similar to Hudson soils but are redder in color.

These Hudson soils are suited to woodland and wildlife habitat. Steep and very steep, unstable slopes limit many uses. Mass slippage is a hazard. Maintaining good natural vegetative cover is very important in management. Capability unit VIIe–1; woodland group 2r4.

Ilion Series

The Ilion series consists of deep, nearly level and gently sloping, poorly drained, medium-textured soils in concave areas of till plains. These soils formed in calcareous glacial till derived from shale, limestone, and sandstone.

In a representative profile the surface layer is 9 inches of very dark gray silt loam. The subsurface layer is 5 inches of mottled olive-gray silty clay loam. The subsoil is mottled olive-gray, firm channery silt loam 25 inches thick. The substratum to a depth of 57 inches is firm, dark grayish-brown gravelly silt loam.

The water table is at or near the surface early in spring and during wet periods. Root growth is mainly in the upper 12 inches of the soil because of wetness. It extends to greater depths during dry periods. Available water capacity is high. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus generally is medium. Unless limed, the surface layer is medium acid.

Prolonged wetness and slow or very slow permeability are the main limitations in farming. Ilion soils respond to drainage. Suitable outlets having sufficient fall are difficult to locate in many nearly level areas. In undrained areas, shallow-rooted, water-tolerant species of hay and grasses are suited to these soils. Prolonged wetness and slow or very slow permeability are the main limitations in town and country planning.

Representative profile of Ilion silt loam, 0 to 3 percent slopes, in an idle field, 230 yards east of Herrick Road and 200 yards north of Finch Road, in Duanesburg:

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) when dry; moderate, very fine and fine, granular structure; very friable; many roots; 10 percent coarse fragments; medium acid; abrupt, smooth boundary.

A2—9 to 14 inches, olive-gray (5Y 5/2) light silty clay loam; common, medium and coarse, prominent, strong-brown (7.5YR 5/6), yellowish-brown (10YR 5/6), and olive-brown (2.5Y 4/4) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky; friable; common roots; common pores; few patchy clay films on faces of peds; 10 percent coarse fragments; mildly alkaline; clear, wavy boundary.

IIB2gt—14 to 39 inches, olive-gray (5Y 4/2) channery silty clay loam; common, coarse, distinct, light olive-brown (2.5Y 5/4) mottles and common, medium and coarse, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/6) mottles; strong, very coarse, prismatic structure parting to weak, medium, subangular blocky; firm; few roots; common fine pores; thin, continuous, gray (5Y 5/1) clay films on faces of prisms and patchy on blocks; 30 percent coarse fragments; neutral; moderately alkaline and calcareous below a depth of 24 inches; gradual, wavy boundary.

IIIC—39 to 57 inches, dark grayish-brown (2.5Y 4/2) gravelly heavy silt loam; weak, thick, platy structure; firm; few roots; 30 percent coarse fragments; moderately alkaline; calcareous.

Thickness of the solum ranges from 24 to 40 inhces. Depth to carbonates ranges form 20 to 60 inches. The content of coarse fragments ranges from 2 to 20 percent in the upper 20 inches and increases to as much as 20 to 35 percent below a depth of 20 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 2 or 1. Dry value is 4 or 5. It ranges from medium acid to neutral. The A2g horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. Mottles are few or common and distinct or prominent. The A2g horizon ranges from loam to silty clay loam. It ranges from medium acid to mildly alkaline.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Mottles of higher chroma are common or many and distinct or prominent. The B horizon is clay loam or silty clay loam. It ranges from medium acid to moderately alkaline.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It ranges from silty clay loam to heavy silt loam. The C horizon contains carbonates.

Ilion soils formed in similar material and are in a drainage sequence with the well-drained Lansing soils and the somewhat poorly drained Appleton or Darien soils. They are also in a drainage sequence with the moderately well drained Nunda soils and the somewhat poorly drained Burdett soils.

IIA—Ilion silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies large depressional or nearly flat areas in glacial till uplands. Areas are broad and irregularly shaped or long and narrow. Many meander with the drainage pattern. Most areas range from 10 to 50 acres in size. In places the surface layer is loam or silty clay loam.

Included with this soil in mapping are small areas of soils that have a thin mantle of lacustrine silt or clay in the towns of Charleston and Root. Many areas of Madalin and Fonda soils are indicated on the map by a clay spot symbol. Also included are areas of similar but wetter soils, areas of Varick soils near soils that are shallow over bedrock, and small areas of the better drained Burdett, Scriba, Appleton, or Darien soils.

This Ilion soil is best suited to hay, pasture, and woodland. Prolonged wetness and slow or very slow permeability limit its use for crops. This soil can be drained if outlets have sufficient fall; however, only a few places have adequate outlets. Capability unit IVw–2; woodland group 3w4.

IIB—Ilion silt loam, 3 to 8 percent slopes. This gently sloping soil occupies foot slopes and low-lying areas. Areas are long and narrow along drainageways and are broad and irregular at higher elevations. Areas range from 5 to more than 150 acres in size.

Included with this soil in mapping are small areas of Madalin and Fonda soils. Many of these areas have a thin mantle of clay underlain by glacial till. They are indicated on the map by a clay spot symbol. Also included are Varick soils near bedrock-controlled areas and a few small areas of Burdett, Scriba, Appleton, and Darien soils on small rises in the higher lying areas.

This Ilion soil is best suited to hay, pasture, and woodland. Drainage is needed and crops respond well to it. Suitable outlets are generally costly to install. Row crops can be grown if the soil is adequately drained. Where the soil is drained and row cropped, minimum tillage, crop residue, and green manure are needed. Capability unit IVw–2; woodland group 3w4.

InB—Ilion very stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping soil has a profile similar to the one described as representative of the series, but stoniness dominates other characteristics. This wet soil occupies depressional areas and foot slopes. Most areas are less than 10 acres in size and are elliptically shaped. Included in mapping are small areas of soils that contain fewer stones.

This Ilion soil is suited to limited pasture, woodland, and wildlife habitat. Stones prevent reseeding, liming, and fertilizing pastures. Prolonged wetness and stoniness limit all uses of this soil. Capability unit VIIs–1; woodland group 3w4.

Joliet Series

The Joliet series consists of shallow, nearly level, poorly drained, medium-textured soils on bedrock-controlled till plains. These soils formed in 10 to 20 inches of glacial drift on limestone bedrock.

In a representative profile the surface layer is very dark grayish-brown silt loam 10 inches thick. The upper part of the subsoil is 3 inches of distinctly mottled dark grayish-brown silt loam. The lower 6 inches is mottled dark grayish-brown, friable gravelly loam. Hard limestone bedrock is at a depth of 19 inches.

The water table is perched on the limestone bedrock, and ground water is at or near the surface except during dry periods. Permeability is moderate. Root growth is mainly in the upper 12 inches of the soil, but it extends to greater depths during dry periods. Available water capacity is very low to low. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus generally is medium. The content of lime is high. Unless limed, the surface layer is slightly acid or neutral.

Prolonged wetness and shallowness are the main

limitations in farming. Artificial drains are very difficult to construct because hard limestone bedrock is at a depth of 10 to 20 inches. Water-tolerant, shallow-rooted species of grasses or trees do better on this soil than other species. Bedrock and prolonged wetness are the main limitations in town and country planning.

Representative profile of Joliet silt loam, in a pasture, 625 feet east of Robb Road and ⅖ mile south of Baldwin Road, in Amsterdam:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam, grayish-brown (10YR 5/2) when dry; moderate, medium and fine, granular structure; friable; many roots; 5 percent gravel; neutral; abrupt, smooth boundary.

B21—10 to 13 inches, dark grayish-brown (10YR 4/2) light silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; common roots; common fine pores; 5 to 10 percent gravel; neutral clear, wavy boundary.

B22—13 to 19 inches, dark grayish-brown (10YR 4/2) gravelly loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles, few, fine, faint, grayish-brown (10YR 5/2) mottles, and common, medium, distinct, grayish-brown (2.5Y 5/2) mottles; weak, medium, subangular blocky structure; friable; common roots; common fine pores; 20 percent gravel and cobbles; neutral.

IIR—19 inches, limestone bedrock.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. The content of coarse fragments ranges from few to 15 percent. The fragments are mostly gravel. The solum ranges from slightly acid to mildly alkaline. It is mainly silt loam or loam but ranges to light silty clay loam.

The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The B horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 0 to 2.

Joliet soils formed in similar material and are in a drainage sequence with the well-drained Farmington soils. They are also associated with soils that have limestone bedrock at a depth of 20 to 40 inches, such as the well drained and moderately well drained Wassaic soils, the somewhat poorly drained Angola soils, and the poorly drained Varick soils.

Jo—Joliet silt loam. This nearly level soil occupies level and depressional areas of limestone bedrock-controlled till plains that are scattered throughout Montgomery County. Areas are small and vary in shape. Most range from 5 to 10 acres in size.

Included with this soil in mapping are small areas of Angola and Varick soils that have bedrock at a depth of more than 20 inches. Also included are a few areas of gently sloping Joliet soils along streams, small areas of Brockport soils, and the Madalin variant, which is clayey and has bedrock at a depth of more than 20 inches.

This Joliet soil is suited to hay, pasture, and woodland. Shallowness to bedrock makes it almost impossible to drain the soil for row crops. Water-tolerant, shallow-rooted plants do best on this soil. Capability unit IVw–5; woodland group 5w1.

Junius Series

The Junius series consists of deep, nearly level, poorly drained and somewhat poorly drained, coarse-textured soils in flat or depressional areas. These soils formed in lake-laid sandy deposits.

In a representative profile the surface layer is 10 inches of very dark grayish-brown loamy fine sand. The upper 5 inches of the subsoil is brown, very friable loamy fine sand. The lower 11 inches is mottled grayish-brown, very friable loamy fine sand. The substratum is neutral in reaction. The upper 5 inches is gray fine sand; the next 17 inches is dark-gray, very friable loamy sand; and the lower 3 inches is dark-gray very fine sandy loam.

The water table is near the surface except during dry periods in summer. Permeability is rapid. Root growth is restricted by the water table, and most roots are within the upper 12 inches of the soil. In drained areas, the available water capacity is low. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is low. The content of lime is medium. Unless limed, the surface layer is slightly acid or neutral.

Prolonged wetness caused by a high water table is the main limitation in farming. It also limits nonfarm uses.

Representative profile of Junius loamy fine sand, in a meadow, 200 yards east of West Shore Railroad and a mile north of Albany County line, in Rotterdam:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, very fine and fine, granular structure; very friable; many roots; porous; neutral; abrupt, smooth boundary.

B21—10 to 15 inches, brown (10YR 5/3) loamy fine sand, dark grayish-brown (10YR 4/2) when dry; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, thick, platy structure; very friable; common roots; common pores; neutral; clear, wavy boundary.

B22—15 to 26 inches, grayish-brown (10YR 5/2) loamy fine sand; few, medium, distinct, dark-brown (7.5YR 4/2) mottles and common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium and thick, platy structure; very friable; few roots; common pores; neutral; clear, wavy boundary.

C1—26 to 31 inches, gray (10YR 5/1) fine sand; few, medium, distinct, yellowish-brown (10YR 5/6) mottles and few, medium, faint, light brownish-gray (10YR 6/2) mottles; massive; very friable; few roots and pores; neutral; clear, wavy boundary.

C2—31 to 48 inches, dark-gray (10YR 4/1) loamy sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; very friable; few roots and pores; neutral; abrupt, smooth boundary.

IIC3—48 to 51 inches, dark-gray (N 4/0) very fine sandy loam; massive; friable; few roots; neutral.

Thickness of the solum ranges from 20 to 40 inches. It is loamy fine sand or fine sand throughout. The solum is slightly acid or neutral. The substratum is neutral or mildly alkaline. Carbonates occur in places below a depth of 6 feet.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. The B horizon has hue of 10YR or 2.5Y, value of 4 to 5, and chroma of 2 or 3. The upper part of the B horizon commonly has chroma of 3, and the lower part has chroma of 2 or 1. Mottles of higher chroma range from common in the upper part to few at greater depths. The C horizon is loamy fine sand, loamy sand, or fine sand. It has hue of neutral to 10YR to 2.5Y, value of 2, 4, or 5, and chroma of 1. Higher chroma mottles similar to those in the B horizon occur.

Junius soils formed in similar material and are in a drainage sequence with the excessively drained Plainfield soils, the well-drained to excessively drained Colonie soils, and the moderately well drained Elnora soils.

Ju—Junius loamy fine sand. This nearly level soil

occupies depressional areas in lake-laid deposits of fine sand. Areas are saucer shaped. Most are less than 20 acres in size. Some small areas of this soil in the East Glenville region are dominantly medium sand instead of fine sand.

Included with this soil in mapping are small areas of Cheektowaga, Granby, and Elnora soils. Also included are areas of a similar soil in the township of Rotterdam that has a compact, cemented layer at a depth of 18 to 24 inches.

This Junius soil is best suited to hay, pasture, and woodland. When the soil is adequately drained, many of the common, local crops can be grown. Where outlets are available, surface or subsurface drains, or both, are generally effective. Minimum tillage, cover crops, crop residue, and green manure are important in management. Capability unit IVw–6; woodland group 4w2.

Lansing Series

The Lansing series consists of deep, gently sloping to very steep, well-drained, medium-textured soils on upland till plains. These soils formed in glacial till derived from shale, limestone, sandstone, and siltstone.

In a representative profile the surface layer is 8 inches of dark grayish-brown silt loam. The subsurface layer is 4 inches of pale-brown, friable silt loam. The next layer is pale-brown, friable gravelly silt loam 8 inches thick. The subsoil is 8 inches of brown, firm, gravelly heavy silt loam. The substratum to a depth of 50 inches is dark grayish-brown, firm gravelly silt loam.

The water table is below a depth of 3½ feet. Permeability is moderate in the solum and slow or very slow in the substratum. Root growth is mainly in the upper 30 inches of the soil. Available water capacity is high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is medium to high. Unless limed, the surface layer is medium acid.

Slope and the hazard of erosion are the main limitations in farming. All crops do very well on these soils. Slope and the slowly permeable or very slowly permeable substratum are the main limitations in town and country planning.

Representative profile of Lansing silt loam, 3 to 8 percent slopes, in a meadow, 100 feet south of Miller Drive and 700 feet west of the house at the end of this road, in Canajoharie:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam, light-gray (10YR 7/2) when dry; moderate, medium, granular structure; friable; many roots; 8 percent gravel; slightly acid; abrupt, smooth boundary.

A2—8 to 12 inches, pale-brown (10YR 6/3) silt loam; moderate, fine, subangular blocky structure; friable; many roots; 12 percent gravel; slightly acid; gradual, wavy boundary.

A&B—12 to 20 inches, pale-brown (10YR 6/3) gravelly silt loam; 40 percent brown (10YR 4/3) soil material like that of the B2t horizon; moderate, medium, subangular blocky structure; friable; common roots; many, fine and medium, clay-lined pores; occasional patchy clay films in B horizon material; 15 percent coarse fragments; slightly acid; gradual, wavy boundary.

B2t—20 to 32 inches, brown (10YR 4/3) gravelly heavy silt loam, very pale brown (10YR 7/3) when dry; weak, coarse and medium, subangular blocky structure; firm; common roots; many, fine and medium, claylined pores; thin, patchy clay films on faces of peds; brown (10YR 5/3) coatings, 1 to 2 millimeters thick, on peds in upper part of horizon; yellowish-brown (10YR 5/4) remnants of rock material; 20 percent coarse fragments; neutral; clear, wavy boundary.

C—32 to 50 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; moderate, thick, platy structure; firm; few roots; many fine and medium pores; 25 percent coarse fragments; mildly alkaline; calcareous.

Thickness of the solum ranges from 32 to 48 inches. Depth to carbonates ranges from 30 to 50 inches. The content of coarse fragments ranges from 5 to 15 percent in the Ap and A2 horizons and increases with increasing depth to as much as 20 to 50 percent in the C horizon.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2). It is strongly acid to neutral. The A2 horizon is pale brown (10YR 6/3) or brown (10YR 5/3). It is dominantly silt loam but ranges to loam. It is strongly acid to slightly acid.

The A&B horizon is pale brown (10YR 6/3) or brown (10YR 5/3), and about 30 to 40 percent of the material is like that of the B2t horizon. The fine earth fraction is dominantly silt loam but ranges to loam. The horizon ranges from strongly acid to slightly acid.

The Bt horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 3 or 4. The fine earth fraction is generally heavy silt loam, silt loam, or loam that has an average clay content of 18 to 28 percent. The horizon ranges from medium acid to neutral.

The C horizon has hue of 10YR to 5Y and value of 2 to 5; its chroma is dominantly 2. The fine earth fraction is silt loam or loam.

Lansing soils formed in similar material and are in a drainage sequence with the somewhat poorly drained Appleton soils and the poorly drained Ilion soils. They are also associated with the well drained and moderately well drained Mohawk and Wassaic soils and the well-drained Nellis soils. Lansing soils are similar to Mohawk soils but are lighter colored throughout. They are deeper than Wassaic soils, which have bedrock at a depth of 20 to 40 inches. Lansing soils have a Bt horizon, but Nellis soils do not.

LaB—Lansing silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies narrow ridgetops. Areas are long and narrow and generally have an east-west orientation. Most areas range from 5 to 10 acres in size. In places the surface layer is very fine sandy loam. Included in mapping are small areas of Mohawk soils and a few areas of Palatine soils.

This Lansing soil is suited to row crops, hay, pasture, and woodland. Slope is the main limitation for farm use. The slowly permeable or very slowly permeable substratum limits some nonfarm uses. When the soil is intensively row cropped, contour planting, stripcropping, and other measures should be used to reduce runoff and erosion. Diversions or terraces also help in controlling erosion. Capability unit IIe–1; woodland group 2o1.

LaC—Lansing silt loam, 8 to 15 percent slopes. This sloping soil occupies the sides of drumlinlike hills on both sides of the Mohawk River. Areas are long and narrow and extend for great distances. Most are

larger than 25 acres. In places the surface layer is very fine sandy loam.

Included with this soil in mapping are small areas of eroded soils. Also included are a few small areas of Appleton soils at the bases of slopes and a few darker colored areas that contain black shale.

This Lansing soil is suited to row crops, hay, pasture, and woodland. The hazard of erosion is severe. When the soil is row cropped, contour planting, strip-cropping, diversions to break up long slopes, and other practices are needed to control or reduce erosion. Plowing under crop residue and green manure is also important in management. Capability unit IIIe–1; woodland group 2o1.

LaD—Lansing silt loam, 15 to 25 percent slopes. This moderately steep soil occupies side slopes that lead from sloping areas to gently rolling foot slopes. Areas are irregularly shaped and are much longer than they are wide. Some areas are broad. Many are larger than 20 acres. In places the surface layer is very fine sandy loam. Included with this soil in mapping are small areas of eroded soils that have a lighter colored surface layer.

This Lansing soil is best suited to hay, pasture, and woodland. The hazard of erosion severely limits its use for row crops. High-yielding alfalfa varieties do especially well. Where possible, contour or cross-slope tillage should be used as an erosion-control measure when hay or pasture is being reestablished. Capability unit IVe–1; woodland group 2r2.

LMF—Lansing and Mohawk silt loams, very steep. Areas of this mapping unit are entirely Lansing soil or Mohawk soil, or both. These soils have similar but shallower profiles than the ones described as representative of their respective series. The surface layer generally ranges from very fine sandy loam to silt loam, but in places the Mohawk soil has a surface layer of light silty clay loam. Slopes are steep and very steep and are generally cut by streams entering the Mohawk River flood plain. Areas are long and narrow and extend for great distances. They range from 20 acres to more than 50 acres in size. Included in mapping are small areas of less sloping soils and a few areas of bare, exposed till embankments.

This mapping unit is suited to woodland or wildlife habitat. Steepness very severely limits most uses. Capability unit VIIe–1; woodland group 2r4.

Lordstown Series

The Lordstown series consists of moderately deep, level to steep, well-drained, medium-textured soils on bedrock-controlled till plains. These soils formed in glacial till that is 20 to 40 inches deep to sandstone and shale bedrock.

In a representative profile the surface layer is 7 inches of dark grayish-brown gravelly silt loam. The upper part of the subsoil is 4 inches of yellowish-brown, very friable gravelly silt loam. The lower part of the subsoil is dark yellowish-brown, friable channery silt loam 11 inches thick. The substratum is 4 inches of mottled dark grayish-brown, firm gravelly silt loam. Hard, gray, sandstone bedrock is at a depth of 26 inches.

The water table is mainly below a depth of 4 feet, but in a few places it is perched 2 to 4 inches above the rock for short periods. Permeability is moderate. Root growth is mainly in the upper 24 inches of the soil. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is very low or low. Unless limed, the surface layer is very strongly acid.

The hazard of erosion and coarse fragments are the main limitations in farming. Shallowness to bedrock and slope are the main limitations in town and country planning.

Representative profile of Lordstown gravelly silt loam, 3 to 8 percent slopes, in a hardwood forest, 100 feet north of Skyline Drive Road and 7/8 mile west of Tidball Road, in Duanesburg:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; weak, very fine, granular structure; many roots; porous; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B21—7 to 11 inches, yellowish-bown (10YR 5/6) gravelly silt loam; weak, very fine, granular structure; very friable; many roots; many pores; 20 percent coarse fragments; strongly acid; clear, wavy boundary.

B22—11 to 22 inches, dark yellowish-brown (10YR 4/4) channery silt loam; weak, fine, granular structure; friable; slightly hard; many roots; common pores; 30 percent coarse fragments; strongly acid; abrupt, wavy boundary.

C—22 to 26 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; common, medium, distinct, strong-brown (7.5YR 5/6) and dark-brown (7.5YR 4/4) mottles; weak, medium and thick, platy structure; firm; few roots; 30 percent coarse fragments; very strongly acid; abrupt, smooth boundary.

IIR—26 inches, gray, hard sandstone bedrock.

Thickness of the solum ranges from 20 to 36 inches, and depth to bedrock ranges from 20 to 40 inches. The fine earth fraction in the solum is loam or silt loam. The content of coarse fragments in the solum ranges from 15 to 35 percent. The solum is very strongly acid or strongly acid in the upper part and ranges to medium acid in the lower part.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2). The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. The C horizon is darker in color and ranges from dark grayish brown (10YR 4/2) to olive brown (2.5Y 4/4). Bedrock is interbedded sandstone, shale, or siltstone.

Lordstown soils are closely associated with the shallow to bedrock Arnot and Nassau soils. They have a lower content of coarse fragments than the moderately deep Manlius soils. Lordstown soils are better drained than the somewhat poorly drained and poorly drained Tuller soils, the somewhat poorly drained Angola soils, and the poorly drained Varick soils, all of which formed in bedrock-controlled glacial till.

LoA—Lordstown gravelly silt loam, 0 to 3 percent slopes. This nearly level soil occupies bedrock-controlled landforms on glaciated, dissected plateaus. Areas are irregularly shaped and range from 5 to 40 acres in size.

Included with this soil in mapping are small areas of Arnot and Manlius soils. Also included are small depressional areas of Brockport, Tuller, and Varick soils.

This Lordstown soil is suited to row crops, hay, pasture, and woodland. Coarse fragments interfere with tillage in places. This soil is somewhat droughty during long, dry periods; therefore, deep-rooted crops are preferred for general cropping. Capability unit IIs–2; woodland group 3o1.

LoB—Lordstown gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies benches and hilltops of bedrock-controlled landforms on glaciated, dissected plateaus. Areas are long and narrow. They generally range from 10 to 35 acres in size.

Included with this soil in mapping are small areas of the shallower Arnot soils. Also included are small areas of the shaly Manlius soils, small, wet, depressional areas of Brockport and Tuller soils, and small areas of Varick soils along drainageways or seep areas.

This Lordstown soil is suited to row crops, hay, pasture, and woodland. It is best suited to deep-rooted crops because it is droughty during long, dry periods. Slope and a moderate hazard of erosion limit farm use. Unless contour planting and stripcropping are used to help control erosion, this soil should not be intensively row cropped. Capability unit IIe–2; woodland group 3o1.

LoC—Lordstown gravelly silt loam, 8 to 15 percent slopes. This sloping soil occupies sides of bedrock-controlled landforms on glaciated, dissected plateaus. Areas are long and narrow and average about 20 acres in size.

Included with this soil in mapping are small areas of Arnot, Manlius, and Nassau soils. Also included are a few small areas of the channery Angola soils along drainageways and a few small areas of the deep Nunda soils.

This Lordstown soil is suited to row crops, hay, pasture, and woodland. Erosion-control practices are needed because the erosion hazard is severe. Hay or sod crops should be grown most of the time. When the soil is row cropped, contour planting and stripcropping are needed to reduce erosion. Plowing under green manure and crop residue is also beneficial. Capability unit IIIe–2; woodland group 3o1.

LoD—Lordstown gravelly silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies sides of bedrock-controlled landforms. Areas are generally long and narrow and range from 10 to 25 acres in size.

Included with this soil in mapping are small areas of the Arnot, Manlius, and Nassau soils. Also included are a few small areas of Varick or Brockport soils along drainageways or around seepage areas.

This Lordstown soil is best suited to hay, pasture, and woodland. The hazard of erosion is very severe. Steepness limits the use of farm machinery. Hay and sod crops should be grown most of the time. Tillage should mainly be restricted to the amount needed to reestablish hay and pasture. Capability unit IVe–2; woodland group 3r1.

LRE—Lordstown-Rock outcrop association, steep. This mapping unit occupies bedrock-controlled uplands, mainly on the walls of the Mohawk Valley. Rock outcrops of sandstone are a prominent feature. These soils are sloping to steep. Slopes range from 8 to 35 percent. Areas are irregularly shaped and range from 10 to 50 acres in size.

This mapping unit is 60 percent Lordstown soils and 40 percent Rock outcrop. Lordstown soils in this mapping unit have a profile similar to the one described as representative of the series, but they have more rock outcrops. Intermingled throughout are exposures of sandstone bedrock.

Included with this unit in mapping are areas of Arnot, Manlius, Nassau, Tuller, Brockport, and Hornell soils. Also included are areas of nearly level, very rocky soils.

This mapping unit is suited to limited pasture or woodland. Exposed bedrock, shallowness, and slope limit tillage. Capability unit VIIe–2. Lordstown soil in woodland group 3r2; Rock outcrop not assigned.

Madalin Series

The Madalin series consists of deep, nearly level, poorly drained and very poorly drained, moderately fine extured soils on glacial lake plains on uplands. These soils formed in calcareous, lake-laid silt and clay.

In a representative profile the surface layer is 7 inches of very dark grayish-brown silty clay loam. The subsoil extends to a depth of 30 inches. The upper 2 inches is mottled dark grayish-brown silty clay. The next 12 inches is mottled dark grayish-brown, very firm clay. The lower 9 inches is mottled dark grayish-brown, very firm silty clay. The substratum to a depth of 58 inches is layers of gray and yellowish-brown, very firm, calcareous silt and clay.

The water table is perched on the clayey subsoil, which is slowly permeable to downward movement of water, and ground water is at or near the surface during most of the year. During dry periods the water table recedes to a depth of 2 feet or more. Root growth is mainly in the upper 18 inches of the soil. When the soil is drained, available water capacity is moderate to high. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus is medium. The content of lime is high. Unless limed, the surface layer is slightly acid.

Prolonged wetness and slow permeability are the main limitations in farming. Shallow-rooted, water-tolerant species do well on these soils. Artificial drainage is difficult to install on these level soils, because outlets that have sufficient fall are difficult to locate. Prolonged wetness, slow permeability, and instability of the soil are the main limitations in town and country planning.

Representative profile of Madalin silty clay loam, in a meadow, 1,000 feet east of Paris Road and 1,500 feet north of Fordsbush Road, in Minden:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silty clay loam, grayish-brown (10YR 5/2) when dry; moderate, fine, subangular blocky structure

parting to moderate, medium and fine, granular; friable; many roots; common fine and medium pores; neutral; abrupt, smooth boundary.

B1g—7 to 9 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, medium and fine, angular blocky structure; firm; common roots; few fine pores; grayish-brown (10YR 5/2) silt coatings on faces of peds; neutral; clear, wavy boundary.

B21tg—9 to 21 inches, dark grayish-brown (10YR 4/2) clay; many, medium and fine, distinct, dark yellowish-brown (10YR 4/4) mottles; strong, coarse, prismatic structure parting to strong, medium and coarse, angular blocky; very firm; common roots along faces of peds; thin, continuous clay linings in the many fine pores; neutral; gradual, wavy boundary.

B22tg—21 to 30 inches, dark grayish-brown (10YR 4/2) silty clay; many, medium and fine, faint, dark yellowish-brown (10YR 4/4) mottles and few, medium, distinct, yellowish-brown (10YR 5/4) mottles; strong, coarse, prismatic structure parting to moderate, coarse, angular blocky; very firm; few roots; common fine pores; dark grayish-brown (10YR 4/2) and gray (10YR 5/1) clay films on all peds; neutral; diffuse, wavy boundary.

Cg—30 to 58 inches, stratified layers of silt and clay, mainly gray (10YR 5/1) and yellowish brown (10YR 5/4); very firm; few roots; mildly alkaline; calcareous.

Thickness of the solum ranges from 24 to 48 inches. Depth to carbonates is the same. The solum ranges from medium acid to mildly alkaline and increases with increasing depth.

The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). Dry value is 5 or 4. The Bt horizon has hue of 10YR to 5Y, value of 4 or 6, and chroma of 2 or 3. It has few to many mottles of yellowish brown or yellowish red. Coatings on peds are gray and have hue of 10YR and 2.5Y, value of 5 or 6, and chroma of 1 or 0. The Bt horizon is silty clay, clay, or silty clay loam. Content of clay ranges from 35 to 55 percent. The C horizon is dominantly gray (10YR 5/1). It has yellowish brown (10YR 5/6) or dark yellowish-brown (10YR 4/4) layers.

Madalin soils formed in similar material and are in a drainage sequence with the well drained and moderately well drained Hudson soils, the somewhat poorly drained Rhinebeck soils, and the very poorly drained Fonda soils. Madalin soils are also associated with the somewhat poorly drained Churchville soils, which formed in lake deposits that are less than 40 inches deep to glacial till.

Ma—Madalin silty clay loam. This nearly level soil occupies flat and depressional areas of old glacial lakebeds that receive runoff from adjacent, better drained soils. Areas are generally broad and somewhat saucer shaped. A few areas along drainageways are long and narrow. Most areas average 20 to 25 acres in size. A few areas have a mucky silt loam surface layer.

Included with this soil in mapping are small, dome-shaped areas of the better drained Rhinebeck soils. Also included are small depressional areas of Fonda soils and a few small, dome-shaped areas of Churchville or Darien soils. Areas at higher elevations tend to have a thinner clayey deposit. A few of these areas have till at a depth of 36 to 40 inches.

This Madalin soil is best suited to hay, pasture, and woodland. Prolonged wetness and slow permeability limit most uses. Completely effective drainage is difficult; therefore, if the soil is cropped, hay and pasture seeding mixtures that are tolerant of wetness are generally best suited. Where outlets are available, surface drainage by open ditches or land shaping, or both, is more effective than tile drainage. This soil clods and puddles easily if tilled when too wet. Capability unit IVw–2; woodland group 5w1.

Madalin Variant

The Madalin variant consists of nearly level, poorly drained and very poorly drained, moderately fine textured soils on glacial lake plains on bedrock-controlled uplands. These soils formed in lake-laid silt and clay. They are 20 to 40 inches deep over limestone or shale bedrock.

In a representative profile the surface layer is 7 inches of very dark gray silty clay loam. The subsurface layer is 3 inches of mottled gray silty clay loam. The upper 6 inches of the subsoil is mottled grayish-brown, firm, slightly sticky, plastic silty clay. The lower 9 inches is distinctly mottled gray and grayish-brown, firm, sticky, very plastic silty clay. The substratum is 2 inches of mottled very dark grayish-brown heavy silt loam. Dark-gray limestone bedrock is at a depth of 27 inches.

The water table is at or near the surface during most of the year, but it is deeper during dry periods. Root growth is mainly in the upper 18 inches of the soil. Available water capacity is moderate. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus generally is medium. The content of lime is high. Unless limed, the surface layer is slightly acid.

Prolonged wetness and slow permeability are the main limitations in farming. Shallow-rooted, water-tolerant species do well on these soils. Adequate artificial drainage cannot be installed because bedrock is at a depth of 20 to 40 inches. The closeness of bedrock to the surface and prolonged wetness are the main limitations in town and country planning.

Representative profile of Madalin silty clay loam, moderately shallow variant, in a pasture, 180 feet west of Kahn Road and 1,200 feet north of Stone Arabia Road, in Palatine:

Ap—0 to 7 inches, very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) when dry; moderate, medium and fine, granular structure; friable; many roots; porous; neutral; clear, smooth boundary.

A2—7 to 10 inches, gray (10YR 5/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; strong, fine, subangular blocky structure; firm, slightly sticky and slightly plastic; many roots; neutral; abrupt, smooth boundary.

B21tg—10 to 16 inches, grayish-brown (10YR 5/2) silty clay; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, coarse, prismatic structure parting to moderate, medium, blocky; firm, slightly sticky and plastic; common roots; many coarse and medium pores; many clay-lined pores and thin, patchy clay films; gray (10YR 5/1) coatings on peds; neutral; gradual, smooth boundary.

B22tg—16 to 25 inches, gray (10YR 5/1) and grayish-brown (10YR 5/2) silty clay; common, fine, distinct, yellowish-brown (10YR 5/4) mottles; moderate, coarse, prismatic structure parting to moderate, medium, blocky; firm, sticky and very plastic; few roots; common clay-lined pores; gray

(5Y 5/1) coatings on peds; neutral; clear, smooth boundary.

IICg—25 to 27 inches, very dark grayish-brown (2.5Y 3/2) heavy silt loam; many, coarse, distinct, dark-brown (10YR 4/3) mottles and common, coarse, distinct, dark-gray (5Y 4/1) mottles; weak, medium, subangular blocky structure; friable; porous; mildly alkaline; abrupt, smooth boundary.

IIIR—27 inches, dark-gray limestone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. The solum ranges from medium acid to mildly alkaline and the reaction increases with increasing depth. Carbonates occur a few inches above the bedrock in places.

The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). Dry value is 5 or 4. A gray (10YR 5/1) or grayish brown (10YR 5/2) A2 horizon occurs in places. It is dominantly silty clay loam but may range to silt loam. The Bt horizon has hue of 10YR to 5Y, value of 4 or 6, and chroma of 0 to 2. It is silty clay, clay, or heavy silty clay loam. Content of clay ranges from 35 to 55 percent. The C horizon is thin or is lacking. Bedrock is hard gray limestone or calcareous black shale.

Madalin variant soils are in a drainage sequence with the somewhat poorly drained Brockport soils. They are associated with the moderately deep Angola, Wassaic, Varick, and Palatine soils. They are finer textured than Varick soils and are more poorly drained than Angola, Wassaic, or Palatine soils.

Md—Madalin silty clay loam, moderately shallow variant. This nearly level soil occupies flat and depressional areas of lake-laid deposits on bedrock-controlled landforms. Areas are small and saucer shaped and a few are larger than 10 acres in size. Included in mapping with the few scattered areas of this soil are small areas of Varick soils that have thin layers of sediment underlain by till.

This Madalin soil is best suited to hay, pasture, and woodland. Prolonged wetness, bedrock at a depth of 20 to 40 inches, and slow permeability limit its use. Completely effective drainage is difficult; therefore, hay and pasture seeding mixtures that are tolerant of wetness are generally best suited. Where outlets are available, surface drainage by open ditches and land shaping, or both, is more effective than tile drainage. This soil clods and puddles easily if tilled when too wet. Capability unit IVw–5; woodland group 5w1.

Made Land

Mg—Made land. This mapping unit has been excavated to a considerable depth so that garbage and trash can be buried in layers and then covered with the soil material. Some areas have been filled, some are in the process of being filled, and some are large abandoned areas where garbage and waste were deposited and buried before modern standards were introduced.

Under properly controlled conditions, made land can be used for recreational purposes, such as parks, playgrounds, or golf courses. Capability unit and woodland group not assigned.

Manheim Series

The Manheim series consists of deep, nearly level and gently sloping, somewhat poorly drained, medium-textured soils on glacial till plains. These soils formed in calcareous glacial till that has a high percentage of black shale.

In a representative profile the surface layer is 9 inches of very dark grayish-brown silt loam. The upper part of the subsoil is 4 inches of mottled dark-brown, friable silt loam. The lower part of the subsoil is dark grayish-brown, firm gravelly heavy silt loam 15 inches thick. The substratum to a depth of 50 inches is mottled dark grayish-brown, firm gravelly silt loam.

The water table is at a depth of 6 to 16 inches during wet periods. Permeability is moderate or slow. Root growth is mainly in the upper 24 inches of the soil. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus is medium. The content of lime is high. Unless limed, the surface layer is medium acid or slightly acid.

Seasonal wetness is the main limitation in farming. Drainage is needed. Crops do well in drained areas, but water-tolerant, shallow-rooted species should be planted in undrained areas. Seasonal wetness and moderate to slow permeability are the main limitations in town and country planning.

Representative profile of Manheim silt loam, 3 to 8 percent slopes, in a meadow, 1,100 feet east of Sanders Road and 2,900 feet north of State Highway 5S, in Minden:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) and grayish-brown (10YR 5/2) silt loam, grayish brown (10YR 5/2) when dry; moderate, medium and fine, granular structure; friable; many roots; 5 percent weathered fragments of shale; neutral; abrupt, smooth boundary.

B21—9 to 13 inches, dark-brown (10YR 4/3) silt loam; common, fine, distinct, yellowish-brown (10YR 5/4 mottles and common, coarse, faint, very dark gray (10YR 3/1) mottles; moderate, medium, subangular blocky structure; friable; many roots; many fine and medium pores; dark grayish-brown (10YR 4/2) surfaces of peds; 10 percent coarse fragments; neutral; clear, wavy boundary.

B22—13 to 28 inches, dark grayish-brown (10YR 4/2) gravelly heavy silt loam; moderate, coarse, subangular blocky structure; firm; many roots; many fine and medium pores; few patchy clay films on faces of peds; few clay-lined pores; very dark grayish-brown (10YR 3/2) surfaces of peds; 20 percent fragments of gravel and shale; neutral; gradual, wavy boundary.

C—28 to 50 inches, dark grayish-brown (2.5Y 4/2) gravelly silt loam; common, medium, distinct yellowish-brown (10YR 5/4) and common, coarse, faint dark-gray (10YR 4/1) mottles; weak, thick, platy structure; firm; few fine pores; 30 percent gravel and black (10YR 2½1) shale fragments over 5 percent flagstone and fragments of hard, black shale or limestone; mildly alkaline; calcareous.

Thickness of the solum ranges from 24 to 45 inches. Depth to carbonates commonly is the same. Bedrock is at a depth of more than 4 feet. Coarse fragments are few in the surface layer, they range from 10 to 15 percent in the upper part of the B horizon, and they increase to as much as 15 to 30 percent in the lower part of the profile. The solum ranges from medium acid to neutral.

The Ap horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The B21 horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 3. It is silt loam or loam. Coatings on peds have chroma of 2. The B22t horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. It is silt loam, heavy silt loam, or light silty

clay loam. The C horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (2.5Y 4/2).

Manheim soils formed in similar material and are in a drainage sequence with the well drained and moderately well drained Mohawk soils and the poorly drained Ilion soils.

MmA—Manheim silt loam, 0 to 3 percent slopes. This nearly level soil occupies foot slopes and depressional areas in calcareous glacial till plains. Areas are irregularly elliptical in shape. Most range from 5 to 15 acres in size.

Included with this soil in mapping are small depressional areas of Ilion soils. Also included are small areas of Appleton soils that have a lower content of black shale in the till and small areas of Darien soils.

This Manheim soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness and slow to moderate permeability are the main limitations for all uses. Unless the soil is adequately drained, shallow-rooted, water-tolerant crops should be planted. Surface drainage is generally more effective than tile drainage because the subsoil is slowly permeable to moderately permeable. Capability unit IIIw–1; woodland group 3w3.

MmB—Manheim silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies glacial till plains that are dark colored because of black shale. Areas are generally long and narrow and vary in size. They range from 15 to 30 acres or more in size.

Included with this soil in mapping are small, dome-shaped areas of the better drained Mohawk soils and small areas of the wetter Ilion soils in depressions and along drainageways. Also included are areas of Appleton soils where the till is lighter in color and areas of heavier textured Darien soils.

This Manheim soil is best suited to row crops, hay, pasture, and woodland. Slope, seasonal wetness, and slow to moderate permeability are the main limitations for all uses. Where the soil is adequately drained, most local crops can be grown. In undrained areas, water-tolerant, shallow-rooted species should be planted. Surface drainage is generally more effective than tile drainage because of the slowly permeable to moderately permeable subsoil. Where practical, contours and diversions should be used to reduce the hazard of erosion. Capability unit IIIw–1; woodland group 3w3.

Manlius Series

The Manlius series consists of moderately deep, gently sloping to steep, well-drained to excessively drained, medium-textured soils on bedrock-controlled glacial till plains. These soils formed in 20 to 40 inches of glacial till derived from the underlying shale bedrock.

In a representative profile the surface layer is dark-brown silt loam 7 inches thick. The subsoil is yellowish-brown, very friable shaly silt loam in the upper 4 inches. Below this it is yellowish-brown, friable very shaly silt loam to a depth of 28 inches. Gray shale bedrock is at a depth of 28 inches.

The water table is generally below a depth of 4 feet. Permeability is moderate. Roots penetrate to a depth of 20 to 40 inches. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is low. The content of lime is low and very low. Unless limed, the surface layer is very strongly acid.

Hazard of erosion and coarse fragments are the main limitations in farming. Shallowness to bedrock, slope, and hazard of erosion are the main limitations in town and country planning.

Representative profile of Manlius silt loam, 3 to 8 percent slopes, in a meadow, 700 feet east of Brookmans Corners Road and 2,900 feet north of Starkville Road, in Minden:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; many roots; many fine and medium pores; 10 percent fragments of shale; very strongly acid; abrupt, smooth boundary.

B21—7 to 11 inches, yellowish-brown (10YR 5/6) shaly silt loam; weak, medium and fine, granular structure; very friable; many roots; many fine pores; 30 percent fragments of shale; strongly acid; clear, wavy boundary.

B22—11 to 16 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, medium and fine, granular structure; friable; common roots; many fine pores; 50 percent coarse fragments; strongly acid; clear, wavy boundary.

B3—16 to 28 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, fine, subangular blocky structure; friable; few roots; many medium pores; 70 percent fragments of shale arranged in bedding planes; strongly acid; gradual, wavy boundary.

IIR—28 to 42 inches, gray shale bedrock.

Thickness of the solum ranges from 15 to 30 inches, and depth to bedrock ranges from 20 to 40 inches. The fine earth fraction in the solum ranges from loam to heavy silt loam throughout. The content of coarse fragments ranges from 10 to 25 percent in the surface layer and increases to more than 50 percent in the lower part of the B horizon. The upper part of the solum ranges from extremely acid to strongly acid. The lower part of the profile is strongly acid or medium acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 3 to 6. Chroma of 6 is most common in the upper part of the B horizon. Some profiles have a thin C horizon.

Manlius soils are in a drainage sequence with the moderately well drained to somewhat poorly drained Hornell soils that formed in the same material. They are also associated with the Lordstown, Nassau, Arnot, and Brockport soils. Manlius soils are similar in depth to bedrock, but contain more shale fragments than the well-drained Lordstown soils and the somewhat poorly drained Brockport soils. Manlius soils are deeper to bedrock than the shallow Nassau and Arnot soils.

MnB—Manlius silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies dome-shaped ridgetops that are long and narrow and broader, irregularly shaped areas on bedrock-controlled plateaus. Areas seldom are larger than 10 acres in size.

Included with this soil in mapping are small depressional areas of Hornell soils. Also included are small areas of Arnot soils where thin beds of sandstone outcrop are within the shale areas. Included areas are few and are scattered throughout the survey area.

This Manlius soil is best suited to hay, pasture, and woodland. Many areas are idle, and some have been reforested. The hazard of erosion, acidity, and droughtiness are the main limitations for crops. Bedrock at a depth of 20 to 40 inches is a main limitation for nonfarm uses. Where practical, contour planting, stripcropping, and other measures help to reduce erosion. Capability unit IIe–2; woodland group 3o1.

MoC—Manlius shaly silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but the surface layer contains more shale fragments, and the soil is generally shallower to bedrock. This soil occupies the sides of small hills. Areas are long and narrow. They range from 10 to 25 acres in size.

Included with this soil in mapping are small areas of eroded soils that have hard bedrock at a depth of 15 to 20 inches. Also included are a few outcrops of sandstone, within the beds of shale, that are indicated on the map by rock outcrop symbols, small areas of Arnot soils, and a few small areas of Hornell soils near the bases of slopes.

This Manlius soil is best suited to hay, pasture, and woodland. Most areas are idle or have been reforested. The hazard of erosion, acidity, and droughtiness are the main limitations for crops. Bedrock at a depth of 20 to 40 inches is a limitation for most nonfarm uses. Tillage equipment is difficult to use on the upper ranges of slopes. Close-grown crops such as hay should be grown most of the time. Contour planting and contour stripcropping help to reduce runoff and erosion. Plowing under crop residue and green manure is also important in management. Capability unit IIIe–2; woodland group 3o1.

MoD—Manlius shaly silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but the surface layer contains more shale fragments, and the soil is generally not as deep. This soil occupies bedrock-controlled uplands. Areas are narrow and long or irregularly shaped. Most are less than 20 acres in size.

Included with this soil in mapping are small areas of Rock outcrop of sandstone. Many of these areas are indicated on the map by rock outcrop symbols. Also included are areas of eroded soils that have hard shale above a depth of 20 inches and areas of Arnot soils.

This Manlius soil is best suited to pasture or woodland. Most areas are wooded or are being reforested. A very severe hazard of erosion, moderately steep slopes, and bedrock at a depth of 20 to 40 inches limit use. Periodic renovation of pasture sod and applications of fertilizer and lime produce higher quality feed and provide better erosion control. Capability unit IVe–2; woodland group 3r1.

MPE—Manlius-Rock outcrop association, steep. This mapping unit occupies steep, bedrock-controlled landforms adjacent to streams that have cut deep in the bedrock, mostly in the Mohawk Valley area of Schenectady County. Slope is generally more than 25 percent. Areas are long and narrow. Most range from 10 to 75 acres in size.

This mapping unit is 55 percent Manlius soils, 30 percent Rock outcrop, and 15 percent less extensive soils.

Manlius soils in this unit have a profile similar to the one described as representative of the series, but the surface layer is very shaly. Intermingled throughout are exposures of shale bedrock that make up the Rock outcrop part of the unit. Short, nearly vertical escarpments of shale are in places. Less extensive in this unit are areas of similar, very shallow soils near the fringe areas of exposed bedrock and a few areas of deeper soils at the tops of slopes.

This mapping unit is suited to limited pasture, woodland, and wildlife habitat. Shallowness, droughtiness, and many rock outcrops limit most uses. Capability unit VIIs–2. Manlius soil in woodland group 3r2; Rock outcrop not assigned.

Mardin Series

The Mardin series consists of deep, gently sloping to moderately steep, moderately well drained, medium-textured soils that have a very firm fragipan and that are on upland till plains. These soils formed in acid glacial till that has a high content of sandstone and shale.

In a representative profile the surface layer is 2 inches of very dark gray, gravelly silt loam. The upper part of the subsoil is 12 inches of yellowish-brown, very friable gravelly loam. The lower part of the subsoil is dark yellowish-brown, very friable gravelly silt loam 10 inches thick. The next 3 inches is a leached layer of mottled brown, firm gravelly loam. The fragipan, from a depth of 27 to 36 inches, is mottled dark grayish-brown, very firm gravelly silt loam. The lower 11 inches of the pan is mottled olive-brown, very firm gravelly silt loam. The substratum to a depth of 55 inches is very firm, olive-brown gravelly silt loam.

Seasonally the water table is perched on the very firm fragipan and ground water is within 1½ to 2 feet of the surface in spring and during periods of heavy precipitation. Permeability is moderate above the fragipan. Root growth is restricted by the fragipan and is mainly in the upper 24 inches of the soil. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low. Unless limed, the surface layer is strongly acid.

The hazard of erosion is the main limitation in farming. Slope and the very slow permeability of the fragipan are the main limitations in town and country planning.

Representative profile of Mardin gravelly silt loam, 15 to 25 percent slopes, in an abandoned field, 600 yards north of Van Buren Road and 300 yards east of Swaggertown Road, in Glenville:

A1—0 to 2 inches, very dark gray (10YR 3/1) gravelly silt loam; weak, very fine, granular structure; very friable; many roots; many pores; 20 percent gravel; strongly acid; abrupt, smooth boundary.

B21—2 to 14 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, fine, subangular blocky structure; very friable; many roots; many pores; 20 percent gravel; strongly acid; clear, wavy boundary.

B22—14 to 24 inches, dark yellowish-brown (10YR 4/4) gravelly silt loam; weak, fine, subangular blocky

structure; very friable; many roots; many pores; 25 percent gravel; medium acid; clear, wavy boundary.

A'2—24 to 27 inches, brown (10YR 5/3) gravelly loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium and thick, platy structure; firm; common roots; many fine pores; 25 percent gravel; strongly acid; clear, irregular boundary.

B'x1—27 to 36 inches, dark grayish-brown (2.5Y 4/2) gravelly silt loam; moderate, very coarse, prismatic structure parting to weak, thick, platy; very firm and brittle; common roots along faces of prisms; many fine pores; brown (7.5YR 4/4) streaks of silt ½ inch wide that have olive-gray (5Y 5/2) interiors; 30 percent gravel; medium acid; clear, wavy boundary.

B'x2—36 to 47 inches, olive-brown (2.5Y 4/4) gravelly silt loam; moderate, very coarse, prismatic structure parting to weak, thick, platy; very firm and brittle; common roots on faces of prisms; common fine pores; brown (7.5YR 4/4) streaks of silt ½ inch wide that have olive-gray (5Y 5/2) interiors 8 inches apart; 30 percent gravel; medium acid; gradual, wavy boundary.

C—47 to 55 inches, olive-brown (2.5Y 4/4) gravelly silt loam; weak, thick, platy structure; very firm; few roots; 25 percent coarse fragments; slightly acid.

Thickness of the solum ranges from 40 to 70 inches. Depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 10 to 25 percent above the Bx horizon and from 20 to 50 percent in the Bx and C horizons. The fine earth fraction is loam or silt loam. The horizons above the fragipan range from very strongly acid to medium acid. The fragipan and C horizon range from strongly acid to neutral.

The Ap horizon has hue of 10YR or 2.5Y, value of 3, 4, or 5, and chroma of 2 or 3. The B2 harizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. The A'2 horion has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3. The B'x horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 or 4, and chroma of 2, 3, or 4. The C horizon has hue of 2.5Y or 5Y, value of 3 or 4, and chroma of 2, 3, or 4.

Mardin soils are associated with the moderately well drained Nunda soils that have a Bt horizon. They are near the shallow Nassau soils on bedrock-controlled landforms. Mardin soils are adjacent to the sandy, well-drained to excessively drained Colonie soils.

MrB—Mardin gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil occupies glacial till plains. Areas are irregularly shaped. They range from 10 to 20 acres in size. A few small areas have a fine sandy loam surface layer.

Included with this soil in mapping are small areas of Nunda and Nassau soils. Also included are areas of similar soils that are well drained.

This Mardin soil is suited to row crops, hay, pasture, and woodland. It is well suited to most field crops. In places, slight wetness briefly delays spring planting. Spot drainage of these areas provides more uniform moisture conditions when entire fields are worked. Contour planting and contour stripcropping reduce the hazard of erosion. Diversions or terraces also help. Plowing under green manure and crop residue helps maintain desirable soil structure. Capability unit IIe–3; woodland group 3o1.

MrC—Mardin gravelly silt loam, 8 to 15 percent slopes. This sloping soil occupies side slopes of glacial till plains in the eastern part of Schenectady County. Areas are long and narrow and range from 10 to 25 acres in size.

Included with this soil in mapping are small areas of soils that have blown over from adjacent Colonie soils. They have a fine sandy loam mantle that ranges from 8 to 16 inches in thickness. Also included are areas of well-drained, similar soils and a few shallow areas of Nassau soils.

This Mardin soil is suited to row crops, hay, pasture, and woodland. The hazard of erosion is greater than on Mardin gravelly silt loam, 3 to 8 percent slopes, and more intensive erosion-control measures are needed for cultivated crops. Capability unit IIIe–4; woodland group 3o1.

MrD—Mardin gravelly silt loam, 15 to 25 percent slopes. This moderately steep soil has the profile described as representative of the series. It occupies the sides of hills and drumlins in the eastern part of Schenectady County. Areas are long and narrow and few are larger than 25 acres in size.

Included with this soil in mapping are small areas of Nunda soils. Also included are a few small areas of the shallow Nassau soils and similar, well-drained soils.

This Mardin soil is best suited to hay, pasture, and woodland. Row crops can be grown occasionally to reestablish pasture or hayfields. The hazard of erosion is very severe, and erosion-control measures are needed when cultivated crops are grown. Close-growing, sod-type crops are needed for maximum protection. Occasional renovation to reestablish hay or pasture stands and applications of lime and fertilizer provide high quality feed and better erosion control. Capability unit IVe–4; woodland group 3r1.

Mohawk Series

The Mohawk series consists of deep, gently sloping to moderately steep, well drained, medium-textured soils on glacial till plains. These soils formed in firm basal till derived mainly from soft, black shale.

In a representative profile the surface layer is 9 inches of very dark grayish-brown silt loam. The upper part of the subsoil is 10 inches of dark-brown, firm heavy silt loam. The lower 8 inches of the subsoil is dark-brown, firm heavy silt loam. The substratum to a depth of 68 inches is very dark grayish-brown, firm shaly silt loam.

Seasonally the water table is perched on the deep, firm layers in the substratum, usually below a depth of 3½ feet. Permeability is moderate. Root growth is mainly in the upper 30 inches of the soil. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus is medium. The content of lime is medium or high. Unless limed, the surface layer is slightly acid.

Slope is the main limitation in farming. The reserve supply of nutrients is higher for soils on uplands than for other soils in the county. Erosion-control practices are needed. Slope is the main limitation in town and country planning.

Representative profile of Mohawk silt loam, 3 to 8

percent slopes, in a cornfield, 20 feet west of Hall Road and ¼ mile north of Logtown Road, in Glen:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam, grayish-brown (10YR 5/2) when dry; weak, medium and fine, granular structure; friable; many roots; 5 percent coarse fragments; slightly acid; abrupt, smooth boundary.

B21—9 to 19 inches, dark-brown (10YR 4/3) heavy silt loam; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; firm; many roots; many fine and medium pores; thin, discontinuous, very dark grayish-brown (10YR 3/2) faces of peds that have patchy clay films; 10 percent coarse fragments; slightly acid; clear,

B22t— 19 to 27 inches, dark-brown (10YR 3/3) heavy silt loam; weak, coarse, prismatic structure parting to moderate, coarse, subangular blocky; firm; few roots; many fine and medium pores; patchy clay films on faces of peds and in pores; 10 percent coarse fragments; neutral; clear, wavy boundary.

C—27 to 68 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; olive-brown (2.5Y 4/4) and strong-brown (7.5YR 5/6) fragments of weathered limestone throughout; weak, coarse, subangular blocky structure; firm; few roots; common fine pores; thin, discontinuous, patchy clay films on pores; 30 percent coarse fragments; neutral; calcareous at a depth of 55 inches.

Thickness of the solum ranges from 24 to 40 inches. Depth to carbonates ranges from 24 to 60 inches. The content of coarse fragments ranges from few to 10 percent in the surface layer and increases with increasing depth to as much as 10 to 25 percent in the lower part of the B horizon. The upper part of the solum is silt loam. The lower part of the B horizon ranges from heavy silt loam to light silty clay loam. The solum ranges from slightly acid to neutral.

The Ap horizon is very dark grayish brown (10YR 3/2). The B horizon has hue of 10 YR or 2.5Y, value of 3, 4, or 5, and chroma of 2 or 3. Chroma is dominantly 2 in the lower part of the B horizon and 3 in the upper part. Faces of peds are generally 1 chroma darker. The C horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2. The content of coarse fragments ranges from 15 to 30 percent. The fragments are mainly black shale and gravel.

Mohawk soils are in a drainage sequence with the somewhat poorly drained Manheim soils and the poorly drained Ilion soils, which formed in similar material. They are also associated with the Palatine soils, which are moderately deep over black shale.

MsB—Mohawk silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies narrow, rolling ridgetops. Areas are long and narrow and have an east-west orientation. Most are 10 acres or less in size.

Included with this soil in mapping are small areas of Palatine soils. Also included are small areas of soils that have dark till about 24 to 40 inches thick over highly weathered, calcareous, black shale bedrock; a few spots of Lansing soils; and small, depressional areas of Manheim soils. Similar but wetter soils are included with this soil in Schenectady County.

This Mohawk soil is suited to row crops, hay, pasture, and woodland. All crops suited to the area can be grown. When the soil is row cropped, erosion-control measures are needed. Contour planting, contour stripcropping, diversions or terraces, and other measures provide the needed runoff and erosion control. Capability unit IIe–1; woodland group 2o1.

MsC—Mohawk silt loam, 8 to 15 percent slopes. This sloping soil occupies side slopes leading from rolling ridgetops. Areas are generally long and narrow, but a few are broad and smooth. Many areas average more than 20 acres in size.

Included with this soil in mapping are small areas of Palatine soils. Also included are small areas of soils that have dark till about 30 inches thick over soft, weathered, dark shale bedrock and a few small areas of the brighter colored Lansing soils.

This Mohawk soil is suited to row crops, hay, pasture, and woodland. When the soil is row cropped, slope is a limitation and erosion control is needed. Contour planting, contour stripcropping, diversions or terraces, and other measures are important in controlling runoff and erosion. Plowing under green manure and crop residue is also important. Capability unit IIIe–1; woodland group 2o1.

MsD—Mohawk silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies long, narrow sides of hills. Areas are generally less than 25 acres in size.

Included with this soil in mapping are small areas of Palatine soils, especially in the northern part of the town of Minden. Also included are areas of soils that have short, steeper slopes, small areas of less sloping soils, and a few, small areas of Lansing soils.

This Mohawk soil is best suited to hay, pasture, and woodland. High-yielding alfalfa varieties do especially well. When the soil is row cropped, the very severe hazard of erosion is a limitation. The use of modern machinery is also a hazard on the moderately steep soils. Occasional cropping to reestablish stands of hay and pasture is beneficial. Where possible, contour planting or cross-slope tillage should be used to reestablish sod crops. Capability unit IVe–1; woodland group 2r2.

Mosherville Series

The Mosherville series consists of deep, nearly level and gently sloping, somewhat poorly drained, medium-textured soils that have a fragipan and that are on glacial till plains. These soils formed partly in a loamy eolian mantle that is underlain by firm glacial till derived from granite, gneiss, limestone, sandstone, and dark shale.

In a representative profile the surface layer is 9 inches of dark-brown loam. The subsoil is 4 inches of mottled yellowish-brown, friable loam. The next layer is mottled brown fine sandy loam 5 inches thick. The fragipan, from a depth of 18 to 39 inches, is mottled dark grayish-brown, firm very fine sandy loam. The substratum to a depth of 52 inches is mottled dark grayish-brown, firm fine sandy loam. To a depth of 60 inches it is very friable, calcareous gravelly loam.

The water table is within 10 inches of the surface early in spring or during wet periods. Permeability is moderate above the fragipan and slow in the fragipan. Root growth is mainly in the upper 20 inches of the soil, and few roots penetrate the fragipan. Available water capacity is moderate. The capacity of these soils to supply nitrogen is high and their capacity to supply

phosphorus and potassium is low. The content of lime is low. Unless limed, the surface layer is strongly acid.

Seasonal wetness is the main limitation in farming. Unless the soil is adequately drained, water-tolerant, shallow-rooted species should be planted. Seasonal wetness, the fragipan, and slow permeability are the main limitations in town and country planning.

Representative profile of Mosherville loam, 3 to 8 percent slopes, in an idle field, 1,000 feet west of Midline Road and 1,600 feet south of Wallins Corners Road, in Amsterdam:

Ap—0 to 9 inches, dark-brown (10YR 3/3) loam; weak, medium and fine, granular structure; friable; many roots; 5 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B—9 to 13 inches, yellowish-brown (10YR 5/4) loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable; common roots; many medium pores; 5 percent coarse fragments; medium acid; abrupt, wavy boundary.

IIA'2—13 to 18 inches, brown (10YR 5/3) fine sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles and few, coarse, distinct, yellowish-brown (10YR 5/4) mottles; moderate, thick, platy structure; firm; few roots and pores; 10 percent coarse fragments; medium acid; abrupt, irregular boundary.

IIB'x—18 to 39 inches, dark grayish-brown (2.5Y 4/2) very fine sandy loam; few, medium and coarse, distinct, yellowish-brown (10YR 5/4) mottles and common, fine, distinct, dark-gray (10YR 4/1) mottles; strong, very coarse, prismatic structure parting to moderate, medium, platy; firm and brittle; few roots and pores; grayish-brown (10YR 5/2) silt coatings on faces of peds in upper part and dark-gray (10YR 4/1) silt coatings in lower part; many, very dark gray (10YR 3/1) friable fragments of shale; 13 percent coarse fragments; slightly acid; gradual, smooth boundary.

IIC—39 to 52 inches, dark grayish-brown (10YR 4/2) fine sandy loam; common, coarse, distinct, yellowish-brown (10YR 5/4) mottles and common, coarse, faint, grayish-brown (10YR 5/2) mottles; strong, thick, platy structure; firm; 15 percent gravel and very dark gray fragments of shale; neutral; abrupt, smooth boundary.

IIIC—52 to 60 inches, dark grayish-brown (2.5Y 4/2) gravelly loam; massive; very friable; 30 percent gravel and very dark brown, small chips of shale; mildly alkaline; calcareous.

Thickness of the solum ranges from 39 to 60 inches. Depth to the fragipan ranges from 16 to 26 inches. Carbonates may occur below a depth of 50 inches. The content of coarse fragments ranges from few to 15 percent in horizons above the fragipan and from 10 to 30 percent in the fragipan and substratum. The horizons above the fragipan range from fine sandy loam to silt loam. The fine earth fraction in the fragipan and below ranges from fine sandy loam to loam.

The Ap horizon ranges from very dark grayish-brown (10YR 3/2) to brown (10YR 5/3). It is strongly acid or medium acid. The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3, 4, or 6. It ranges from strongly acid to slightly acid. The A'2 horizon has hue of 10YR or 2.5Y, value of 4, 5, or 6, and chroma of 2 or 3. It is strongly acid or medium acid. The B'x horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It ranges from medium acid to neutral. The C horizon is dominantly dark grayish brown (2.5Y 4/2 or 10YR 4/2). It ranges from neutral to moderately alkaline.

Mosherville soils are in a drainage sequence with the well drained or moderately well drained Broadalbin soils and the poorly drained or very poorly drained Sun soils, which formed in similar material. They are closely associated with Appleton and Ilion soils. Mosherville soils are similar in drainage to Appleton soils, which have an argillic horizon and do not have a fragipan. On nearby wetter areas where the surficial deposit is thin, Mosherville soils are associated with the poorly drained Ilion soils, which have a Bt horizon instead of a fragipan layer.

MtA—Mosherville loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but the surface layer is darker in color and the subsoil is slightly darker in color. This soil occupies level glacial till plains. Areas tend to be saucer shaped and few are larger than 10 acres in size.

Included with this soil in mapping are small depressional areas of the wetter Sun soils. Also included are a few scattered areas of Churchville and Appleton soils.

This Mosherville soil is suited to row crops, hay, pasture, and woodland. Seasonal wetness is the main limitation for farm use. Water-tolerant, shallow-rooted species do best especially where the soil is only partly drained. When the soil is intensively row cropped, a drainage system is needed. Capability unit IIIw–2; woodland group 3w2.

MtB—Mosherville loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies glacial till plains in the north-central part of the town of Amsterdam. Areas are broad and flat and average 25 to 30 acres in size.

Included with this soil in mapping are small depressional areas of wetter Sun or Ilion soils. Also included, where the eolian deposit is thin, are areas of Appleton soils and Ilion soils in the wetter depressions.

This Mosherville soil is suited to row crops, hay, pasture, and woodland. It is best suited to water-tolerant, shallow-rooted crops. Seasonal wetness, slow permeability, and a fragipan limit nonfarm uses. The installation of a subsurface drainage system greatly improves the soil for row crop production. In sloping areas, diversions that cut off seepage water are effective in draining these soils and also help to control erosion. Capability unit IIIw–2; woodland group 3w2.

Nassau Series

The Nassau series consists of shallow, nearly level to moderately steep, somewhat excessively drained, medium-textured soils on bedrock-controlled till plains. These soils formed in 10 to 20 inches of shaly glacial till over hard shale or slate bedrock.

In a representative profile the surface layer is very dark grayish-brown shaly silt loam 8 inches thick. The subsoil, which extends to a depth of 15 inches, is yellowish-brown, very friable, very shaly silt loam. Shale bedrock is at a depth of 15 inches.

The water table is deep and is in the shale bedrock. Permeability is moderate. Root growth is restricted to the 10 to 20 inches of soil above the bedrock. Available water capacity is very low or low. The capacity of these soils to supply available nitrogen and phosphorus is medium and their capacity to supply potassium is low. The content of lime is very low. Unless

limed, the surface layer is strongly acid or very strongly acid.

Droughtiness and the hazard of erosion on the steeper slopes are the main limitations in farming. If this soil is cultivated, early-maturing, shallow-rooted crops should be grown. The bedrock at a depth of 10 to 20 inches limits the nonfarm use of this soil.

Representative profile of Nassau shaly silt loam, 0 to 8 percent slopes, in an idle field, 25 yards west of Baldwin Road and 125 yards northwest of Swaggertown Road, in Glenville:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; weak, fine, granular structure; very friable; many roots; many pores; 25 percent fragments of shale; slightly acid; clear, wavy boundary.

B2—8 to 15 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, fine, subangular blocky structure; very friable; common roots; common pores; 40 percent fragments of shale; strongly acid; abrupt, wavy boundary.

IIR—15 inches, dark-gray beds of shale and slate.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. The content of coarse fragments ranges from 15 to 30 percent in the A horizon and from 35 to 50 percent in the B horizon. The fine earth fraction is loam or silt loam. Unless limed, the solum is strongly acid or very strongly acid throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 6.

Nassau soils are similar in depth to Arnot soils, but Arnot soils are channery or flaggy. Nassau soils are closely associated with the moderately deep Manlius, Brockport, and Hornell soils.

NaB—Nassau shaly silt loam, 0 to 8 percent slopes. This nearly level to gently sloping soil has the profile described as representative of the series. It occupies undulating or gently sloping, bedrock-controlled, glacially modified till plains. Areas are irregularly shaped and range from 10 to 45 acres in size. Included in mapping are small, deeper areas of Mardin soils, other small areas of Arnot, Manlius, and Brockport soils, and a few small outcrops of bedrock.

This Nassau soil is best suited to hay, pasture, and woodland. Because the soil is droughty, early-maturing varieties do best. Bedrock at a depth of 10 to 20 inches limits nonfarm uses. Plowing under green manure and crop residue helps to improve water-holding capacity and surface soil structure. Cross-slope or contour planting is effective in runoff and erosion control. Capability unit IIIs–2; woodland group 4d1.

NaD—Nassau shaly silt loam, 8 to 25 percent slopes. This sloping to moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies bedrock-controlled areas that are irregularly shaped and range from 15 to 30 acres in size.

Included with this soil in mapping are small areas of the deeper Mardin soils and moderately deep Manlius soils. Also included are the wetter, moderately deep Brockport soils adjacent to seepage areas and in a few small depressions. Small outcrops of shale are common.

This Nassau soil is best suited to pasture or woodland. The hazard of erosion is very severe. Early-maturing, shallow-rooted varieties are best suited to this soil. Bedrock at a depth of 10 to 20 inches and slope limit many nonfarm uses. Application of lime and fertilizer improves the quality of pastures and the density of plant cover, which, in turn, controls erosion. Capability unit VIe–1; woodland group 4x1.

Nellis Series

The Nellis series consists of deep, gently sloping to moderately steep, well-drained, medium-textured soils on glacial till plains. These soils formed in calcareous glacial till derived from limestone and black shale.

In a representative profile the surface layer is very dark grayish-brown loam 10 inches thick. The subsoil is brown, friable loam to a depth of 33 inches. The calcareous substratum to a depth of 51 inches is olive-brown, friable gravelly loam.

The water table is below a depth of 3½ feet. Permeability is moderate to moderately slow. Root growth is not restricted, but most roots are in the upper 30 inches of the soil. Available water capacity is high. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is low. The content of lime is high. Unless limed, the surface layer is slightly acid.

Slope and the hazard of erosion are the main limitations in farming. Erosion-control practices are needed. Slope is the main limitation in town and country planning.

Representative profile of Nellis loam, 3 to 8 percent slopes, in a meadow, 120 feet north of Crumb Creek Road and 75 yards east of Kennedy Road, in St. Johnsville:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) loam, light brownish-gray (10YR 6/2) when dry; moderate, medium, granular structure; friable; many roots; porous; 3 percent coarse fragments; neutral; clear, smooth boundary.

B21—10 to 19 inches, brown (10YR 5/3) loam; moderate, medium, subangular blocky structure; friable, common roots; many medium pores; many earthworm channels; 5 percent coarse fragments; neutral; gradual, wavy boundary.

B22—19 to 33 inches, brown (10YR 4/3) loam; weak, medium, subangular blocky structure; friable; common roots; many medium and fine pores; few silt coatings on faces of peds and few clay-lined pores; 10 percent coarse fragments; neutral; abrupt, wavy boundary.

C—33 to 51 inches, olive-brown (2.5Y 4/4) gravelly loam; moderate, very thick, platy structure; friable; few fine roots; common fine and medium pores; 20 percent gravel; mildly alkaline; calcareous.

Thickness of the solum ranges from 18 to 35 inches. Depth to carbonates is the same. The content of coarse fragments ranges from 5 to 20 percent in the solum and from 15 to 35 percent in the substratum. The fragments are mainly gravel and some stones. The solum is mainly loam but ranges from fine sandy loam to silt loam. It ranges from medium acid to neutral.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (2.5Y 4/2). The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2, 3, or 4. The C horizon ranges from dark grayish brown (10YR 4/2) to light olive brown (2.5Y 5/4).

Nellis soils are in a drainage sequence with the moderately well drained Amenia soils and the poorly drained Ilion soils that formed in similar material. They are also

associated with Lansing, Mohawk, and Farmington soils. Nellis soils do not have a Bt horizon, which the deep, well drained and moderately well drained Mohawk soils and the well-drained Lansing soils have. Nellis soils are deeper than the shallow Farmington soils.

NeB—Nellis loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies rounded hilltops on gently undulating till plains. Areas are long and narrow and average 5 to 15 acres in size.

Included with this soil in mapping are small areas of soils in the north-central part of Montgomery County that have a more acid, silty surface layer and subsoil and are brighter in color in the upper 8 to 12 inches. Also included are small depressional areas of Amenia soils, very narrow areas of Ilion soils along a few drainageways, and scattered, small areas of somewhat poorly drained Churchville soils that have surface deposits of clay over glacial till.

This Nellis soil is well suited to row crops, hay, pasture, and woodland. It is very productive, and all locally suited crops can be grown. When the soil is row cropped, erosion-control measures are generally needed. Contour planting and contour stripcropping provide runoff and erosion control. Diversions or terraces are also needed in places. Capability unit IIe–1; woodland group 2o1.

NeC—Nellis loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies the sides of drumloidal-shaped hills on till plains. Areas are long and narrow and range from 10 to 25 acres in size.

Included with this soil in mapping are small areas of Wassaic soils that have limestone bedrock at a depth of 20 to 40 inches. Also included are a few small areas of rock outcrop that are indicated on the map by spot symbols and a few areas of Lansing and Mohawk soils.

This Nellis soil is suited to row crops, hay, pasture, and woodland. When the soil is cultivated, a severe hazard of erosion is the main limitation. When the soil is row cropped, contour planting, contour stripcropping, and other measures are needed to control erosion. Diversions and other measures also help to control runoff and erosion. Close-grown crops, such as hay and pasture, provide excellent protection for this soil. Capability unit IIIe–1; woodland group 2o1.

NeD—Nellis loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies smooth hillsides on till plains. Areas are long and narrow and range from 15 to 25 acres in size.

Included with this soil in mapping are small areas of the moderately deep Wassaic soils or shallow Farmington soils. Also included are a few small areas of Lansing soils.

This Nellis soil is best suited to hay, pasture, and woodland. The hazard of erosion is very severe. When the soil is row cropped, erosion-control measures are needed. Contour planting, cross-slope tillage, and other measures should be used where possible to reestablish hay or pasture. Applications of lime and fertilizer protect the soil from erosion by substantially increasing the quality of feed and the density of plant cover. Capability unit IVe–1; woodland group 2r2.

Nunda Series

The Nunda series consists of deep, gently sloping to very steep, moderately well drained, medium-textured soils on till plains. These soils formed in an acid, loamy mantle that is underlain by calcareous, compact glacial till.

In a representative profile the surface layer is 7 inches of dark-brown channery silt loam. The subsoil is 8 inches of yellowish-brown, very friable channery silt loam. Below this is a leached layer of mottled olive-gray, friable channery loam 5 inches thick. A leached layer from a depth of 20 to 25 inches is mottled grayish-brown, firm gravelly loam. The lower part of the subsoil, which extends to a depth of 42 inches, is mottled dark grayish-brown, firm gravelly silty clay loam. The calcareous substratum is mottled grayish-brown, friable gravelly loam to a depth of 54 inches.

The water table is within 18 inches of the surface early in spring and during periods of heavy precipitation. Permeability is slow or very slow. Root growth is mainly in the upper 25 to 30 inches of the soil, but roots penetrate to greater depths. Available water capacity is high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low to medium. Unless limed, the surface layer is strongly acid.

Slope and the hazard of erosion are the main limitations in farming. These soils are suited to crops commonly grown in the area. Erosion-control practices are needed. Slope and slow or very slow permeability are the main limitations in town and country planning.

Representative profile of Nunda channery silt loam, 15 to 25 percent slopes, in an idle field, 210 yards east of Harrick Road and 135 yards south of Finch Road, in Duanesburg:

Ap—0 to 7 inches, dark-brown (10YR 4/3) channery silt loam; weak, very fine, granular structure; very friable; many roots; 15 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B2—7 to 15 inches, yellowish-brown (10YR 5/6) channery silt loam; weak, fine, granular structure; very friable; many roots; many pores; 15 percent coarse fragments; strongly acid; clear, wavy boundary.

A'21—15 to 20 inches, olive-gray (5Y 5/2) channery loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; strong, thin and medium, platy structure; friable; common roots; many pores; 25 percent coarse fragments; medium acid; clear, wavy boundary.

IIA'22—20 to 25 inches, grayish-brown (2.5Y 5/2) gravelly loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and many, medium, faint, light olive-brown (2.5Y 5/4) mottles; moderate, medium, subangular blocky structure; firm; few roots; common pores; thin, patchy clay films on a few faces of peds, light brownish-gray (2.5Y 6/2) faces on peds; 25 percent coarse fragments; medium acid; clear, wavy boundary.

IIB'2t—25 to 42 inches, dark grayish-brown (2.5Y 4/2) gravelly silty clay loam; many, medium and coarse, distinct, dark yellowish-brown (10YR 4/4) mottles and few, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; firm; few roots; many pores; thin, patchy

clay films on surfaces of peds in lower part, grayish-brown (2.5Y 5/2) faces on peds in upper 3 inches; 20 percent coarse fragments, many fine fragments of shale; neutral; gradual, wavy boundary.

IIC—42 to 54 inches, grayish-brown (2.5Y 5/2) gravelly loam, many large bodies of light silty clay loam; few, medium, faint, yellowish-brown (10YR 5/4) mottles; weak, thick, platy structure; friable; few roots; common medium and fine pores; few patchy clay films on faces of cleavages and in pores; 20 percent coarse fragments; neutral; calcareous below a depth of 50 inches.

Thickness of the solum ranges from 30 to 45 inches. Depth to carbonates ranges from 36 to 72 inches. The upper part of the mantle ranges from 13 to 24 inches in thickness. The content of coarse fragments, mainly channery fragments and flagstones, ranges from 10 to 25 percent. The fine earth fraction in the upper part of the solum ranges from loam to silt loam. Below the mantle, the content of coarse fragments, mainly gravel or shale fragments, ranges from 15 to 30 percent. The fine earth fraction in the lower part of the solum is heavy loam or heavy silt loam or silty clay loam. The fine earth fraction ranges from heavy silt loam to loam in the C horizon. The upper silty deposit is strongly or medium acid. The rest of the solum ranges from medium acid to neutral.

The Ap horizon has hue of 10YR, value of 3, 4, or 5, and chroma of 2 or 3. The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. The underlying A' horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2 or 3. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 2. The C horizon is similar to the Bt in hue, value, and chroma.

Nunda soils are in a drainage sequence with the somewhat poorly drained Burdett soils and the poorly drained Ilion soils, which formed in similar material. They are associated with Lansing soils, which have a silt cap less than 12 inches thick.

NuB—Nunda channery silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but the subsoil is darker in color. This soil occupies ridgetops that are long and narrow. Areas range from 15 to 30 acres in size.

Included with this soil in mapping are small, flat or depressional areas of Burdett and Ilion soils. Also included are areas of similar soils that have a fragipan, mainly in Schenectady County.

This Nunda soil is suited to row crops, hay, pasture, and woodland. All crops suited to the area can be grown. The slowly permeable or very slowly permeable subsoil limits nonfarm uses. When the soil is cultivated, erosion-control measures are generally needed. When the soil is intensively row cropped, contour planting, contour stripcropping, diversions or terraces, and other measures are needed to control runoff and erosion. Capability unit IIe–3; woodland group 2o1.

NuC—Nunda channery silt loam, 8 to 15 percent slopes. This sloping soil occupies the sides of the east-west oriented, drumloidal hills in the southern part of the survey area. Areas are long and narrow and range from 20 to 40 acres in size.

Included with this soil in mapping are small areas of the wetter Burdett and Ilion soils along drainageways or in small, less sloping areas. Also included are areas of similar soils that have a fragipan and a few narrow bands of bedrock escarpment that are indicated on the map by bedrock outcrop or bedrock escarpment symbols.

This Nunda soil is suited to row crops, hay, pasture, and woodland. It tends to be somewhat droughty during the growing season. When the soil is cultivated, erosion-control measures are needed. Where conditions and slope permit, contour planting, contour stripcropping, diversions or terraces, and other measures are effective in controlling runoff and erosion. Close-grown crops, such as hay and pasture, are effective in protecting the soil. Capability unit IIIe–4; woodland group 2o1.

NuD—Nunda channery silt loam, 15 to 25 percent slopes. This moderately steep soil has the profile described as representative of the series. It occupies the sides of drumloidal hills at high elevations in the southern part of the survey area. Areas are long and narrow. Most average 25 to 50 acres in size.

Included with this soil in mapping are small narrow bands of Arnot or Manlius soils, many of which are indicated on the map by rock outcrop symbols or bedrock escarpment symbols. Also included are areas of similar soils that have a fragipan and areas of eroded soils.

This Nunda soil is suited to pasture and woodland, but is best suited to close-grown hay and sod crops. High-yielding alfalfa varieties do especially well. Occasional seeding is sometimes needed to reestablish stands of hay or pasture. The hazard of erosion severely limits farm use. Where possible, contour or cross-slope tillage should be used as an added erosion-control practice. Reestablishment of hay and pasture and application of lime and fertilizer provide improved quality feed and better plant cover for erosion control. Capability unit IVe–4; woodland group 2r2.

NVF—Nunda soils, very steep. These very steep soils have a similar but thinner profile than the one described as representative of the series. The surface layer is loam, silt loam, or their channery or gravelly analogs. Most areas were formed by fast-moving water that dissected the till plain. Areas are long and narrow and range from 20 to 50 acres in size.

Included with these soils in mapping are small, very steep areas of exposed till that have no plant cover. Bedrock is often exposed near the lower parts of the slopes in these areas.

These Nunda soils are suited to woodland or wildlife habitat. Steepness limits farm and most nonfarm uses. Capability unit VIIe–1; woodland group 2r4.

NWC—Nunda extremely stony soils, sloping. These gently sloping to moderately steep soils have a profile similar to the one described as representative of the series, but more stones are on the surface. The surface layer is loam, silt loam, or their channery and gravelly analogs. These soils occupy ridgetops and side slopes that are dominantly sloping. Areas are irregularly shaped and range from 10 to 30 acres in size.

Included with these soils in mapping are small areas of stony and very stony Nunda soils. Also included are areas of wetter, stony soils.

These Nunda soils are suited to limited pasture and woodland. The large number of stones on the surface, slow or very slow permeability, and slope limit farm and nonfarm uses. It is impractical to use farm ma-

chinery because of the many stones. Capability unit VIIs–2; woodland group 3x1.

Odessa Series

The Odessa series consists of deep, gently sloping, somewhat poorly drained, medium-textured soils on glacial lake plains within the till uplands. These soils formed in glacial lake deposits of silt and clay.

In a representative profile the surface layer is 8 inches of dark-brown silt loam. The next layer is mottled brown silty clay loam 3 inches thick. The subsoil, which extends to a depth of 23 inches, is mottled reddish-brown, very firm silty clay. The substratum to a depth of 50 inches is mottled reddish-brown, very firm silty clay.

The water table is within 8 inches of the surface early in spring. Permeability is very slow. Root growth is in the upper 18 to 20 inches of the soil. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus is medium. Unless limed, the surface layer is strongly acid or medium acid.

Seasonal wetness is the main limitation in farming. The soil has a high percentage of clay, and tilth is difficult to maintain. Seasonal wetness, very slow permeability, and instability of the soil are the main limitations in town and country planning.

Representative profile of Odessa silt loam, 3 to 8 percent slopes, in a hayfield, 30 yards east of Creek Road and 60 yards southwest of Old Route N.Y. 30, in Duanesburg:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly hard; many roots and pores; strongly acid; abrupt, smooth boundary.

B&A—8 to 11 inches, brown (7.5YR 5/4) silty clay loam; many, common, distinct, strong-brown (7.5YR 5/8) mottles and common, medium, faint, pinkish-gray (7.5YR 6/2) mottles; moderate, medium, subangular blocky structure; firm, slightly plastic; many roots and pores; pinkinsh-gray (5YR 6/2) silt films on peds; strongly acid; clear, wavy boundary.

B2t—11 to 23 inches, reddish-brown (5YR 4/3) silty clay; common, medium, distinct, brown (7.5YR 5/4) mottles and few, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, coarse, blocky structure; very firm, plastic; common roots and pores; pinkish-gray (5YR 6/2) clay films on many faces of peds; neutral; clear, wavy boundary.

C—23 to 50 inches, reddish-brown (5YR 4/3) silty clay; common, medium, distinct, yellowish-brown (10YR 5/8) and light-gray (10YR 7/1) mottles; thin to thick, platy structure; very firm, plastic; few roots; common fine pores; layers of pinkish-gray (7.5YR 6/2) silt at lower depths; mildly alkaline; calcareous.

Thickness of the solum ranges from 20 to 40 inches, and depth to bedrock is generally more than 10 feet. Depth to carbonates ranges from 20 to 45 inches. The content of coarse fragments is generally none, but it may range to as much as 5 percent in the lower part of the solum.

The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3). It ranges from strongly acid to slightly acid.

The B&A horizon has hue of 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is heavy silt loam or silty clay loam. The B&A horizon ranges from strongly acid to slightly acid.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2, 3, or 4. It is silty clay or clay. The B2t horizon ranges from medium acid to mildly alkaline.

The C horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. It is silty clay or clay. The C horizon consists of fine to thick varves of silt and clay.

Odessa soils are associated with the Churchville soils, which are similarly drained but formed in deposits of silt and clay 20 to 40 inches thick over till. They have drainage similar to that of Rhinebeck soils, but are redder throughout. On the adjacent till areas, Odessa soils are associated with the coarser textured Burdett, Scriba, and Darien soils.

OdB—Odessa silt loam, 3 to 8 percent slopes. This gently sloping soil formed in silt and clay deposits within the till uplands of the southwestern part of Schenectady County. It occupies small areas on old glacial lakebeds that are adjacent to Schoharie Creek. Some areas are long and narrow; others are broad and irregularly shaped. Areas range from 5 to 25 acres in size. In places the surface layer is silty clay loam.

Included with this soil in mapping are small areas of similar but wetter soils along drainageways, in depressions, or around seepage spots. Also included are areas of Churchville soils along valley sides at the high-water mark of the old glacial lake.

This Odessa soil is best suited to hay, pasture, and woodland. Seasonal wetness and the clayey nature of the soil limit its use for row crops. Selection of water-tolerant species should be considered. If this soil is tilled when too wet, it clods and puddles easily. Plowing under crop residue and green manure helps to maintain desirable soil structure. Capability unit IIIw–4; woodland group 3w1.

Otisville Series

The Otisville series consists of deep, nearly level and undulating, excessively drained, coarse-textured soils on outwash terraces. These soils formed in water-sorted sand and gravel derived from acid, silicious rocks.

In a representative profile the surface layer is 7 inches of very dark grayish-brown gravelly loamy sand. The upper part of the subsoil is 17 inches of brown, very friable very gravelly loamy sand. The lower part of the subsoil is loose, brown very gravelly loamy sand 12 inches thick. The substratum to a depth of 50 inches is stratified sand and gravel. Gravel is prominent throughout the soil.

The water table is below a depth of 4 feet throughout the year. Permeability is very rapid. Root growth is mainly in the upper 30 inches. Available water capacity is very low. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low. The content of lime is very low or low. Unless limed, the surface layer is strongly acid.

Droughtiness is the main limitation in farming. This soil generally needs moderate to large applications of lime and fertilizer. These nutrients are readily leached from the soil. It is difficult to establish seedings in this droughty soil. Soil blowing is a hazard when large areas are plowed.

Representative profile of Otisville gravelly loamy sand, 0 to 8 percent slopes, in a gravel pit, 300 yards

west of State Highway 50 and ¾ mile south of Van Buren Road, in Glenville:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) gravelly loamy sand; weak, very fine and fine granular structure; very friable; many roots; porous; 25 percent gravel; strongly acid; abrupt, smooth boundary.

B2—7 to 24 inches, brown (7.5YR 4/4) very gravelly loamy sand; weak, fine and very fine, granular structure; very friable; common roots; 40 percent gravel; strongly acid; clear, wavy boundary.

B3—24 to 36 inches, brown (10YR 5/3) very gravelly loamy sand; single grained; loose; few roots; 50 percent gravel; strongly acid; gradual, wavy boundary.

C—36 to 50 inches, stratified sand and gravel; single grained; loose; 50 percent gravel, ⅛ to ½ inch in size; medium acid.

Thickness of the solum ranges from 14 to 36 inches. Depth to carbonates is more than 80 inches. The content of coarse fragments ranges from 20 to 35 percent in the A horizon and from 35 to 60 percent in the lower part of the B horizon. The fine earth fraction of the B horizon is loamy sand or sand. The solum is very strongly acid or strongly acid.

The Ap horizon has hue of 7.5YR to 2.5Y and value of 3 to 5; chroma is dominantly 2. The B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 6. The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

Otisville soils are similar to the Plainfield soils that have few or no coarse fragments throughout the profile. In some areas, Otisville soils are near the nongravelly, sandy, well-drained to excessively drained Colonie soils, which have thin, wavy lamellae.

OtB—Otisville gravelly loamy sand, 0 to 8 percent slopes. This nearly level and undulating soil occupies small areas on outwash terraces. Areas are small and range from 5 to 20 acres in size.

Included with this soil in mapping are small areas of Plainfield and Colonie soils. Also included are a few areas of the steeper Otisville soils.

This Otisville soil is best suited to hay, pasture, and woodland. Droughtiness and the hazards of soil blowing and erosion limit its use for row crops. Unless the soil is irrigated, its use for shallow-rooted crops is especially limited. The soil warms early in spring and can be tilled and seeded before most other soils. Minimum tillage, cover crops, plowing under green manure and crop residue, and other measures are needed to maintain organic-matter content and stabilize soil structure. Capability unit IIIs–1; woodland group 4s1.

Palatine Series

The Palatine series consists of moderately deep, sloping to moderately steep, well-drained to somewhat excessively drained, medium-textured soils on bedrock-controlled till plains. These soils formed in glacial till derived from calcareous dark shale and limestone.

In a representative profile the surface layer is very dark grayish-brown silt loam 11 inches thick. The subsoil is very dark grayish-brown, friable shaly silt loam which extends to a depth of 18 inches. The substratum is 10 inches of very dark grayish-brown, friable very shaly silt loam. Dark grayish-brown, calcareous hard shale bedrock is at a depth of 28 inches. The water table is below a depth of 4 feet. Permeability is moderate. Root growth is mainly in the upper 24 inches of soil, but roots extend to the bedrock. Available water capacity is low to moderate. The capacity of these soils to supply nitrogen and potassium is high and their capacity to supply phosphorus is generally medium. The content of lime is high. Unless limed, the surface layer is medium acid or slightly acid.

Slope, droughtiness, and shallowness are the main limitations in farming. Shallowness to bedrock and slope are the main limitations in town and country planning.

Representative profile of Palatine silt loam, 3 to 8 percent slopes, in a meadow, 200 yards north of State Highway 5S and ¼ mile west of Sanders Road, in Minden:

Ap—0 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam, dark grayish-brown (10YR 4/2) when dry; moderate, fine, subangular blocky structure parting to weak, medium and fine, granular; friable; many roots; 10 percent fragments of shale; slightly acid; abrupt, smooth boundary.

B2—11 to 18 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; weak, medium and fine, granular structure; friable; many roots; many fine pores; few clay-lined pores; 25 percent soft fragments of shale; slightly acid; abrupt, wavy boundary.

C—18 to 28 inches, very dark grayish-brown (10YR 3/2) very shaly silt loam; friable; common roots; 50 percent calcareous black shale, arranged in bedding planes; neutral; calcareous below a depth of 24 inches, gradual, smooth boundary.

IIR—28 inches, very dark grayish-brown (10YR 3/2), hard shale bedrock; few roots in upper part; moderately alkaline; calcareous.

Thickness of the solum ranges from 15 to 30 inches, and depth to hard shale bedrock ranges from 20 to 40 inches. Carbonates are within a depth of 40 inches, in the horizon above the bedrock or within the bedrock. The content of shale fragments ranges from 10 to 35 percent in the Ap and B horizons. The content of coarse fragments in the lower B or C horizons ranges from 35 to 60 percent. The fine earth fraction in the solum is dominantly silt loam throughout. The Ap horizon is medium acid or slightly acid, the B horizon is slightly acid or neutral, and the lower part of the B horizon and the C horizon are neutral to moderately alkaline.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Dry value is 4 or 5.

The B horizon has hue of 10YR, value of 2, 3, or 4, and chroma of 1, 2, or 3.

A C horizon similar in color to the B horizon occurs in places. Soil material occurs between the bedding planes and vertical cracks in the weathered shale.

The R horizon is a calcareous, very dark grayish-brown (10YR 3/2), very dark brown (10YR 2/2), or black (10YR 2/1) shale. The shale is difficult to cut with a spade.

Palatine soils are in a drainage sequence with the somewhat poorly drained Angola soils and the shallow, poorly drained Joliet soils. Palatine soils are also near the moderately deep Brockport soils and the Madalin variant, which formed in silt and clay deposits.

PaB—Palatine silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies areas on hilltops and benches on the sides of bedrock-controlled hills (fig. 10). Areas are generally less than 30 acres in size. In places the surface layer is loam.

Included with this soil in mapping are small depressional areas of the wetter Angola soils. Also included are small depressional areas of Brockport soils, many

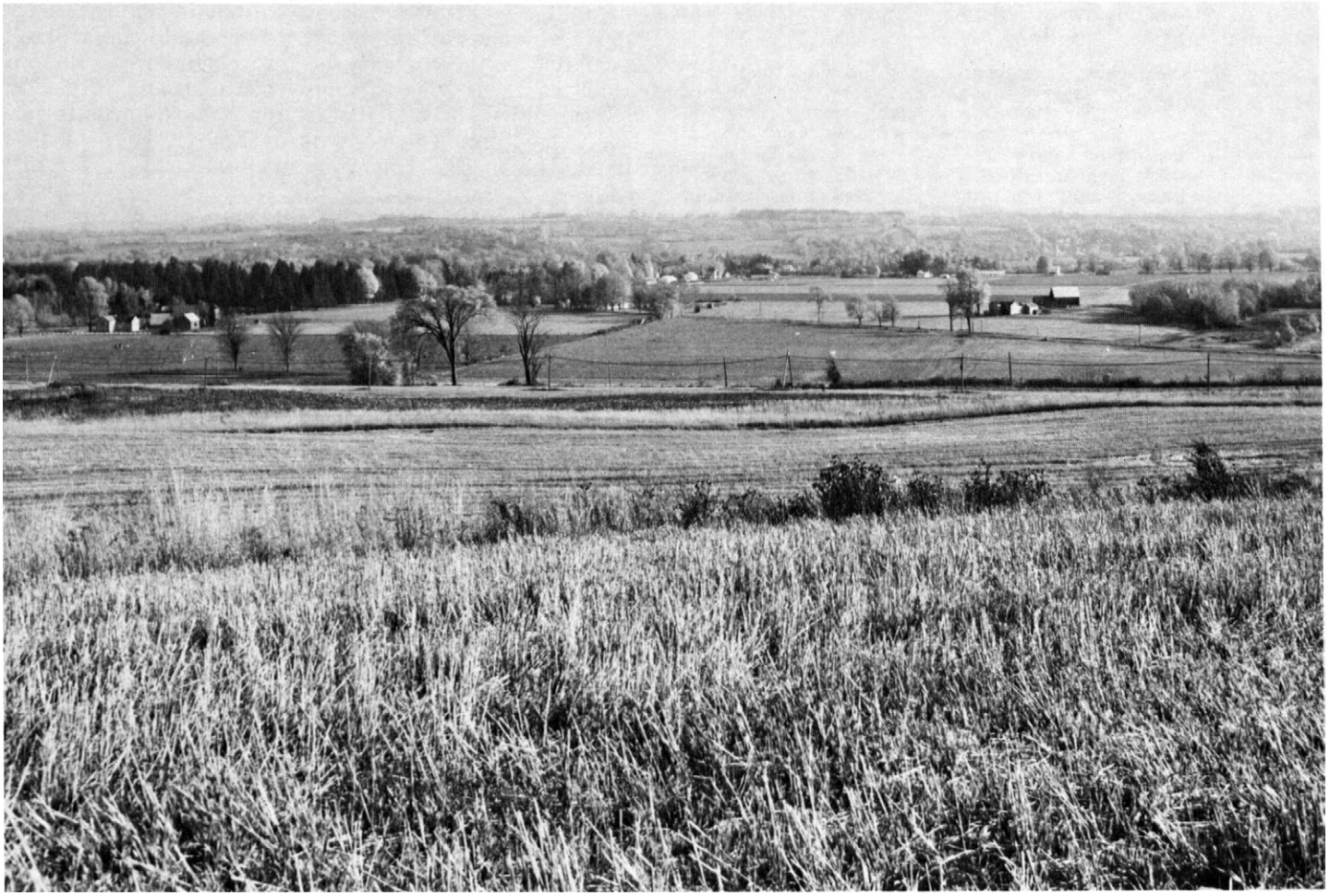

Figure 10.—View of bedrock-controlled Palatine soils in foreground. The farm buildings are on nearly level sandy Plainfield soils.

of which are indicated on the map by clay spot symbols; a few areas of steeper Palatine soils; and some areas of soils that have fewer coarse fragments than Palatine soils.

This Palatine soil is suited to row crops, hay, pasture, and woodland. Slope, the hazard of erosion, and droughtiness are the main limitations when the soil is cropped. When the soil is intensively row cropped, erosion-control measures are needed. Minimum tillage, crop residue, green manure, contour planting, and contour stripcropping are important in erosion control. On long, uniform slopes, diversions or terraces help to control runoff and erosion. Capability unit IIe–1; woodland group 2o1.

PaC—Palatine silt loam, 8 to 15 percent slopes. This sloping soil occupies the sides of bedrock-controlled hills and is adjacent to well-defined streams. Areas are long and narrow and rarely are larger than 20 acres in size. In places the surface layer is loam.

Included with this soil in mapping are small areas of eroded soils that have hard bedrock at a depth of slightly less than 20 inches. Also included are areas of Angola soils along streams or in small seepage areas and some areas of Mohawk soils where this Palatine soil grades into Mohawk soils.

This Palatine soil is best suited to hay, pasture, woodland, and occasional row crops. The hazard of erosion is severe. This soil is droughtier than the gently sloping Palatine soils. When the soil is row cropped, erosion-control measures are needed. Contour planting and contour stripcropping help in controlling erosion. Returning crop residue and plowing under green manure are also important in management. Capability unit IIIe–1; woodland group 2o1.

PaD—Palatine silt loam, 15 to 25 percent slopes. This moderately steep soil occupies the sides of shaly, bedrock-controlled hills and a few areas that are adjacent to well-defined streams that cut through black shale. Areas are generally long and narrow and few are larger than 20 acres in size. In places the surface layer is loam and is very shaly.

Included with this soil in mapping are small areas of eroded soils that have hard shale bedrock at a depth of 12 to 20 inches. Also included are a few small areas of Mohawk soils.

This Palatine soil is suited to hay, pasture, and woodland. Modern machinery cannot be used safely on these soils. Tillage should be restricted to only the amount needed to maintain good stands of hay or pasture. Contour or cross-slope planting should be used

where possible to help in controlling erosion. Capability unit IVe–1; woodland group 2r2.

Palms Series

The Palms series consists of level, very poorly drained muck soils in bogs on till and outwash plains. These soils formed in organic deposits that are 16 to 50 inches deep over medium-textured mineral layers.

In a representative profile the surface layer is 5 inches of black, granular muck. The next layer is black, nonplastic muck 19 inches thick. The upper 12 inches of the substratum is firm, gray silt. The lower 20 inches is firm, gray light silty clay loam.

The water table is at or near the surface about 10 months of the year. Permeability is moderately rapid in the organic material and moderate in the substratum. Root growth is generally in the upper 6 inches of the soil, and vegetation is mainly on hummocks. When the soils are drained, available water capacity is high. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is low. The content of lime is low or very low. Unless limed, the surface layer is strongly acid.

Prolonged wetness or ponding is the main limitation in farming. The organic deposits are shallow, and their potential for farming is low. Prolonged wetness or ponding and very poor stability are the main limitations in town and country planning.

Representative profile of Palms muck, in a forest, 250 yards south of West Lykers Road and ½ mile east of junction with Latimer Hill Road, in Root:

Oa1—0 to 5 inches, black (10YR 2/1) sapric material, broken and rubbed; moderate, fine, granular structure; friable; 1 percent fiber; 20 percent mineral; strongly acid; abrupt, smooth boundary.

Oa2—5 to 15 inches, black (N 2/0) sapric material, black (10YR 2/1) when rubbed; massive parting to weak, coarse, granular structure; nonplastic; 10 percent fiber, less than 3 percent when rubbed; 10 percent mineral; medium acid; clear, smooth boundary.

Oa3—15 to 24 inches, black (10YR 2/1) sapric material, very dark brown (10YR 2/2) when rubbed; massive parting to weak platy structure; nonplastic; 15 percent fiber, less than 5 percent when rubbed; 5 percent mineral; medium acid; abrupt, smooth boundary.

IIC1g—24 to 36 inches, gray (5Y 5/1) silt; massive parting to thick, platy structure; firm; slightly acid; clear, smooth boundary.

IIIC2g—36 to 56 inches, gray (N 5/0) light silty clay loam; massive; stratified silt and some clay; firm, plastic and slightly sticky; neutral.

Depth to loamy IIC material is 16 to 50 inches. Fiber content is 15 percent or less. Fibers are derived from herbaceous plants. Fragments of twigs, branches, or logs range from ½ inch to 3 inches in diameter. The surface tier contains as much as 35 percent mineral material, but the amount decreases with increasing depth. The organic material is strongly acid or medium acid.

The surface tier is black (10YR 2/1) or very dark brown (10YR 2/2).

The subsurface and bottom tiers have hue of 10YR, 7.5YR, 5YR, or N, value of 2 or 3, and chroma of 0 to 3. Broken face, rubbed, and pressed colors are similar. Rubbed colors are often one unit higher in value and chroma than broken face colors.

The IICg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4, 5, or 6, and chroma of 1 or 2. The IIICg horizon tends to be grayer. The content of clay is less than 35 percent. The IIICg horizon ranges from slightly acid to moderately alkaline. It generally is calcareous within a depth of 80 inches.

Palms soils are closely associated with Carlisle soils, which formed in deeper organic deposits, and with the poorly drained Ilion soils, which formed in glacial till.

Pb—Palms muck. This nearly level soil occupies bogs on till and outwash plains. It has organic deposits less than 50 inches deep. Areas are broad. Most range from 30 to 75 acres in size.

Included with this soil in mapping are small areas of the deeper Carlisle muck and small areas of soils that have a sandy substratum. Also included at the margins of bogs are areas where this soil grades into poorly drained Ilion soils or other soils that formed in upland till.

This Palms soil is wooded. If adequately drained, it is suited to specialized crops. The muck settles and oxidizes when drained, leaving significantly thinner layers of organic soil than those in the natural condition. Palms muck occupies low positions where it is difficult to locate drainage outlets. Capability unit IVw–7; woodland group 5w1.

Palmyra Series

The Palmyra series consists of deep, nearly level to sloping, well-drained to excessively drained, medium-textured soils on low-lying outwash plains and terraces. These soils formed in water-sorted sand and gravel derived from limestone, black shale, sandstone, and igneous erratics.

In a representative profile the surface layer is 9 inches of dark grayish-brown gravelly silt loam. The next layer is brown, friable, gravelly loam 3 inches thick. Below this the subsoil is 9 inches of dark-brown, friable gravelly loam. The substratum to a depth of 50 inches is very dark brown, stratified, loose sand and gravel.

The water table is generally below a depth of 4 feet. Permeability is moderate in the subsoil and very rapid in the substratum. Root growth is mainly in the upper 24 inches of the soil, but roots may extend to greater depths. Available water capacity is moderate to low. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is medium to high. Unless limed, the surface layer is medium acid or slightly acid.

The hazard of erosion is the main limitation in farming. Coarse fragments may interfere with precision tillage of some crops. Very rapid permeability in the substratum, slope, and coarse fragments are the main limitations in town and country planning.

Representative profile of Palmyra gravelly silt loam, 3 to 8 percent slopes, in a meadow, 100 feet north of State Highway 80 and 2,800 feet east of junction with Pickle Hill Road, in Minden:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) gravelly silt loam, brown (10YR 5/3) when dry; weak, fine, subangular blocky structure parting to weak, medium, granular; friable; many roots; many

pores; 18 percent gravel; slightly acid; abrupt, smooth boundary.

B&A—9 to 12 inches, brown (10YR 4/3) gravelly loam; weak, fine, subangular blocky structure; friable; many roots; common clay-lined pores; grayish-brown (10YR 5/2) coatings on peds; 18 percent gravel; slightly acid; gradual, smooth boundary.

B2t—12 to 21 inches, dark-brown (10YR 4/3) gravelly loam; weak, medium and fine, subangular blocky structure; friable; many roots; many medium and large pores that have clay linings; thin, patchy clay films on faces of peds; grayish-brown (10YR 5/2) coatings 1 to 2 millimeters thick on peds in upper 3 inches; 18 percent coarse fragments; slightly acid; gradual, wavy boundary.

IIC—21 to 50 inches, very dark grayish-brown (10YR 3/2) stratified gravel and sand; single grained; loose; common roots; 55 percent gravel ¼ to ¾ inch in diameter; neutral; moderately alkaline; calcareous at a depth of 40 inches.

Thickness of the solum ranges from 15 to 45 inches and averages 18 to 28 inches. Tongues of Bt horizon extend to a depth of 45 inches. The C horizon contains carbonates. The content of coarse fragments ranges from 5 to 30 percent in the surface and subsurface horizons, from 18 to 35 percent in the B2t horizon, and from 40 to 60 percent in the C horizon. The upper 12 inches ranges from medium acid to neutral, and the B horizon ranges from slightly acid to neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 3, 4, or 5, and chroma of 2.

The A&B or B&A horizon has hue of 7.5YR or 10YR, value of 4, 5, or 6, and chroma of 2, 3, or 4. The fine earth fraction is fine sandy loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 3, 4, or 5, and chroma of 2, 3, or 4. The fine earth fraction is heavy loam or heavy silt loam.

The C horizon is dominantly gravel, sand, and cobbles that have variable stratification. It ranges from very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2).

Palmyra soils are in a drainage sequence with the moderately well drained Phelps soils and the somewhat poorly drained and poorly drained Fredon soils, which formed in similar gravelly outwash material. Palmyra soils have a higher content of clay and a lower content of coarse fragments in the B horizon than Howard soils.

PmA—Palmyra gravelly silt loam, 0 to 3 percent slopes. This nearly level soil occupies glacial outwash plains and terraces. Areas are long and irregularly shaped and generally are less than 10 acres in size. The surface layer ranges from silt loam to sandy loam.

Included with this soil in mapping are small areas of soils that contain less gravel in the surface layer. Also included are a few areas of soils that are darker in color because of inherently dark parent material and a few small areas of Hamlin and Teel soils.

This Palmyra soil is suited to row crops, hay, pasture, and woodland. In places, it is excessively drained, and droughtiness is a limitation. Gravel may interfere with precision tillage. This soil can be tilled early and worked sooner in spring than most soils of the area. Capability unit IIs–1; woodland group 2o1.

PmB—Palmyra gravelly silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies glacial outwash plains and terraces. Areas are long and irregularly shaped and range from 10 to 20 acres in size. The surface layer ranges from silt loam to sandy loam.

Included with this soil in mapping are small areas of soils that are darker in color because of inherently dark parent material. Also included are small areas of soils that have less than 15 percent gravel in the surface layer and small depressional areas of the wetter Phelps soils.

This Palmyra soil is well suited to row crops, hay, pasture, and woodland. In places, it is excessively drained, and droughtiness and a moderate hazard of erosion are the main limitations. Gravel may interfere with precision tillage. Deep-rooted crops are preferred and generally do best. This soil can be tilled early and worked sooner in spring than most soils of the area. Contour or cross-slope planting helps to control erosion. Where practical, diversions or terraces can be used to reduce runoff and erosion. Capability unit IIs–1; woodland group 2o1.

PmC—Palmyra gravelly silt loam, 8 to 15 percent slopes. This sloping soil occupies side slopes of glacial outwash plains and terraces. Areas are long and narrow. Most are less than 15 acres in size. The surface layer ranges from silt loam to sandy loam.

Included with this soil in mapping are small areas of eroded soils that have a very gravelly surface layer. Also included are small areas of Howard soils.

This Palmyra soil is suited to row crops, hay, pasture, and woodland. A moderate hazard of erosion is the main limitation for farm use. Deep-rooted crops do best. When the soil is row cropped, contour or cross-slope planting and other measures help to reduce erosion. This soil can be tilled early because of its texture and content of gravel. Capability unit IIIe–8; woodland group 2o1.

Phelps Series

The Phelps series consists of deep, nearly level and gently sloping, moderately well drained, medium-textured soils in slight depressional areas on glacial outwash terraces and alluvial fans. These soils formed in water-sorted sand and gravel derived from limestone, black shale, sandstone, and granite.

In a representative profile the surface layer is 7 inches of very dark grayish-brown, gravelly loam. The subsurface layer is 6 inches of brown, very friable gravelly silt loam. The upper part of the subsoil is mottled dark-brown, friable gravelly silt loam 12 inches thick. The lower part of the subsoil is 10 inches of mottled olive-brown, very friable gravelly silt loam. The substratum to a depth of 50 inches is loose, stratified layers of dark grayish-brown gravel and sand.

The water table is within 18 inches of the surface during wet periods. Permeability is moderate in the subsoil and rapid in the substratum. Root growth is mainly in the upper 30 inches of the soil. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low to medium. Unless limed, the surface layer is medium acid.

Slope and the hazard of erosion are the main limitations in farming. Slight seasonal wetness may influence crop selection. Gravel in the surface layer interferes with precision tillage of vegetable crops and with the harvesting of root crops. Seasonal wetness and rapid permeability are the main limitations in town and country planning.

Representative profile of Phelps gravelly loam, 0 to 3 percent slopes, in a cultivated field, 200 yards south of State Highway 7 and 300 yards east of Pangburn Road, in Rotterdam:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) gravelly loam; weak, fine, granular structure; very friable; many roots; 25 percent gravel; medium acid; abrupt, smooth boundary.

A2—7 to 13 inches, brown (10YR 5/3) gravelly silt loam, light gray (10YR 7/2) when dry; weak to moderate, fine and medium, subangular blocky structure; very friable; common roots; common pores; 25 percent gravel; medium acid; clear, irregular boundary.

B21t—13 to 25 inches, dark-brown (10YR 4/3) gravelly silt loam; few, fine, faint, grayish-brown (2.5Y 5/2) mottles; few, medium, distinct, reddish-brown (5YR 4/3) mottles; and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; common roots; common pores; thin, patchy clay films on faces of peds and many clay-lined pores; brown (10YR 5/3) ped coatings 1 to 2 millimeters thick, light-gray (10YR 7/2) when dry, in upper part of horizon; clay films on many pebbles and cobblestones; 25 percent gravel; medium acid; clear, wavy boundary.

B22t—25 to 35 inches, light olive-brown (2.5Y 5/4) gravelly silt loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, granular structure; very friable; common roots; common pores; clay films on pebbles and cobblestones; 30 percent coarse fragments; medium acid; clear, wavy boundary.

IIC—35 to 50 inches, dark grayish-brown (2.5Y 4/2) stratified layers of gravel and sand; single grained; loose; slightly acid.

Thickness of the solum ranges from 24 to 36 inches. Carbonates generally are within a depth of 72 inches. Gravel and sand deposits are more than 6 feet thick. The content of gravel ranges from 10 to 30 percent in the Ap and A2 horizons, from 20 to 35 percent in the B horizon, and from 35 to 55 percent in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2. It ranges from medium acid to neutral. The A2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The fine earth fraction ranges from fine sandy loam to silt loam. The A2 horizon ranges from medium acid to neutral.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. The fine earth fraction is loam, silt loam, or light clay loam. The Bt horizon ranges from medium acid to neutral.

The C horizon ranges from dark grayish brown (2.5Y 4/2) to grayish brown (10YR 5/2). It has strata of sand and gravel.

Phelps soils are in a drainage sequence with the well-drained to excessively drained Howard soils and the poorly drained and somewhat poorly drained Fredon soils. Phelps soils are near the Lansing and Mohawk soils and their wetter associates, which formed in the nearby glacial till upland.

PpA—Phelps gravelly loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies nearly level or slightly depressional areas in glacial outwash terraces. Areas are small and saucer shaped. They range from 5 to 20 acres in size. In places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are small depressional areas of the wetter Fredon soils and small areas of the well-drained Howard soils. Also included are a few areas of soils that have stratified silt or silt and clay at a depth of 3 to 4 feet.

This Phelps soil is suited to row crops, hay, pasture, and woodland. Gravel may interfere with precision tillage. Slight seasonal wetness does not significantly affect selection of crops. Crop residue, green manure, and minimum tillage are important in maintaining desirable tilth. Random drainage of wet spots may be needed for uniform tillage. Capability unit IIw–1; woodland group 2o1.

PpB—Phelps gravelly loam, 3 to 8 percent slopes. This gently sloping soil occupies gravelly outwash terraces or valley trains. Areas are irregularly shaped and generally are broad. They range from 10 to 25 acres in size. In places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are small, dome-shaped areas of the better drained Howard soils and small depressional areas of the wetter Fredon soils. Commonly included are areas of soils that have stratified silt or silt and clay at a depth of 3 to 4 feet, because the valley terraces are deposited on lacustrine sediment and the smear of gravel is thinner as it merges with soils that formed in lacustrine deposits.

This Phelps soil is suited to row crops, pasture, and woodland. Gravel may interfere with precision tillage and harvesting of some crops. Seasonal wetness is a limitation but does not significantly affect selection of crops. Contour or cross-slope planting, stripcropping, and other measures are needed in places to control erosion. Crop residue, green manure, and minimum tillage are important in maintaining desirable tilth. Random drainage is needed in places. Capability unit IIw–1; woodland group 2o1.

Pr—Phelps gravelly loam, fan. This nearly level and gently sloping soil has a profile similar to the one described as representative of the series, but the upper part of the profile contains fewer coarse fragments. This soil occupies alluvial fans over outwash terraces and flood plains along the smaller streams throughout the survey area. It is 5 to 10 feet higher on the landscape than the flood plains. Most areas are long and narrow and occur along streams. Many range from 5 to 15 acres in size. Only a few areas are larger. In places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are areas of soils that have a higher percentage of gravel and areas of soils that lack accumulation of clay in the subsoil. Also included are a few wetter, depressional areas of soils that are indicated on the map by wet spot symbols and small areas of soils that formed in recent alluvium.

This Phelps soil is suited to row crops, hay, pasture, and woodland. It is adjacent to the alluvial soils along streams and must be managed along with these soils because of their size and shape. Crops are occasionally lost because of stream flooding. Flooding also limits nonfarm uses of this soil. Crop residue, green manure, and minimum tillage help maintain desirable structure and production of this soil. Capability unit IIw–1; woodland group 2o1.

Plainfield Series

The Plainfield series consists of deep, nearly level and gently sloping, excessively drained, coarse-textured soils. These soils formed in deep sand on outwash plains, deltas, and terraces.

In a representative profile the surface layer is 8 inches of brown loamy sand. The upper part of the subsoil is 9 inches of yellowish-brown, very friable, loamy sand. The lower part of the subsoil is dark yellowish-brown, loose coarse sand 15 inches thick. The substratum from a depth of 32 to 78 inches is loose coarse sand. It is brown to a depth of 55 inches and dark brown to a depth of 78 inches.

The water table is generally below a depth of 3½ feet during wet periods. Root growth is mainly in the upper 30 inches of the soil. Permeability is very rapid. Available water capacity is low. The capacity of these soils to supply nitrogen, phosphorus, and potassium is low. The content of lime is low. Unless limed, the surface layer is strongly acid.

Droughtiness and the hazard of erosion are the main limitations in farming. Because the soil is droughty, seedlings are often difficult to establish. Erosion-control practices are needed in the gently undulating and sloping areas.

Representative profile of Plainfield loamy sand, 0 to 3 percent slopes, in an idle field, 100 yards west of State Highway 50 and 200 yards south of junction with Charlton Road, in Glenville:

Ap—0 to 8 inches, brown (10YR 4/3) loamy sand; weak, very fine, granular structure; very friable; many roots; many pores; 3 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B21—8 to 17 inches, yellowish-brown (10YR 5/6) loamy sand; weak, very fine, granular structure; very friable; common roots; many pores; 3 percent coarse fragments; strongly acid; clear, wavy boundary.

B22—17 to 32 inches, dark yellowish-brown (10YR 4/4) coarse sand; single grained; loose; few roots; many pores; 5 percent coarse fragments; medium acid; clear, wavy boundary.

C1—32 to 55 inches, brown (10YR 4/3) coarse sand; single grained; loose; few roots; many pores; 2 percent coarse fragments; slightly acid; clear, wavy boundary.

C2—55 to 78 inches, dark-brown (10YR 3/3) coarse sand; single grained; loose; no roots; many pores; 10 percent coarse fragments; moderately alkaline; calcareous at a depth of 75 inches.

Thickness of the solum ranges from 25 to 34 inches. Carbonates are below a depth of 60 inches in places. The content of coarse fragments, mainly gravel, is less than 5 percent in the solum. Reaction ranges from strongly acid in the A horizon to medium acid or slightly acid in the B horizon. The C horizon ranges from slightly acid to moderately alkaline.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. The C horizon has hue of 10YR or 2.5, value of 3, 4, or 5, and chroma of 2, 3, or 4.

Reaction is higher and the substratum is darker than is defined as the range for the Plainfield series. These differences do not affect use and management of the soils.

Plainfield soils are associated with the gravelly, excessivley drained Otisville soils; the sandy, well-drained to excessively drained Colonie soils; the sandy, moderately well drained Elnora soils; and the poorly drained and somewhat poorly drained Junius soils. Plainfield soils formed in medium sand and do not have lamellae in the B horizon as do Colonie soils.

PsA—Plainfield loamy sand, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies broad, flat outwash plains, deltas, and terraces. Areas are very large. Most average 50 to 100 acres in size.

Included with this soil in mapping are areas in Montgomery County where deposits of lacustrine silt and clay are at a depth of less than 80 inches, commonly where Plainfield soils are adjacent to Cheektowaga soils. Also included are small areas of Otisville, Elnora, and Colonie soils.

This Plainfield soil is suited to row crops, hay, pasture, and woodland. It is best suited to deep-rooted crops. Unless the soil is irrigated, its use for shallow-rooted crops is limited. The soil is droughty, and large areas are subject to soil blowing when left unprotected. This soil warms early and can be worked and seeded much sooner than most other soils. Cover crops, green manure, crop residue, and other measures are important in maintaining organic-matter content and stabilizing soil structure. Capability unit IIIs–1; woodland group 4s1.

PsB—Plainfield loamy sand, 3 to 10 percent slopes. This undulating and rolling soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies outwash plains, terraces, and deltas. Areas are broad and irregularly shaped. About two-thirds of the acreage has an undulating surface.

Included with this soil in mapping are small areas of soils in the northwestern part of Montgomery County that have a more acid surface layer and subsoil. Also included are small gravelly areas of Otisville soils in Schenectady County and small areas of Colonie soils that have finer textured sand.

This Plainfield soil is suited to row crops, hay, pasture, and woodland. The hazards of soil blowing and erosion are the main limitations for farm use. Seedlings are often difficult to establish because the soils are droughty. Minimum tillage, cover crops, green manure, and crop residue are important in maintaining a stable soil structure and reducing soil blowing and erosion. Capability unit IIIs–1; woodland group 4s1.

Raynham Series

The Raynham series consists of deep, nearly level, poorly drained to somewhat poorly drained, medium-textured soils on lake plains. These soils formed in water-laid deposits of silt and very fine sand.

In a representative profile the surface layer is dark grayish-brown silt loam 8 inches thick. The upper part of the subsoil is 7 inches of mottled olive-brown, friable silt loam. The lower part of the subsoil, from a depth of 15 to 23 inches, is mottled strong-brown, friable silt loam. The substratum to a depth of 50 inches is dark grayish-brown, friable silt loam.

The water table is at or near the surface in wet periods, but it recedes to greater depths during dry periods. Permeability is slow. Root growth is generally

in the upper 18 inches of the soil, but it extends to greater depths in dry periods. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low. Unless limed, the surface layer is very strongly acid or strongly acid.

Prolonged wetness is the main limitation for most uses. A high water table delays planting and retards crop growth during extended periods.

Representative profile of Raynham silt loam, in a hayfield, 50 yards west of Belmont Avenue and 250 yards north of Alplaus Avenue, in Glenville:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and very fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.

B21—8 to 15 inches, olive-brown (2.5Y 4/4) silt loam; common, medium and coarse, distinct, strong-brown (7.5YR 5/6) mottles; weak, fine and medium, subangular blocky structure; friable; many roots; many fine pores; grayish-brown (2.5Y 5/2) faces on peds; medium acid; clear, wavy boundary.

B22—15 to 23 inches, dark-brown (10YR 4/3) silt loam; many (45 percent), medium and coarse, strong-brown (7.5YR 5/6) and olive-brown (2.5Y 4/4) mottles; weak, fine and medium, subangular blocky structure; friable; common roots; many fine pores; grayish-brown (2.5Y 5/2) faces on peds; medium acid; clear, wavy boundary.

C1—23 to 29 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) mottles; weak, thin and medium, platy structure; friable; common roots; many fine pores; medium acid; clear, irregular boundary.

C2—29 to 50 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) mottles; weak, thick, platy structure; friable; few roots; common fine pores; slightly acid.

Thickness of the solum ranges from 16 to 36 inches, and depth to contrasting material such as clay, gravel, or bedrock is more than 40 inches. The solum ranges from strongly acid to slightly acid. Acidity generally decreases with increasing depth. The content of coarse fragments is generally none or not more than 1 or 2 percent throughout the soil. The solum is dominantly silt loam but ranges to very fine sandy loam.

The B horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 2 to 4. The dominant mottles in the solum have a high value and chroma. They are common or many and distinct or prominent. The C horizon is massive or has a platy structure.

Raynham soils formed in similar material and are in a drainage sequence with the well-drained Unadilla soils and the moderately well drained Scio soils. They are associated with Madalin, Colonie, and Plainfield soils. Raynham soils are coarser textured than the clayey Madalin soils and finer textured than the sandy Colonie and Plainfield soils.

Ra—Raynham silt loam. This nearly level soil occupies flat and slightly depressional areas on lake plains. Areas are irregularly shaped and range from 5 to more than 50 acres in size.

Included with this soil in mapping are small areas of Scio, Rhinebeck, and Madalin soils. Also included are areas of soils that are similar to Raynham soils, but are slightly finer textured throughout.

This Raynham soils is best suited to water-tolerant species of hay, pasture, and woodland. Unless drained, it is too wet for row crops. If adequately drained, it can be row cropped. In intensively cropped areas, minimum tillage, cover crops, crop residue, green manure, and other measures help to maintain organic-matter content and desirable soil structure. Capability unit IVw–6; woodland group 4w1.

Rhinebeck Series

The Rhinebeck series consists of deep, nearly level and gently sloping, somewhat poorly drained, moderately fine-textured soils on glacial lake plains within the glacial till uplands. These soils formed in deposits of lake-laid silt and clay.

In a representative profile the surface layer is 7 inches of dark grayish-brown silty clay loam. The subsurface layer is 6 inches of mottled grayish-brown silty clay. The upper part of the subsoil is mottled brown, very firm silty clay 8 inches thick. The lower part of the subsoil, from a depth of 21 to 28 inches, is mottled dark-brown, very firm clay. The substratum to a depth of 70 inches is thin layers of very firm silt and clay that are olive brown, olive gray, and dark brown in color.

The water table is perched on the slowly permeable subsoil and substratum, and ground water is within 12 inches of the surface early in spring or during prolonged wet periods. Root growth is mainly in the upper 20 inches of the soil. Available water capacity is moderate to high. The capacity of these soils to supply nitrogen and potassium is high, and their capacity to supply phosphorus generally is medium. The content of lime is medium to high. Unless limed, the surface layer is slightly acid.

Seasonal wetness is the main limitation in farming. The slowly permeable subsoil and clayey surface texture limit tillage operations. Seasonal wetness and the slowly permeable subsoil are the main limitations in town and country planning.

Representative profile of Rhinebeck silty clay loam, 3 to 8 percent slopes, in a meadow, 1,300 feet northwest of Frederick Street at junction with McEwan Road, in Canajoharie:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, medium and fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

A2—7 to 13 inches, grayish-brown (10YR 5/2) silty clay; common, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles; strong, coarse, prismatic structure parting to strong, coarse, subangular blocky; firm; common roots; few fine pores; grayish-brown (2.5Y 5/2) silt films on faces of peds; medium acid; clear, wavy boundary.

B21t—13 to 21 inches, brown (10YR 5/3) silty clay; many (40 percent), medium, distinct, dark-gray (10YR 4/1) mottles; strong, coarse, prismatic structure parting to strong, coarse, angular blocky; very firm; few roots along faces of peds; thin, continuous, dark grayish-brown (10YR 4/2) clay films on faces of prisms, discontinuous on blocks; neutral; clear, wavy boundary.

B22t—21 to 28 inches, dark-brown (10YR 4/3) clay; many (40 percent), distinct, dark grayish-brown (10YR 4/2) mottles; strong, coarse, prismatic structure parting to moderate, thick, platy; very firm; few roots on faces of peds; dark grayish-brown (10YR 4/2) clay films on faces of prisms; neutral; gradual, smooth boundary.

C—28 to 70 inches, thin layers of silt and clay that are

olive brown (2.5Y 4/4), olive gray (5Y 5/2), and dark brown (10YR 4/3); strong, very coarse, prismatic structure parting to thick, platy; very firm; few roots; dark-gray (10YR 4/1) faces on prisms; thin, continuous clay films on a few faces of prisms; moderately alkaline; calcareous.

Thickness of the solum ranges from 20 to 44 inches and commonly averages about 30 inches. Depth to carbonates is nearly the same. The A2 horizon ranges from silt loam to silty clay. The B horizon is silty clay or clay. The Ap and A2 horizons range from medium acid to neutral. The B horizon is slightly acid or neutral.

The Ap horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2). The A2 horizon is dominantly grayish brown (10YR or 2.5Y 5/2).

The B2t horizon has hue of 10YR or 2.5Y, value of 3, 4, or 5, and chroma of 2 or 3. Faces of peds have chroma of 2 or 1. Content of clay ranges from 35 to 55 percent.

The C horizon has neutral color or hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 0 to 4.

Rhinebeck soils are in a drainage sequence with the moderately well drained and well drained Hudson soils, the poorly drained and very poorly drained Madalin soils, and the very poorly drained Fonda soils. They are similar to Churchville soils, which formed in 20 to 40 inches of silt and clay over medium-textured material derived mainly from glacial till.

RhA—Rhinebeck silty clay loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but the surface layer is slightly darker in color. This soil occupies nearly level lake plains that are in glacial uplands. Areas tend to be slightly depressional and are longer than they are wide. They range from 5 to 30 acres in size. In places the surface layer is silt loam or silty clay.

Included with this soil in mapping are small depressional areas of the wetter, very poorly drained and poorly drained Madalin soils that are indicated on the map by wet spot symbols. Also included are areas of Churchville soils that have a thin lacustrine mantle of silt and clay and are shallower to glacial till.

This Rhinebeck soil is best suited to hay, pasture, and woodland unless it is drained. Seasonal wetness severely limits selection of crops. When the soil is used for hay or pasture, grasses and other plants that are tolerant of wetness should be considered. Where this fine-textured soil is drained and row cropped, good tilth is difficult to maintain; therefore, the soil should not be row cropped more than once every 4 or 5 years. Crop residue, green manure, and minimum tillage are important in maintaining organic-matter content and desirable soil structure. Capability unit IIIw–4; woodland group 3w1.

RhB—Rhinebeck silty clay loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies glacial lake plains within glacial till uplands. Areas are irregularly shaped and long. Most average 15 to 30 acres in size. Other areas are as large as 100 acres. In places the surface layer is silt loam or silty clay.

Included with this soil in mapping are small areas of nearly level Rhinebeck soils. Also included are a few small, dome-shaped areas of the Hudson soils, small, depressional areas of the wetter Madalin soils, and areas of Madalin or Fonda soils, many of which are indicated on the map by wet spot symbols.

This Rhinebeck soil is best suited to hay, pasture, and woodland unless it is drained. Seasonal wetness and slow permeability limit selection of crops. Water-tolerant, shallow-rooted species do best on this soil. Where the soil is drained and row cropped, good soil tilth is difficult to maintain; therefore, the soil should not be row cropped more than once about every 4 years. Crop residue, green manure, and minimum tillage are important in maintaining desirable soil structure and reducing the hazard of erosion. Capability unit IIIw–4; woodland group 3w1.

Rock Outcrop

Rock outcrop consists of areas that are more than 90 percent exposed bedrock or patches of soil that are too shalow over bedrock for use. In this survey area Rock outcrop is mapped only in combination with Arnot, Hollis, Farmington, Manlius, and Lordstown soils.

Where Rock outcrop is mapped with Arnot and Lordstown soils, it is mainly sandstone and siltstone. Where Rock outcrop is mapped with Hollis soils, it is mainly granite. Where it is mapped with Manlius soils, it is mainly shale; and where mapped in association with Farmington soils, it is mainly limestone.

RLF—Rock outcrop-Farmington association, very steep. This mapping unit occupies steep and very steep areas mainly on valley walls adjacent to the Mohawk River. Areas are long and irregularly shaped. They range from 40 acres to more than 200 acres in size. Slopes range from 25 to 70 percent.

This mapping unit is about 70 percent Rock outcrop and 30 percent Farmington soils. Rock outcrop consists of exposures of limestone bedrock or patches of soil that are too thin to support tree growth. In places, vertical bedrock escarpments are 5 to 100 feet high. The Farmington part of the association consists of shallow, well-drained, medium-textured soils that are 10 to 20 inches deep over limestone bedrock. Farmington soils are intermingled with the Rock outcrop. Vegetation grows in the deeper pockets of soil, and roots penetrate deeply in cracks and crevices.

Included with this unit in mapping are a few small areas of the deep, well-drained Lansing soils. Also included are small areas of less sloping soils.

This mapping unit is suited to woodland and wildlife habitat. Slope, shallow depth to rock, and exposures of bedrock limit its use. Capability unit VIIs–2. Farmington soil in woodland group 5x2; Rock outcrop not assigned.

Saprists and Aquents

SA—Saprists and Aquents. This mapping unit consists of marsh areas that are permanently under shallow water. The depth of water ranges from a few inches to 3 feet. The water level of the areas along the Mohawk River fluctuates with the level of the water in the New York State Barge Canal. Other areas of this unit are improved wildlife marshes on State land.

The soil material is covered by water and varies greatly in texture. The areas along the Mohawk River typically have a layer of well-decomposed mucky ma-

terial over stratified alluvial silt, very fine sand, and, in places, clay. The thickness of the organic material ranges from a few inches to 1½ feet. Upland areas have a thin layer of mucky material over glacial till or lacustrine sediment. The soil material has been changed very little by soil-forming processes.

Saprists and Aquents provides excellent wetland wildlife habitat. Shallow water is the main limitation for all uses. Capability unit VIIIw–1; woodland group not assigned.

Scio Series

The Scio series consists of deep, nearly level or gently sloping, moderately well drained, medium-textured soils on lake plains and terraces. These soils formed in lacustrine or eolian deposits of silt and very fine sand.

In a representative profile the surface layer is 10 inches of dark grayish-brown silt loam. The upper part of the subsoil is 11 inches of yellowish-brown, very friable silt loam. The lower part of the subsoil is mottled dark yellowish-brown, very friable silt loam 12 inches thick. The substratum from a depth of 33 to 50 inches is stratified layers of grayish-brown and light olive-brown, very friable very fine sandy loam, light silt loam, and loamy very fine sand.

The water table is at a depth of about 18 inches early in spring and during periods of heavy rain. Root growth is in the upper 30 inches of the soil. Permeability of the upper 40 inches is moderate. Below that depth it is variable because of the nature of the underlying material. Available water capacity is high. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is low. Unless limed, the surface layer is very strongly acid or strongly acid. The high water table in the early part of the growing season is the main limitation in farming. In dry periods of summer this soil may be somewhat droughty.

Representative profile of Scio silt loam, 3 to 8 percent slopes, in an idle field, 20 feet west of junction of Catalina and Montclair Drives, in Glenville:

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

B21—10 to 21 inches, yellowish-brown (10YR 5/6) silt loam; weak, thin to thick, platy structure; very friable; common roots; common fine pores; strongly acid; clear, wavy boundary.

B22—21 to 33 inches, dark yellowish-brown (10YR 4/4) silt loam; common, medium, distinct, light olive-gray (5Y 6/2), strong, brown (7.5YR 5/6), and brown (7.5YR 4/4) mottles; weak, thin to thick, platy structure; very friable; few roots; common fine pores; strongly acid; clear, wavy boundary.

C—33 to 50 inches, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4) stratified very fine sandy loam, light silt loam, and loamy very fine sand; very friable; few roots; few pores; few very thin layers of silty clay loam; medium acid in upper part, slightly acid below a depth of 40 inches.

Thickness of the solum ranges from 20 to 36 inches, and depth to contrasting material such as clay, gravel, or till is more than 40 inches. The content of coarse fragments is generally none or less than 2 percent. The solum is silt loam and very fine sandy loam. The content of clay ranges from 6 to 18 percent. The solum ranges from very strongly acid to medium acid.

The Ap horizon is dominantly dark grayish brown (10YR 4/2) but ranges to very dark grayish brown (10YR 3/2).

The B horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Low- and high-chroma mottles are in the lower part of the B horizon. The matrix of the C horizon generally has a lower chroma than the matrix of the B horizon.

Scio soils formed in similar material and are in a drainage sequence with the well-drained Unadilla soils and the poorly drained and somewhat poorly drained Raynham soils. They are associated with the coarse-textured, well-drained to excessively drained Colonie soils, the excessively drained Plainfield soils, and the moderately fine textured Hudson soils.

ScA—Scio silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but in places it has a thicker subsoil. This soil occupies flat areas on the lake plain and terraces. Areas are generally long and narrow where they are adjacent to the Mohawk River; they are broader and more irregularly shaped in other parts of the survey area. Areas are generally less than 25 acres in size. Included with this soil in mapping are small areas of Rhinebeck soils and small areas of Raynham soils in depressions.

This Scio soil is suited to row crops, hay, pasture, and woodland. It is well suited to most crops grown in the area. Wetness is a limitation, because a seasonal high water table may delay planting in spring. Crop residue, green manure, and minimum tillage are important in maintaining desirable soil structure and organic-matter content. Capability unit IIw–1; woodland group 2o1.

ScB—Scio silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies undulating and smoothly sloping areas on lake plains and terraces. Areas are broad and irregularly shaped and range from 5 to 40 acres in size. Near Schoharie Creek, the Scio soils are browner in color than in other areas.

Included with this soil in mapping are small areas of the adjacent Hudson, Unadilla, and Colonie soils. Also included are areas of Raynham soils in drainageways and seepage areas.

This Scio soil is suited to row crops, hay, pasture, and woodland. It is well suited to most crops grown in the area. Wetness is a slight limitation and may delay planting in spring. Crop residue, green manure, and minimum tillage help to maintain desirable soil structure and organic-matter content. Where practical, contour or cross-slope planting, stripcropping, diversions or terraces, and other measures should be used for runoff and erosion control. Capability unit IIe–5; woodland group 2o1.

Scriba Series

The Scriba series consists of deep, nearly level to sloping, somewhat poorly drained, medium-textured soils on glacial till plains. These soils formed in very firm, dense glacial till derived mainly from dark-colored shale, sandstone, and a small amount of limestone.

In a representative profile the surface layer is 7 inches of dark-brown channery silt loam. The upper part of the subsoil is 4 inches of mottled light olive-brown, very friable channery silt loam. The next layer is leached, distinctly mottled light brownish-gray, very friable channery silt loam 4 inches thick. The fragipan, between depths of 15 and 43 inches, is mottled olive-brown, very firm and brittle very gravelly loam. The substratum to a depth of 54 inches is olive-brown, very firm very gravelly loam.

The water table is at a depth of about 8 inches during wet periods. Root growth is restricted mainly to the 10 to 16 inches of soil above the slowly permeable fragipan. Available water capacity is low or moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is medium. Unless limed, the surface layer is very strongly acid or strongly acid.

Wetness and slope are the main limitations for farm and nonfarm uses.

Representative profile of Scriba channery silt loam, from an area of Burdett-Scriba channery silt loams, 0 to 3 percent slopes, in an idle field, 30 feet south of Thousand Acre Road and 100 yards east of Youngs Road, in Duanesburg:

Ap—0 to 7 inches, dark-brown (10YR 3/3) channery silt loam; weak, fine, granular structure; very friable; many roots; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B2—7 to 11 inches, light olive-brown (2.5Y 5/4) channery silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; very friable; many roots; many pores; 20 percent coarse fragments; strongly acid; clear, wavy boundary.

A'2—11 to 15 inches, light brownish-gray (2.5Y 6/2) channery silt loam; many, coarse, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and thick, platy structure; very friable; common roots; many pores; 25 percent coarse fragments; strongly acid; clear, wavy boundary.

B'x—15 to 43 inches, olive-brown (2.5Y 4/4) very gravelly loam; common, fine and medium, distinct, dark yellowish-brown (10YR 4/4) and grayish-brown (2.5Y 5/2) mottles; strong, very coarse, prismatic structure parting to weak, thick, platy; very firm and brittle; few roots around prisma; many pores; thin, patchy films on faces of cleavages and in pores; silt streaks surrounding prisms are ½ inch to 1 inch thick and have grayish-brown (2.5Y 5/2) centers and strong-brown (7.5YR 5/6) borders; 40 percent coarse fragments; neutral; gradual, wavy boundary.

C—43 to 54 inches, olive-brown (2.5Y 4/4) very gravelly loam; few, fine and medium, faint, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) mottles; weak, thick, platy structure; very firm; no roots; many pores; thin, patchy clay films on faces of cleavages; 40 percent coarse fragments; neutral.

Thickness of the solum ranges from 40 to 60 inches. Depth to carbonates is the same. Depth to bedrock is more than 40 inches. Depth to the fragipan ranges from 10 to 18 inches. The horizons above the fragipan range from strongly acid to slightly acid. The fragipan ranges from medium acid to neutral. The content of coarse fragments ranges from 10 to 25 percent in the surface layer, from 20 to 40 percent above the C horizon, and from 30 to 55 percent in the C horizon. The fine earth fraction in the solum is dominantly loam or silt loam throughout.

The Ap horizon has hue of 10YR and 2.5Y, value of 3 and 4, and chroma of 2 and 3.

A B horizon that has hue of 10YR and 2.5Y, value of 4 and 5, and chroma of 3 and 4 underlies the surface layer in most places. It has few to many, distinct or faint, yellowish-brown and dark-brown mottles. An A'2 horizon that is generally lighter gray and has a weak to moderate, platy structure underlies the B horizon.

The Bx horizon is generally dark grayish brown or olive brown, but it has hue of 10YR 4/2 to 5Y 5/4. Mottles that have both a high and low chroma are generally common, medium, and distinct. The Bx horizon is firm or extremely firm and brittle.

The C horizon is generally dark grayish brown or olive brown. It is neutral in reaction. The C horizon generally has a platy structure. It is firm or very firm.

Scriba soils are near the moderately well drained Nunda soils and the wetter Ilion soils. They are very closely associated with Burdett soils and are mapped only with those soils. Scriba soils have a fragipan, but Burdett soils do not.

Sun Series

The Sun series consists of deep, nearly level, very poorly drained, and poorly drained, medium-textured soils in depressional areas on till plains. These soils formed in glacial till derived from sandstone, limestone, and granite.

In a representative profile the surface layer is 7 inches of black loam. The subsurface layer is 3 inches of mottled light-gray, firm fine sandy loam. The upper part of the subsoil is distinctly mottled gray, firm fine sandy loam 7 inches thick. The lower part of the subsoil, from a depth of 17 to 38 inches, is mottled brown, firm gravelly fine sandy loam. The substratum to a depth of 54 inches is mottled dark grayish-brown very gravelly fine sandy loam.

The water table is at or near the surface most of the year, but it recedes to greater depths in dry periods. Permeability is slow. Root growth is restricted mainly to the upper 12 to 18 inches because of wetness. Available water capacity is high. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is low. Unless limed, the surface layer is medium acid.

Prolonged wetness is the main limitation for farm and nonfarm uses.

Representative profile of Sun loam, 0 to 3 percent slopes, in a forest, near Hagaman, 1,600 feet south of Rogge Road and 1,600 feet east of Mannys Corners Road, in Amsterdam:

O2—1 inch to 0, black (10YR 2/1), well-decomposed leaf litter.

A1—0 to 7 inches, black (10YR 2/1) loam; weak, coarse, granular structure; friable; many roots; porous; 5 percent gravel; slightly acid; abrupt, smooth boundary.

A2g—7 to 10 inches, light-gray (10YR 6/1) fine sandy loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, blocky structure; firm; common roots; many medium and fine pores; 10 percent gravel and stones; medium acid; clear, smooth boundary.

B21g—10 to 17 inches, gray (10YR 6/1) fine sandy loam; many (40 percent), medium and coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, thick, platy structure; firm; few roots; many medium and fine pores; no clay films; 12 percent gravel and stones; slightly acid; gradual, wavy boundary.

B22g—17 to 38 inches, brown (10YR 5/3) gravelly fine sandy loam; many, medium and coarse, faint, yellowish-brown (10YR 5/4) mottles; very weak, thick, platy structure; firm; common fine pores; gray (10YR 5/1) faces on peds; 20 percent coarse fragments; neutral; gradual, smooth boundary.

C—38 to 54 inches, dark grayish-brown (10YR 4/2) very gravelly fine sandy loam; many, coarse, distinct, yellowish-brown (10YR 5/4) and gray (10YR 5/4) and gray (10YR 5/1) mottles; massive; friable; 50 percent gravel and stones; mildly alkaline.

Thickness of the solum ranges from 24 to 40 inches. Depth to carbonates ranges from 36 to 70 inches. The content of coarse fragments ranges from 5 to 25 percent in the solum and from 20 to 50 percent in the C horizon. The A2 and B horizons range from sandy loam to loam. The solum ranges from medium acid to neutral throughout.

Uncleared areas have a black (10YR 2/1) or very dark gray (10YR 3/1) A1 horizon. In cultivated areas the Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The upper part of the B horizon has hue of 10YR or 2.5Y, value of 4, 5, or 6, and chroma of 1 or 2. Mottles have chroma of 3 to 6. The lower part of the B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2, 3, or 4. Mottles that have chroma of 3 to 6 are many.

The C horizon ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (2.5Y 3/2). It ranges from sandy loam to loam.

The Sun soils are in a drainage sequence with the well drained and moderately well drained Broadalbin soils and the somewhat poorly drained Mosherville soils. They are associated with the poorly drained Ilion soils, which have a finer textured Bt horizon.

Su—Sun loam. This nearly level soil occupies depressional areas on till plains. Areas are generally long and narrow. Average areas range from 5 to 20 acres in size. A few areas are larger. The surface layer ranges from sandy loam to silt loam.

Included with this soil in mapping are small areas of Ilion soils. Also included are a few dome-shaped areas of Mosherville soils and a few areas of Madalin and Fonda soils that are indicated on the map by clay spot symbols.

This Sun soil is best suited to hay, pasture, and woodland. Cultivated crops can be grown where the soil is adequately drained. Unless the soil is drained, water-tolerant, shallow-rooted species do best. Prolonged wetness limits soil use. Where the soil is cropped, minimum tillage, crop residue, green manure, and other measures are needed to maintain desirable soil structure. If outlets are available, surface or subsurface drainage can generally be used. Capability unit IVw–3; woodland group 4w1.

Teel Series

The Teel series consists of deep, nearly level, moderately well drained and somewhat poorly drained, medium-textured soils on flood plains of the larger streams in the survey area. These soils formed in recent alluvium derived mainly from limestone, shale, and sandstone.

In a representative profile the surface layer is very dark grayish-brown silt loam 13 inches thick. The subsoil is brown, friable silt loam to a depth of 19 inches. Below this it is mottled dark-brown, friable silt loam 19 inches thick. The substratum to a depth of 56 inches is mottled dark-brown, friable silt loam.

The water table is at a depth of 1 to 2 feet during wet periods. Permeability is moderate. Root growth is mainly in the upper 24 to 30 inches of the soil. It is restricted somewhat early in spring by the high water table. Available water capacity is high. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is medium. The content of lime is medium. Unless limed, the surface layer is slightly acid or neutral.

Seasonal wetness and the hazard of flooding are the main limitations in use of this soil.

Representative profile of Teel silt loam, 120 feet south of State Highway 5 and 1,700 feet west of Canal Lock 13, near the village of Randall, in Mohawk:

Ap—0 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish-gray (10YR 6/2) when dry; moderate, medium and fine, subangular blocky structure parting to medium and coarse, granular; friable; many roots; slightly acid; clear, smooth boundary.

B21—13 to 19 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; many roots; many fine pores; few silt films on faces of peds; neutral; gradual, wavy boundary.

B22—19 to 38 inches, dark-brown (10YR 3/3) silt loam; common, fine, distinct, yellowish-brown (10YR 5/4) and dark grayish-brown (2.5Y 4/2) mottles; weak, medium, prismatic structure parting to medium and fine, subangular blocky; friable; common roots; many medium and fine pores; mildly alkaline; gradual, wavy boundary.

C—38 to 56 inches, dark-brown (10YR 3/3) silt loam; common dark grayish-brown (2.5Y 4/2) mottles; very weak, medium and thick, platy structure; friable; few roots; common fine pores; mildly alkaline.

Thickness of the solum ranges from 24 to 40 inches. Stratified layers of sand and gravel occur below a depth of 4 feet in places. Coarse fragments are generally lacking within a depth of 40 inches. Reaction is slightly acid or neutral in the upper 20 inches and neutral or mildly alkaline between depths of 20 and 40 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 2, 3, or 4, and chroma of 2 or 3. Dry value is 6 or more.

The B horizon has hue of 10YR and 2.5Y, value of 3 to 5, and chroma of 2 to 4. Low-chroma mottles occur within a depth of 12 to 20 inches. The B horizon is dominantly silt loam, but it may be loam and fine sandy loam in places.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3. Mottles are dominantly dark grayish brown. The C horizon is mainly silt loam, but ranges to fine sandy loam.

Teel soils formed in similar material and are in a drainage sequence with the well-drained Hamlin soils and the poorly drained or very poorly drained Wayland soils. They are near the Howard and Copake soils. Teel soils have a solum that is free of coarse fragments, unlike Howard soils, which have more than 35 percent coarse fragments in the solum, and Copake soils, which have more than 35 percent coarse fragments in the substratum.

Te—Teel silt loam. This nearly level soil occupies alluvial flats or slight depressions on flood plains. Areas are generally long and irregularly shaped. They range from less than 10 to more than 40 acres in size. Many areas are darker in color because of the black shale in the survey area.

Included with this soil in mapping are small areas of the wetter Wayland soils in depressional areas and old oxbows. Also included are spots of Hamlin soils in slightly higher positions and small areas of a similar

but more acid soil in the glacial till uplands in the western part of Schenectady County.

This Teel soil is well suited to row crops, hay, pasture, and woodland. It is suited to most crops grown in the area. A seasonal water table may delay planting in spring. Flooding is an intermittent hazard, either early in spring or late in fall. This soil can be row cropped almost continuously without damage if minimum tillage, crop residue, and green manure are used. A winter cover crop is also desirable. Capability unit IIw–2; woodland group 2o2.

Tuller Series

The Tuller series consists of shallow, nearly level and gently sloping, somewhat poorly drained and poorly drained, medium-textured soils on bedrock-controlled upland till plains. These soils formed in thin deposits of glacial till that are underlain by sandstone, siltstone, and thin beds of shale at a depth of 10 to 20 inches.

In a representative profile the surface layer is dark grayish-brown channery silt loam 7 inches thick. The subsoil is mottled grayish-brown, friable channery silt loam 7 inches thick. Interbedded gray sandstone and shale is at a depth of 14 inches.

The water table is perched on the underlying bedrock, and ground water is at or near the surface during wet periods. Permeability is moderate. Root growth is restricted to the 10 to 20 inches of soil above the rock. Available water capacity is low. The capacity of these soils to supply phosphorus and potassium is medium and their capacity to supply nitrogen is medium to high. Nitrogen is not readily available early in spring because the soil is cold and wet. The content of lime is low. Unless limed, the surface layer is strongly acid.

Prolonged wetness and shallowness to bedrock are the main limitations in farming. Occasional outcrops interfere with tillage.

Representative profile of Tuller channery silt loam, 100 feet east of Knight Road and 200 yards north of U.S. Route 20, in Duanesburg:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, fine and medium, granular structure; very friable; many roots; many pores; 20 percent coarse fragments; neutral; abrupt, smooth boundary.

B2—7 to 14 inches, grayish-brown (2.5Y 5/2) channery silt loam; many, common, distinct, dark-brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4) mottles; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; friable; common roots; common pores; 20 percent coarse fragments; medium acid; abrupt, smooth boundary.

IIR—14 inches +, interbedded gray sandstone and shale.

Thickness of the solum and depth to bedrock both range from 10 to 20 inches. The content of coarse fragments in the solum ranges mainly from 20 to 35 percent, but in some places is less than 20. The unlimed solum is strongly acid or medium acid. The fine earth fraction of the solum is loam or silt loam.

The Ap horizon has hue of 7.5YR, 10YR, and 2.5Y, value of 3 to 5, and chroma of 2 and 3. The B horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 and 5, and chroma of 2 and 3. The dominant color is grayish brown (10YR or 2.5Y 5/2). The B21 horizon is lacking in some profiles. Mottles are common to many, distinct or prominent, and have high chroma. The solum is very friable to friable.

These Tuller soils dominantly have a slightly lower content of coarse fragments than is typical for Tuller soils. This does not affect their use and management.

Tuller soils are in a drainage sequence with the well drained and moderately well drained Arnot soils. They are also associated with Brockport and Varick soils. Tuller soils are shallower and coarser textured than Brockport and Varick soils.

Tu—Tuller channery silt loam. This nearly level and gently sloping soil has the profile described as representative of the series. Slopes range from 0 to 5 percent. It occupies flat and slightly sloping areas on bedrock-controlled plateaus and also long narrow strips between bedrock escarpments. Areas are broad and narrow and range from less than 5 acres to more than 25 acres in size.

Included with this soil in mapping are small areas of the better drained Arnot soils near escarpments and on slight rises. Also included are small areas of Brockport soils and the channery Angola soils and areas of soils in the township of Duanesburg that are similar to Tuller soils, but depth to bedrock is 20 to 40 inches.

This Tuller soil is poorly suited to row crops. It is wet in spring and dry in summer because it is shallow to bedrock. It will generally produce only one crop of hay and is better suited to pasture and woodland. This soil is not a good site for ponds because of the underlying bedrock. Capability unit IVw–4; woodland group 5w1.

TvA—Tuller-Brockport complex, 0 to 3 percent slopes. This mapping unit is about 60 percent Tuller soils and 40 percent Brockport soils. The Tuller soil is shallow and somewhat poorly drained and poorly drained. The Brockport soil is moderately deep and somewhat poorly drained.

These nearly level soils occupy flat, bedrock-controlled benches and hilltops on uplands. Areas are broad and irregularly shaped. They range from 5 to 100 acres in size. Included with this unit in mapping are small areas of Hornell, Arnot, Varick, and Angola soils.

The soils in this mapping unit are suited to hay, pasture, and woodland. Seasonal wetness, bedrock at a depth of 10 to 40 inches, and slow permeability limit their use. Capability unit IVw–4; Tuller soil in woodland group 5w1, Brockport soil in woodland group 3w1.

TvB—Tuller-Brockport complex, 3 to 8 percent slopes. This mapping unit is about 60 percent Tuller soils and 40 percent Brockport soils. The Tuller soil is shallow over sandstone and somewhat poorly drained and poorly drained. The Brockport soil is moderately deep over shale and somewhat poorly drained.

These gently sloping soils occupy bedrock-controlled glacial till plains. Areas are broad and irregularly shaped. They are about 30 acres in size. Included with this unit in mapping are small areas of Hornell, Arnot, Angola, and Varick soils.

The soils in this mapping unit are suited to hay, pasture, and woodland. Seasonal wetness, bedrock at a depth of 10 to 40 inches, and slow permeability limit their use. Capability unit IVw–4; Tuller soil in wood-

land group 5w1, Brockport soil in woodland group 3w1.

Unadilla Series

The Unadilla series consists of deep, nearly level to moderately steep, well-drained, medium-textured soils on valley terraces and lake plains. These soils formed in water- or wind-deposited silt and very fine sand.

In a representative profile the surface layer is dark-brown silt loam 9 inches thick. The subsoil is brown, friable very fine sandy loam that extends to a depth of 28 inches. The substratum, to a depth of 50 inches, is mottled brown, friable very fine sandy loam. The substratum between depths of 50 and 60 inches is stratified, loose, dark-brown sand and gravel.

The water table generally is several feet below the surface, but in places ground water is at a depth of 3 to 3½ feet for short periods. Permeability is moderate. Root growth is not restricted, but it is mainly in the upper 30 inches of the soil. Available water capacity is high. The capacity of these soils to supply nitrogen and phosphorus is medium and their capacity to supply potassium is low. The content of lime is very low or low. Unless limed, the surface layer is very strongly acid or strongly acid. Slope and hazard of erosion are the main limitations in farming. Natural fertility is low. This soil may develop strong plowpans if it is worked intensively with heavy machinery and if the organic-matter content is not maintained at a high level.

Representative profile of Unadilla silt loam, 0 to 8 percent slopes, in an idle field, 200 yards north of State Highway 5S and ½ mile northwest of County Route 103 at Lock 9, in Rotterdam:

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam; weak, very fine and fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.

B21—9 to 18 inches, brown (7.5YR 4/4) very fine sandy loam; weak, fine, subangular blocky structure parting to weak, fine, granular; very friable; many roots; many fine pores; strongly acid; gradual, wavy boundary.

B22—18 to 28 inches, brown (10YR 5/3) very fine sandy loam; few, fine, distinct, strong-brown (7.5YR 5/6) mottles in lower part; weak, fine, subangular blocky structure; friable; common roots; common fine pores; strongly acid; gradual, wavy boundary.

C—28 to 50 inches, brown (10YR 5/3) very fine sandy loam; common, medium, distinct, yellowish-red (5YR 4/6) and grayish-brown (2.5Y 5/2) mottles; massive; friable; common roots; many fine pores; strongly acid; abrupt, wavy boundary.

IIC—50 to 60 inches, dark-brown (10YR 3/3) stratified sand and gravel; single grained; loose; few roots; medium acid.

Thickness of the silt and very fine sand mantle in which the soil formed is more than 40 inches but generally less than 6 feet. The silty layer is commonly underlain by a IIC horizon of stratified sand and gravel or clay. Depth to bedrock is generally more than 6 feet. The silty layer is dominantly strongly acid but ranges to medium or slightly acid between depths of 40 and 60 inches. Coarse fragments are few or none. The fine earth fraction in the solum is silt loam and very fine sandy loam. The C horizon is commonly silt loam or very fine sandy loam, but it may contain thin layers of finer textured and coarser material.

The Ap horizon has hue of 7.5YR, and 10YR, value of 3 and 4, and chroma of 2 and 3. The B horizon has hue of 7.5YR, 10YR, and 2.5Y, value of 4 and 5, and chroma of 3 to 6. Consistence is friable or very friable. The C horizon is massive or has a weak platy structure.

Unadilla soils formed in similar material and are in a drainage sequence with the moderately well drained Scio soils and the somewhat poorly drained Raynham soils. Unadilla soils are associated with the gravelly Howard soils on terraces and the Hamlin soils on adjacent bottom lands. Unadilla soils are associated with the clayey Hudson soils and the sandy Colonie soils on lake plains.

UnB—Unadilla silt loam, 0 to 8 percent slopes. This nearly level and gently sloping soil has the profile described as representative of the series. It occupies high stream terraces and old lake plains. The largest acreage is near the Mohawk River. Areas are long and narrow or broad and irregularly shaped. They range from less than 5 acres to more than 30 acres in size.

Included with this soil in mapping are small areas of the wetter Scio soils, the finer textured Hudson soils on the lake plain, and the gravelly Howard soils on terraces. Also included are areas of soils that are similar to Unadilla soils but have stratified sand and gravel or clay at a depth of less than 40 inches.

This Unadilla soil is suited to row crops, hay, pasture, and woodland. Under good management, this soil is very productive and is suited to all locally grown field crops. Minimum tillage, returning crop residue, plowing under green manure, and other measures are important to help control erosion. Winter cover crops also help to control erosion. Diversions or terraces may be needed in the sloping areas to reduce runoff and erosion. Capability unit IIe–5; woodland group 2o1.

UnC—Unadilla silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but in places it has a thinner subsoil. This soil occupies the sides of small, dome-shaped hills and terrace breaks adjacent to the Mohawk River. Areas are irregularly shaped and range from 5 to 20 acres in size. Included with this soil in mapping are small areas of the fine-textured Hudson soils and the sandy Plainfield soils.

This Unadilla soil is best suited to hay, pasture, and woodland. It is highly erodible. When the soil is row cropped, diversions or terraces, stripcropping, and other measures are needed to control surface water. This soil tends to be slightly droughty during the summer months. Minimum tillage, returning crop residue, and plowing under green manure are needed to maintain organic-matter content and desirable soil structure. Capability unit IIIe–7; woodland group 2r1.

UnD—Unadilla silt loam, 15 to 25 percent slopes. This moderately steep soil has a profile similar to the one described as representative of the series, but it has a thinner subsoil. This soil occupies the sides of small, dome-shaped hills. Areas generally range from 5 to 20 acres in size. Included with this soil in mapping are small areas of eroded soils and small areas of the sandy Plainfield soils.

The use of this Unadilla soil should be limited to hay, pasture, or woodland. Steepness and erosion limit its use for cultivated crops. Machinery is difficult to operate on these moderately steep slopes. In reestablishing hay or pasture, contour or cross-slope tillage

and planting help to control runoff and erosion. Capability unit IVe–6; woodland group 2r3.

Urban Land

UR—Urban land-Colonie complex. This mapping unit consists of areas of soils in the inner part of the city of Schenectady, largely under structures or pavements. This mapping unit is about 70 percent Urban land and 30 percent Colonie soils. The Urban land part is covered with homes and commercial and industrial developments. It is dominantly underlain by sandy material. Areas of deep, well-drained to excessively drained, sandy Colonie soils are used for residences and large parking lots, as well as for parks and other such areas where the soils have had little disturbance. This mapping unit is typically nearly level, but some areas range from gently sloping to steep. Capability unit and woodland group not assigned.

Varick Series

The Varick series consists of moderately deep, nearly level to gently sloping, poorly drained, medium-textured soils on bedrock-controlled till plains. These soils formed in compact glacial till that is underlain at a depth of 20 to 40 inches by interbedded sandstone and shale, siltstone, limestone, and calcareous black shale.

In a representative profile the surface layer is 8 inches of very dark gray silt loam. The subsurface layer is 5 inches of mottled olive-gray, friable heavy loam. The subsoil is mottled dark grayish-brown, firm shaly silty clay loam 17 inches thick. The reaction of these horizons is neutral. Gray siltstone bedrock is at a depth of 30 inches.

The water table is perched on the slowly or very slowly permeable subsoil, and ground water is at or near the surface most of the year. Root growth is restricted by wetness mainly to the upper 12 inches of the soil, but it is deeper in dry periods. Available water capacity is moderate, and moisture generally is sufficient for plant growth. The capacity of these soils to supply nitrogen is high, phosphorus medium, and potassium medium to high. Unless limed, the surface layer is medium acid.

Prolonged wetness and shallowness to bedrock are the main limitations in farming. The close underlying bedrock and the lack of outlets make artificial drainage difficult.

Representative profile of Varick silt loam, 0 to 3 percent slopes, in an old meadow, 20 feet south of U.S. Route 20 and ¼ mile west of junction with Schoharie Turnpike, in Duanesburg:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam, (10YR 5/1) where dry; weak, fine and medium, granular structure; very friable; many roots; 10 percent coarse fragments; neutral; abrupt, smooth boundary.

A2g—8 to 13 inches, olive-gray (5Y 5/2) heavy loam; common, coarse, faint, gray (5Y 5/1) mottles; many, medium, prominent, yellowish-brown (10YR 5/4) and brown (10YR 5/3) mottles and few, medium, prominent, strong-brown (7.5YR 5/6) mottles (30 percent); weak, very thick, platy structure parting to weak, medium, subangular blocky; friable; common roots; many pores; 10 percent coarse fragments; neutral; clear, wavy boundary.

IIB2tg—13 to 30 inches, dark grayish-brown (2.5Y 4/2) shaly silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) mottles; many light olive-brown (2.5Y 5/6) mottles and common, coarse, faint, gray (5Y 5/1) mottles; strong, very coarse, prismatic structure parting to weak, medium and coarse, subangular blocky; firm; few roots; many pores; patchy clay films on faces of peds; 25 percent coarse fragments; neutral; abrupt, smooth boundary.

IIR—30 inches, gray bedrock.

The solum is 20 to 40 inches thick over interbedded sandstone and shale, siltstone, limestone, and calcareous black shale. The content of coarse fragments ranges from 10 to 20 percent in the A horizon to as much as 20 to 40 percent in the other layers above the bedrock. The coarse fragments are mainly channery and shaly. The fine earth fraction in the solum is loam, silt loam, and silty clay loam. The solum ranges from medium acid to neutral. The Ap and A1 horizons have hue of 10YR or 2.5Y, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 1 or 2.

The A2g horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. The IIB2tg horizon has hue of 10YR, 2.5Y, and 5Y, value of 4 or 5, and chroma of 1 or 2. More than 60 percent of the matrix from the base of the Ap horizon to a depth of 30 inches has chroma of 2 or less. Mottles occur in all horizons beneath the Ap horizon.

Varick soils are associated with Arnot, Tuller, Angola, Brockport, and Ilion soils. Varick soils are wetter and deeper to bedrock than Arnot soils. They are deeper to bedrock than Tuller soils and wetter than the channery Angola soils. They are coarser textured than Brockport soils and are not so deep as the similarly textured Ilion soils.

VaA—Varick silt loam, 0 to 3 percent slopes. This nearly level soil has the profile described as representative of the series. It occupies flat or depressional areas on ridgetops and plateaus and between ridges and bedrock escarpments. Areas vary in shape and range from less than 5 acres to more than 30 acres in size.

Included with this soil in mapping are small, dome-shaped areas of the Darien and Angola soils. Also included are areas of Tuller soils in a few small depressions, spots of the deeper Ilion soils that are similarly drained, and a few small areas of the finer textured Brockport and Fonda soils.

This Varick soil is best suited to hay, pasture, and woodland. It remains wet for long periods because water is received from adjacent, higher lying soils, and the water table remains perched on the slowly permeable subsoil and underlying bedrock. Drainage is generally impractical. Shallow-rooted, water-tolerant plants do best on this soil. It is poorly suited to ponds because of the shallow depth to bedrock. Capability unit IVw–5; woodland group 3w4.

VaB—Varick silt loam, 3 to 8 percent slopes. This gently sloping soil has a profile similar to the one described as representative of the series, but in places it has a thinner subsoil and it is shallower to underlying bedrock. This soil occupies bedrock-controlled areas on glacial till uplands. Areas are broad on ridgetops and narrow between bedrock escarpments. They range from less than 5 acres to more than 20 acres in size.

Included with this soil in mapping are small areas of Tuller, Angola, and Hornell soils. Also included are

spots of Arnot soils near the edge of steep, short escarpment breaks.

This Varick soil is best suited to water-tolerant grasses used for hay and pasture and to woodland. It is subject to long, wet periods and is shallow to bedrock. This soil should be tilled late in spring because the water table is high. Cross-slope or contour tillage should be used when hay or pasture is reestablished. Capability unit IVw–5; woodland group 3w4.

Wassaic Series

The Wassaic series consists of moderately deep, nearly level to sloping, well drained and moderately well drained, medium-textured soils on bedrock-controlled till plains. These soils formed in glacial till derived mainly from limestone but also from sandstone and shale. Limestone bedrock is at a depth of 20 to 40 inches.

In a representative profile the surface layer is 7 inches of dark-brown silt loam. The upper part of the subsoil is 6 inches of yellowish-brown, very friable gravelly silt loam. The next layer is leached, brown, firm gravelly loam 6 inches thick. The lower part of the subsoil, between depths of 19 and 27 inches, is dark-brown, very firm light silty clay loam that is neutral in reaction. Gray limestone bedrock is at a depth of 27 inches.

Seasonally the water table is perched on the subsoil or bedrock, and ground water is within 18 to 30 inches of the surface for short periods. Permeability is moderate. Root growth is from the upper 20 inches of soil to bedrock. Bedrock generally is at a depth of about 30 inches. Available water capacity is moderate. The capacity of these soils to supply nitrogen, phosphorus, and potassium is medium. The content of lime is medium. Unless limed, the surface layer is strongly acid or medium acid.

Slope, hazard of erosion, and slight droughtiness are the main limitations in farming. Slope and shallowness to bedrock are limitations in town and country planning.

Representative profile of Wassaic silt loam, 3 to 8 percent slopes, in a hayfield, 200 yards southwest of junction of Touareuna and Potter Roads, in Glenville:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; weak, fine and medium, granular structure; very friable; many roots; 10 percent coarse fragments; medium acid; abrupt, smooth boundary.

B2—7 to 13 inches, yellowish-brown (10YR 5/4) gravelly silt loam; weak, very fine and fine, blocky structure; very friable; many roots; common fine pores; 15 percent coarse fragments; medium acid; clear, wavy boundary.

A'2—13 to 19 inches, brown (10YR 5/3) gravelly loam, very pale brown (10YR 7/3) when dry; moderate, medium, platy structure; firm; common roots; many pores; 20 percent coarse fragments; medium acid;

IIB'2t—19 to 27 inches, dark-brown (10YR 4/3) light silty clay loam; moderate, fine and medium, angular blocky structure; very firm; few roots; few very fine pores; thin, patchy clay films on faces of peds; brown (10YR 5/3) films 1 to 2 millimeters thick on peds in upper 3 inches, very pale brown (10YR 7/3) when dry; 12 percent coarse fragments; neutral; abrupt, smooth boundary.

IIIR—27 inches, gray limestone bedrock.

Thickness of the solum ranges from 20 to 36 inches, and depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from less than 5 percent to more than 25 percent, but it does not exceed 35 percent. The solum ranges from medium acid to neutral.

The Ap horizon ranges from dark brown (10YR 3/3) to dark grayish brown (10YR 4/2). If A2 horizons occur, they are thin.

The Bt horizon has hue of 10YR, value of 4 and 5, and chroma of 3 and 4. If mottles occur, they generally have higher chroma than the matrix. The fine earth fraction ranges from loam to light silty clay loam. Clay films on faces of peds are common or abundant. The Bt horizon is firm or very firm.

Wassaic soils are associated with Lansing, Farmington, Angola, and Ilion soils. Wassaic soils are shallower to bedrock than Lansing soils. They are deeper to bedrock than Farmington soils and are better drained than the moderately deep Angola soils and the deep Ilion soils.

WaA—Wassaic silt loam, 0 to 3 percent slopes. This nearly level soil has a profile similar to the one described as representative of the series, but it is generally deeper to bedrock. This soil occupies flat areas in bedrock-controlled uplands. Areas are broad and irregularly shaped and range from less than 5 acres to more than 25 acres in size.

Included with this soil in mapping are small areas of the shallower Farmington soils and the deeper Lansing soils. Also included are spots of Angola soils in low areas and areas of a soil that is similar to Wassaic soils but has a lighter textured lower subsoil.

This Wassaic soil is suited to row crops, hay, pasture, and woodland. It is well suited to high-yielding varieties of alfalfa. The soil is droughty during long, dry periods; therefore, deep-rooted crops are preferred for general cropping. Capability unit IIs–2; woodland group 2o1.

WaB—Wassaic silt loam, 3 to 8 percent slopes. This gently sloping soil has the profile described as representative of the series. It occupies the tops and sides of bedrock ridges and plateaus. Areas are broad and range from 5 acres to more than 50 acres in size.

Included with this soil in mapping are small areas of Farmington soils in shallow areas and Lansing and Nellis soils in deeper areas. Also included are small areas of the wetter Brockport and Angola soils in slight depressions and drainageways and small areas of a soil that is similar to Wassaic soils but is coarser textured.

This Wassaic soil is well suited to most row crops grown in the area and to hay, pasture, and woodland. It is slightly droughty during long, dry periods. A few outcrops of limestone may interfere with tillage and harvesting. Deep-rooted crops, such as high-yielding varieties of alfalfa, do well. Where practical, contour or cross-slope tillage and planting can be used to control erosion. Where feasible, diversions can also be used to control runoff and erosion. Capability unit IIe–1; woodland group 2o1.

WaC—Wassaic silt loam, 8 to 15 percent slopes. This sloping soil has a profile similar to the one described as representative of the series, but it is slightly shallower to bedrock, and the soil is slightly drier. This soil occupies the sides of bedrock-controlled ridges and hills and areas adjacent to drainageways. Areas

are generally 5 to 10 acres in size. A few areas are larger.

Included with this soil in mapping are small areas of the deeper Lansing and Nellis soils and the shallow Farmington soils. Also included are outcrops of limestone.

This Wassaic soil is suited to row crops, hay, pasture, and woodland. Slope and an occasional outcrop of limestone hinder farming. The soil is slightly droughty during long, dry periods. Contour or cross-slope tillage and planting and other measures help to control erosion. Where practical, diversions and contour stripcropping should be used to control runoff and erosion. Capability unit IIIe–1; woodland group 2o1.

Wayland Series

The Wayland series consists of deep, nearly level, very poorly drained and poorly drained, medium-textured soils in slightly depressional areas of flood plains. These soils formed in recent alluvium along the major streams in the survey area.

In a representative profile the surface layer is 6 inches of black silt loam. The subsoil is 4 inches of mottled dark-gray, friable silt loam. The subsoil is mottled very dark gray, friable silt loam 13 inches thick. The substratum, between depths of 23 and 38 inches, is mottled dark-gray, firm silt loam. The substratum to a depth of 54 inches is mottled dark-gray, stratified silt loam and silty clay.

The water table is near the surface most of the year. These soils are often flooded during rainy periods. Permeability is slow. Root growth is restricted mainly to the upper 12 inches of the soil by the prolonged water table. Plants seldom lack moisture but are frequently affected by excess water. The capacity of these soils to supply nitrogen is high and their capacity to supply phosphorus and potassium is medium. The content of lime is medium. Unless limed, the surface layer is slightly acid or neutral.

Prolonged wetness and the hazard of flooding are the main limitations in farming. A few areas of this soil can be drained, but drainage is most areas is restricted by the water table that is at the same level as the Mohawk River and the New York State Barge Canal. Frequent flooding is the main limitation in town and country planning.

Representative profile of Wayland silt loam, in a wooded area, 200 feet south of State Highway 5 and 3,800 feet east of junction with McKinley Road, in Palatine:

A1—0 to 6 inches, black (10YR 2/1) silt loam, gray (10YR 5/1) when dry; moderate, medium to coarse, granular structure; friable; many roots; porous; neutral; abrupt, smooth boundary.

B21g—6 to 10 inches, dark-gray (10YR 4/1) silt loam; many, medium, distinct, reddish-brown (5YR 4/4) mottles, common, medium, distinct, brown (7.5YR 4/4) mottles, and common, coarse, faint, dark-gray (N 4/0) mottles; weak, thick, platy structure parting to moderate, fine, subangular blocky; friable; many roots; many fine and medium pores; many worm holes; neutral; gradual, wavy boundary.

B22g—10 to 23 inches, very dark gray (10YR 3/1) silt loam, very dark grayish-brown (10YR 3/2) when crushed; common, fine, distinct, reddish-brown (5YR 4/3) mottles; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; friable; common roots; many fine and medium pores; many earthworm channels; neutral; gradual, smooth boundary.

C1g—23 to 38 inches, dark-gray (10YR 4/1) silt loam; many, fine and medium, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; firm in place, friable when removed; few roots; many fine and medium pores; neutral; gradual, smooth boundary.

IIC2—38 to 54 inches, dark-gray (10YR 4/1) stratified silt loam and silty clay; heavy silt loam texture; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; massive; firm, slightly plastic; mildly alkaline.

Thickness of the solum ranges from 20 to 30 inches, and depth to contrasting gravelly or sandy material is more than 50 inches. The solum is dominantly silt loam throughout, but the Bg horizon rangrs to light silty clay loam in some places. The A horizon is dominantly slightly acid or neutral, the B horizon is neutral, and the C horizon ranges from neutral to mildly alkaline.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The Bg horizon has hue of 10YR or 2.5Y, value of 3, 4, or 5, and chroma of 1. The C horizon dominantly has hue of 10YR, value of 3 to 5, and chroma of 1. It is dominantly silt loam.

Wayland soils are in a drainage sequence with the well-drained Hamlin soils and the moderately well drained and somewhat poorly drained Teel soils, all of which formed in alluvial material. In many areas, Wayland soils are near the gravelly Howard, Palmyra, and Copake soils, all of which have a gravelly C horizon.

Wy—Wayland silt loam. This nearly level soil occupies level or slightly depressional areas on flood plains. In many places it occupies oxbows and meanders on bottom lands. Areas are long and narrow. Most range from 5 to 20 acres in size. In places a few areas have an organic surface layer 10 to 12 inches thick over alluvial material. Included with this soil in mapping are small, dome-shaped areas of the moderately well drained to somewhat poorly drained Teel soils.

This Wayland soil is best suited to water-tolerant hay, pasture, and woodland species. Effective drainage makes some areas suitable for row crops, but drainage is not feasible in many places. Spring flooding and high water table are the main limitations for all uses. Capability unit IVw–1; woodland group 4w1.

Use and Management of the Soils

This part of the survey defines general principles of management that apply to all arable soils in Montgomery and Schenectady Counties. It explains the capability grouping and lists estimated yields per acre for the main crops under two levels of management. Also in this part of the survey is information on woodland, wildlife, and engineering and on selected use of the soils in town and country planning.

Soil Management for Farming [2]

Some principles of management are general enough to apply to all the soils suitable for farm crops in the two counties even though the individual soils require

[2] HAROLD L. HANSEN, conservation agronomist, Soil Conservation Service, helped prepare this section.

different kinds of management. These general principles of management are described in the following paragraphs.

Many soils in the county need additions of lime or fertilizer or both. The amounts needed depend on the natural content of lime and plant nutrients as determined by laboratory analyses of soil samples, on the needs of the crop, and on the level of yield desired. For assistance in making and interpreting tests, farmers and others should consult their Cooperative extension agent. Timely fertilization, particularly nitrogen applications, is important. Such applications are needed when crop demand is at a peak in order to gain maximum benefits. Nitrogen is easily lost through leaching, especially from coarse-textured soils, for example, Colonie, Otisville, and Plainfield soils. Applying small amounts at frequent or timely intervals gives better results than other techniques.

Figure 11 shows the relationship of the different lime levels noted in the soil series descriptions. New research findings are also available.[3] In the absence of soil tests, such information, along with this publication, can be used as a guide in determining lime and fertilizer needs.

Most of the soils of Montgomery and Schenectady Counties have fairly high organic-matter content. It is important to maintain this high level by returning organic matter to the soil. This can be done by adding farm manure, by leaving plant residue on the surface, and by growing sod crops, cover crops, and green-manure crops.

Tillage tends to reduce organic-matter content and to break down soil structure. It should be limited to the minimum amount necessary to prepare a seedbed and to control weeds. Maintaining organic-matter content of the plow layer also helps to protect the soil structure.

On wet soils, such as Appleton silt loam, yields of cultivated crops can be increased by open-ditch drainage or tile drainage. Tile drains cost more to install, but they generally require less maintenance and can be farmed over, unlike open ditches. Drainage on sloping soils is more effective if the ditches of tile lines intercept the water as it moves horizontally downslope on top of the fragipan or other impervious layer. For drainage by either tile or open ditches, suitable outlets are needed.

Erosion is a major source of sediment; the latter ranks high as a major cause of pollution. All of the gently sloping and steeper soils that are cultivated are subject to erosion. Runoff and erosion occur mostly while a cultivated crop is growing or soon after one has been harvested. On erodible soils, such as Unadilla silt loam, 0 to 8 percent slopes, a cropping system that controls runoff and erosion is needed in combination with other erosion-control practices. As used here, the term cropping system refers to the sequence of crops grown under management practices such as minimum tillage, mulch planting, use of crop residue, growing of cover crops and green-manure crops, and use of lime and fertilizer. Other erosion-control practices are contour cultivation, terracing, contour stripcropping diversion of runoff, use of grassed waterways, and use of windbreaks to control soil blowing. The effectiveness of a particular combination of these measures differs from one soil to another. However, different combinations can be equally effective on the same soil. The local representative of the Soil Conservation Service can assist in planning an effective combination of practices to control erosion.

Pasture is effective in controlling erosion on all but a few of the soils that are subject to erosion. A high level of pasture management is needed on some soils to provide enough ground cover to keep the soil from eroding. A high level of pasture management provides for fertilization, control of grazing, selection of pasture mixtures, and other practices that are adequate for maintaining good ground cover and forage for grazing. Grazing is controlled by rotating the livestock from one pasture to another, thereby providing a time period for regrowth of plants. On some soils it is important to establish pasture plants that require little renovation in order to provide good ground cover and adequate forage.

[3] New research findings are reported in current editions of "Cornell Recommends for Field Crops" and "Vegetable Production Recommendations," both prepared by the staff of the New York State College of Agriculture at Cornell University.

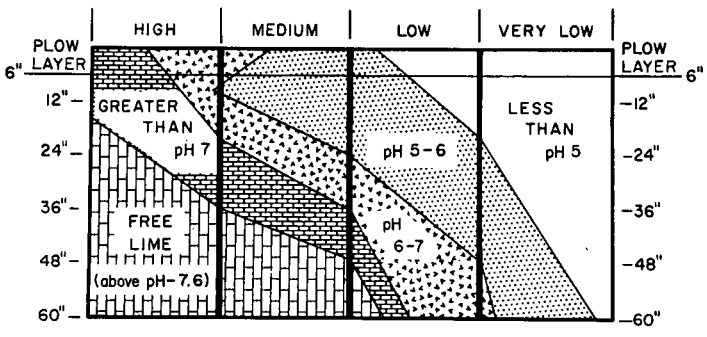

Figure 11.—**Lime level of different soil profiles.**

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are so 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, nor does it take into consideration possible but unlikely major reclamation projects. It also does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

Familiarity with the capability classification enables one to infer much about the behavior of soils when they are 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 for engineering.

In the capability system, all kinds of soils are

grouped at three levels: the capability class, the subclass, and the unit. These levels are described 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, that require special conservation practices, or both.

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

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

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

Class VIII soils and landforms have limitations that preclude their use for commercial plants and that restrict their use to recreation, wildlife, 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 to 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. However, they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about soil management. Capability units are generally designated by adding an Arabic numeral to the subclass symbol; for example, IIe–4, or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

The placement of any mapping unit in the grouping can be learned by referring to the notation that ends the description of each mapping unit in the section that describes the soils of the county.

Use and management of the soils is suggested for each mapping unit in the section Descriptions of the Soils.

Estimated yields [4]

Table 2 shows estimated average acre yields of major crops grown in the counties. The estimates are for two levels of management. Column A shows yields that can be expected under average management, which consists of applying less than half of the recommended conservation and management practices. The estimates are for yields obtained in the early 1970's.

The estimated yields in column B are the approximate high yields attained by the top 10 percent of farmers in the county who used the best combinations of conservation and management practices. High-level management consists of using suitable crop rotations; applying appropriate amounts of lime and fertilizer; providing drainage and irrigation where needed; using contour farming, stripcropping, sodded waterways, or other appropriate measures where needed to conserve soil and water; controlling weeds and insects as completely as possible; and tilling at the right time and in the proper way.

To obtain yields like those shown in column B, management practices should meet the levels recommended in the annually published "Cornell Recommends for Field Crops," prepared by the New York State College of Agriculture and Life Sciences at Cornell University.

From year to year actual estimated yields may vary from those listed by about 10 percent. However, management that results in high crop yields, as shown in column B, requires that the farmer be consistent in dealing with all factors over which he has control. Yields may be expected to increase in the future as new varieties and improvements in management become available.

Several varieties of vegetables are grown commercially in Montgomery and Schenectady Counties. They are mainly snapbeans, sweet corn, squash, and potatoes. Estimated acre yields are as follows: snapbeans, 100 to 200 bushels; sweet corn, 4 to 12 tons; squash, 15 to 25 tons; and potatoes, 300 to 600 bushels. There are also minor acreages of carrots, peas, and tomatoes. Vegetable crops are produced mainly on the Hamlin, Teel, Copake, Plainfield, Palatine, and Mohawk soils.

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[4] HAROLD L. HANSEN, conservation agronomist, Soil Conservation Service, helped prepare the tables in this section.

Woodland [5]

Woodland occupies approximately 24 percent, or 63,500 acres, of Montgomery County (*10*). The wooded area is well distributed throughout the county and ranges from 10 percent in the town of Canajoharie to a high of 45 percent in the town of Charlestown (*8*). A total of 6,402 acres of State-owned land is distributed by towns as follows: Charlestown, 5,256 acres; Glen, 98 acres; Root, 1,048 acres.

Forests are dominantly northern hardwood. Small patches of hemlock grow in the ravines. Northern white-cedar is in the swamps and around calcareous rock outcropping.

The areas of commercial forest-type groups in the county are as follows: white pine or red pine, 11,100 acres (fig. 12); other softwoods, 3,700 acres; oak-pine, 2,600 acres; oaks, 9,900 acres; elm-ash-red maple, 15,700 acres; maple-beech-birch, 18,000 acres; aspen-birch, 2,500 acres.

Woodland occupies approximately 34 percent, or 45,700 acres, of Schenectady County (*10*). The wooded area is well distributed throughout the county and ranges from 14 percent in the town of Princeton to a high of 30 percent in the town of Niskayuna (*8*).

In the western half of Schenectady County forests are dominantly northern hardwood. Small patches of hemlock grow in the ravines. Northern white-cedar is in the swamps and around calcareous rock outcrops.

In the eastern half of Schenectady County most of the forests are scraggly pioneer hardwoods and softwoods. Pitch pine and scrub oaks result from periodic burning. On the more productive soils, pitch pine is mixed with small amounts of white pine. Aspen and gray birch grow where moisture is favorable.

The areas of commercial forest-type groups in Schenectady Couny are as follows: white or red pine, 8,200 acres; other softwoods, 2,800 acres; oak-pine, 900 acres; oak, 6,700 acres; elm-ash-red maple, 12,600 acres; maple-beech-birch, 12,700 acres; aspen-birch, 1,800 acres.

The soils of Montgomery and Schenectady Counties have been assigned to woodland suitability groups in order to assist owners in planning the use of their soils for wood crops. Each group is made up of soils that are suited to the same kinds of trees, that have the same production potential, and that require similar management.

Each woodland group is identified by a three-part symbol, such as 1o1, 2w1, or 3w3. The productivity potential of the soils in the group is indicated by the first number in the symbol: 1 = very high, 2 = high, 3 = moderately high, 4 = moderate, and 5 = low. These ratings are based on the field determination of the average site index of an indicator species. The site index of a given soil is the height, in feet, that the dominant and co-dominant trees reach in a natural, essentially unmanaged stand in 50 years. This index can be converted into approximate expected growth and yield per acre. For Montgomery and Schenectady Counties, conversions of average site index into volu-

[5] Prepared by MEREDITH A. PETERS, woodland conservationist, Soil Conservation Service.

Figure 12.—**Red pine plantation on Nunda soils.**

TABLE 2.—*Estimated average yields per acre of*

[Figures in columns A indicate yields obtained under ordinary management; those in columns B are yields to be expected under are

Soil	Corn for silage		Corn for grain	
	A	B	A	B
	Tons	*Tons*	*Bu*	*Bu*
Alton gravelly loam, 3 to 8 percent slopes	14	20	60	100
Amenia loam, 0 to 3 percent slopes	16	22	70	110
Amenia loam, 3 to 8 percent slopes	16	22	70	110
Angola silt loam, 3 to 8 percent slopes	14	18	75	100
Angola channery silt loam, 0 to 3 percent slopes	8	12	40	70
Angola channery silt loam, 3 to 8 percent slopes	8	12	40	70
Appleton silt loam, 0 to 3 percent slopes	12	20	60	100
Appleton silt loam, 3 to 8 percent slopes	12	20	60	100
Arnot channery silt loam, 0 to 8 percent slopes	---	---	---	---
Arnot rocky silt loam, 8 to 15 percent slopes	---	---	---	---
Arnot rocky silt loam, 15 to 25 percent slopes	---	---	---	---
Arnot-Angola channery silt loams, 3 to 8 percent slopes	8	12	40	60
Broadalbin loam, 3 to 8 percent slopes	14	22	70	110
Broadalbin loam, 8 to 15 percent slopes	14	22	70	110
Broadalbin loam, 15 to 25 percent slopes	12	18	60	90
Brockport silt loam	---	---	---	---
Burdett channery silt loam, 0 to 3 percent slopes	8	12	40	70
Burdett channery silt loam, 3 to 8 percent slopes	12	15	50	80
Burdett channery silt loam, 8 to 15 percent slopes	12	15	50	80
Burdett-Scriba channery silt loams, 0 to 3 percent slopes	8	15	40	75
Burdett-Scriba channery silt loams, 3 to 8 percent slopes	8	15	40	75
Burdett-Scriba channery silt loams, 8 to 15 percent slopes	8	15	40	75
Cheektowaga fine sandy loam	---	---	---	---
Churchville silty clay loam, 0 to 3 percent slopes	10	16	50	80
Churchville silty clay loam, 3 to 8 percent slopes	10	16	50	80
Claverack loamy fine sand, 0 to 3 percent slopes	15	20	80	110
Claverack loamy fine sand, 3 to 8 percent slopes	15	20	80	110
Colonie loamy fine sand, 0 to 3 percent slopes	10	18	50	90
Colonie loamy fine sand, 3 to 15 percent slopes	8	15	45	80
Copake silt loam	15	20	80	110
Darien silt loam, 0 to 3 percent slopes	10	14	40	70
Darien silt loam, 3 to 8 percent slopes	12	16	70	90
Darien silt loam, 8 to 15 percent slopes	12	16	70	90
Elnora loamy fine sand	10	18	60	90
Farmington silt loam, 0 to 8 percent slopes	8	12	40	60
Fonda mucky silty clay loam	---	---	---	---
Fredon silt loam	10	16	50	80
Granby loamy fine sand	---	---	---	---
Hamlin silt loam	16	25	80	125
Herkimer shaly silt loam, calcareous subsoil variant	16	22	80	110
Hornell silt loam, 0 to 3 percent slopes	6	10	35	50
Hornell silt loam, 3 to 8 percent slopes	8	12	40	60
Hornell silt loam, 8 to 15 percent slopes	8	12	40	60
Howard gravelly silt loam, 0 to 3 percent slopes	16	20	80	110
Howard gravelly silt loam, 3 to 8 percent slopes	16	20	80	110
Howard gravelly silt loam, 8 to 15 percent slopes	14	18	70	100
Howard gravelly silt loam, 15 to 25 percent slopes	12	16	60	80
Hudson silty clay loam, 3 to 8 percent slopes	10	15	50	75
Hudson silty clay loam, 8 to 15 percent slopes	10	15	50	75
Hudson silty clay loam, 15 to 25 percent slopes	---	---	---	---
Ilion silt loam, 0 to 3 percent slopes	---	---	---	---
Ilion silt loam, 3 to 8 percent slopes	---	---	---	---
Joliet silt loam	---	---	---	---
Junius loamy fine sand	---	---	---	---
Lansing silt loam, 3 to 8 percent slopes	16	25	70	125
Lansing silt loam, 8 to 15 percent slopes	14	22	70	115
Lansing silt loam, 15 to 25 percent slopes	12	18	60	100
Lordstown gravelly silt loam, 0 to 3 percent slopes	8	12	35	60
Lordstown gravelly silt loam, 3 to 8 percent slopes	8	12	35	60
Lordstown gravelly silt loam, 8 to 15 percent slopes	8	12	35	60
Lordstown gravelly silt loam, 15 to 25 percent slopes	---	---	---	---
Madalin silty clay loam	---	---	---	---
Madalin silty clay loam, moderately shallow variant	---	---	---	---

specified crops under two levels of management

improved management. Absence of a figure indicates that the crop is not commonly grown on the specified soil. Only arable soils listed]

Oats		Forage mixtures (hay)						Grass for hay	
		Alfalfa-grass		Alfalfa-birdsfoot trefoil-grass		Birdsfoot trefoil-grass			
A	B	A	B	A	B	A	B	A	B
Bu	*Bu*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
40	85	3.0	5.5	3.0	4.5	2.0	4.0	1.5	2.5
50	90	4.0	6.0	3.5	5.5	3.0	5.0	2.0	4.0
50	90	4.0	6.0	3.5	5.5	3.0	5.0	2.0	4.0
40	60	2.5	3.5	2.0	3.0	2.5	3.5	2.0	3.0
30	60	3.0	4.0	3.0	4.0	3.0	4.0	2.0	3.0
30	60	3.0	4.0	3.0	4.0	3.0	4.0	2.0	3.0
60	90	2.5	4.0	2.5	3.5	2.0	3.5	2.0	3.0
60	90	2.5	4.0	2.5	3.5	2.0	3.5	2.0	3.0
30	55	2.0	3.5	2.0	3.5	1.5	2.5	1.0	2.0
20	30	---	---	---	---	1.5	2.5	1.0	2.0
---	---	---	---	---	---	1.5	2.5	1.0	2.0
30	40	---	---	---	---	1.5	3.0	1.0	2.5
40	60	3.0	6.0	3.0	5.5	2.5	4.0	2.0	3.0
40	60	3.0	6.0	3.0	5.5	2.5	4.0	2.0	3.0
40	60	3.0	6.0	3.0	5.5	2.5	4.0	2.0	3.0
---	---	---	---	---	---	1.5	2.5	1.0	2.0
30	60	3.0	4.0	3.0	4.0	3.0	4.0	2.0	3.0
50	80	4.0	5.0	3.5	4.5	3.5	4.0	3.0	4.0
50	80	4.0	5.0	3.5	4.5	3.5	4.5	2.5	3.5
30	60	2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
30	60	2.0	4.5	2.0	3.5	2.0	3.5	1.5	2.5
30	60	2.0	4.5	2.0	4.0	2.0	3.0	1.5	2.5
---	---	---	---	---	---	2.0	2.5	1.5	2.0
50	80	---	---	---	---	2.0	3.5	1.5	2.5
50	80	2.5	4.0	2.0	3.5	2.0	3.5	1.5	2.5
60	90	4.0	5.0	3.5	4.5	3.5	4.5	2.5	3.5
60	90	4.0	5.0	3.5	4.5	3.5	4.5	2.0	3.0
60	80	2.5	4.0	2.0	3.5	2.0	3.0	1.0	2.0
50	75	2.0	3.5	1.5	3.0	1.5	2.5	1.0	2.0
60	90	4.0	5.0	3.5	4.5	3.0	4.0	2.5	3.0
60	90	2.5	3.5	2.5	3.5	2.5	3.5	1.5	2.0
60	90	3.0	4.0	3.0	4.0	3.0	4.0	1.5	2.5
60	90	3.0	4.0	3.0	4.0	3.0	4.0	1.5	2.5
50	80	3.0	4.0	2.5	3.5	2.0	3.0	1.0	2.0
40	80	3.0	4.0	2.5	3.5	2.0	3.5	1.5	2.0
---	---	---	---	---	---	1.5	3.0	1.0	2.0
40	70	---	4.0	---	3.5	2.0	3.0	1.5	2.0
---	---	---	---	---	---	1.0	2.0	1.0	1.5
60	90	3.5	6.0	3.5	5.0	3.0	4.5	2.5	3.5
60	90	3.5	5.5	3.5	4.5	3.0	4.0	2.5	3.0
20	30	---	---	---	---	1.5	3.0	1.0	2.0
30	40	---	---	---	---	1.5	3.0	1.0	2.0
30	40	---	---	---	---	1.5	3.0	1.0	2.0
60	90	3.5	4.5	3.0	4.0	3.0	4.0	1.5	2.5
60	90	3.5	4.5	3.0	4.0	3.0	4.0	1.5	2.5
50	80	3.5	4.5	2.5	3.5	2.0	3.0	1.5	2.5
40	70	2.5	3.5	2.0	3.0	1.5	2.5	1.0	2.0
45	60	2.5	4.0	2.5	3.5	2.0	3.0	1.0	2.0
45	60	2.5	4.0	2.5	3.5	2.0	3.0	1.0	2.0
40	50	2.0	3.5	2.0	3.5	2.0	3.0	1.0	2.0
---	---	---	---	---	---	2.0	3.0	1.0	2.0
---	---	---	---	---	---	2.0	3.0	1.0	2.0
---	---	---	---	---	---	2.0	2.5	1.0	1.5
---	---	---	---	---	---	1.5	2.5	1.0	1.5
55	90	3.0	6.0	2.5	3.5	2.5	4.0	2.0	3.0
50	85	3.0	6.0	2.5	3.5	2.5	4.0	2.0	3.0
40	60	2.5	5.0	2.5	3.5	2.0	3.5	1.5	2.5
40	60	2.0	3.5	2.0	3.5	2.0	3.0	1.0	2.0
40	60	2.0	3.5	2.0	3.5	2.0	3.0	1.0	2.0
40	60	2.0	3.5	2.0	3.5	2.0	3.0	1.0	2.0
---	---	1.5	2.5	1.5	2.5	1.5	2.5	1.0	1.5
---	---	---	---	---	---	1.5	3.0	1.0	2.0
---	---	---	---	---	---	1.5	2.5	1.0	1.5

TABLE 2.—*Estimated average yields per acre of*

Soil	Corn for silage		Corn for grain	
	A	B	A	B
	Tons	*Tons*	*Bu*	*Bu*
Manheim silt loam, 0 to 3 percent slopes	14	20	80	100
Manheim silt loam, 3 to 8 percent slopes	14	20	80	100
Manlius silt loam, 3 to 8 percent slopes	8	14	40	70
Manlius shaly silt loam, 8 to 15 percent slopes	8	14	40	70
Manlius shaly silt loam, 15 to 25 percent slopes	7	12	35	60
Mardin gravelly silt loam, 3 to 8 percent slopes	10	15	50	75
Mardin gravelly silt loam, 8 to 15 percent slopes	8	12	40	60
Mardin gravelly silt loam, 15 to 25 percent slopes	---	---	---	---
Mohawk silt loam, 3 to 8 percent slopes	16	25	75	125
Mohawk silt loam, 8 to 15 percent slopes	14	23	70	115
Mohawk silt loam, 15 to 25 percent slopes	12	20	60	100
Mosherville loam, 0 to 3 percent slopes	8	14	40	70
Mosherville loam, 3 to 8 percent slopes	8	14	40	70
Nassau shaly silt loam, 0 to 8 percent slopes	8	10	30	50
Nassau shaly silt loam, 8 to 25 percent slopes	---	---	---	---
Nellis loam, 3 to 8 percent slopes	17	24	70	120
Nellis loam, 8 to 15 percent slopes	15	22	60	110
Nellis loam, 15 to 25 percent slopes	12	20	60	100
Nunda channery silt loam, 3 to 8 percent slopes	10	16	60	90
Nunda channery silt loam, 8 to 15 percent slopes	10	16	50	90
Nunda channery silt loam, 15 to 25 percent slopes	8	14	40	60
Odessa silt loam, 3 to 8 percent slopes	10	14	50	70
Otisville gravelly loamy sand, 0 to 8 percent slopes	8	14	40	70
Palatine silt loam, 3 to 8 percent slopes	16	25	80	125
Palatine silt loam, 8 to 15 percent slopes	14	23	75	120
Palatine silt loam, 15 to 25 percent slopes	12	20	60	100
Palmyra gravelly silt loam, 0 to 3 percent slopes	16	20	80	110
Palmyra gravelly silt loam, 3 to 8 percent slopes	16	20	80	110
Palmyra gravelly silt loam, 8 to 15 percent slopes	14	18	70	100
Phelps gravelly loam, 0 to 3 percent slopes	16	22	60	100
Phelps gravelly loam, 3 to 8 percent slopes	16	22	60	100
Phelps gravelly loam, fan	16	22	60	100
Plainfield loamy sand, 0 to 3 percent slopes	10	15	50	90
Plainfield loamy sand, 3 to 10 percent slopes	10	15	50	90
Raynham silt loam	10	16	50	80
Rhinebeck silty clay loam, 0 to 3 percent slopes	8	15	40	70
Rhinebeck silty clay loam, 3 to 8 percent slopes	10	16	50	80
Scio silt loam, 0 to 3 percent slopes	14	20	50	100
Scio silt loam, 3 to 8 percent slopes	14	20	50	100
Sun loam	---	---	---	---
Teel silt loam	16	25	80	120
Tuller channery silt loam	---	---	---	---
Tuller-Brockport complex, 0 to 3 percent slopes	---	---	---	---
Tuller-Brockport complex, 3 to 8 percent slopes	---	---	---	---
Unadilla silt loam, 0 to 8 percent slopes	14	22	70	110
Unadilla silt loam, 8 to 15 percent slopes	12	20	60	100
Unadilla silt loam, 15 to 25 percent slopes	---	---	---	---
Varick silt loam, 0 to 3 percent slopes	---	---	---	---
Varick silt loam, 3 to 8 percent slopes	---	---	---	---
Wassaic silt loam, 0 to 3 percent slopes	12	18	50	100
Wassaic silt loam, 3 to 8 percent slopes	12	18	50	100
Wassaic silt loam, 8 to 15 percent slopes	11	17	45	90
Wayland silt loam	---	---	---	---

metric growth and yield are based on research on sugar maple (*3*), white pine (*4*), and red maple (*3*).

The second part of the symbol identifying a woodland group is a small Arabic letter *x*, *w*, *d*, *c*, *s*, *f*, *r*, or *o*. Except for the letter *o*, the Arabic letter indicates an important soil property that imposes a hazard or limitation in managing the soils of the group for trees. The letter *x* means limitations resulting from stones or rocks. The letter *w* means excessive wetness, either seasonal or all year. The letter *d* means a restricted rooting depth. The letter *c* stands for limitations resulting from the kind or amount of clay in the upper part of the profile. The letter *s* indicates dry, unstable, abrasive sandy soils that have little or no difference in texture between the surface layer and subsoil. The letter *f* means limitations resulting from large amounts of gravel, cobbles, or other coarse rock fragments less than 10 inches in size. The letter *r* shows

specified crops under two levels of management—Continued

Oats		Forage mixtures (hay)						Grass for hay	
		Alfalfa-grass		Alfalfa-birdsfoot trefoil-grass		Birdsfoot trefoil-grass			
A	B	A	B	A	B	A	B	A	B
Bu	*Bu*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*
55	90	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.0
55	90	2.5	3.5	2.5	3.5	2.0	3.0	1.5	2.0
40	70	2.0	3.5	2.0	3.0	2.0	3.0	1.0	1.5
40	70	2.0	3.5	2.0	3.0	2.0	3.0	1.0	1.5
35	60	2.0	3.5	2.0	3.0	2.0	3.0	1.0	1.5
45	60	2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
45	60	2.0	3.5	2.0	3.5	2.0	3.0	1.5	2.5
---	---	2.0	3.5	2.0	3.5	1.5	2.5	1.0	2.0
55	90	3.5	6.0	3.0	5.5	3.0	4.0	2.5	3.5
50	85	3.5	6.0	3.0	5.5	3.0	4.0	2.5	3.5
40	60	3.0	4.5	3.0	4.5	2.5	3.5	2.0	3.0
40	60	2.0	3.0	2.0	3.0	2.0	4.0	1.0	2.5
40	60	2.0	3.0	2.0	3.0	2.0	4.0	1.0	2.5
40	50	---	---	2.0	3.0	1.5	2.5	1.0	2.5
---	---	---	---	---	---	1.5	2.5	1.0	2.5
60	90	4.0	6.0	3.5	5.0	3.0	4.5	2.5	3.5
55	85	4.0	6.0	3.5	5.0	3.0	4.5	2.5	3.5
40	80	3.5	5.5	3.0	4.5	2.5	4.0	2.0	3.0
50	80	3.0	4.0	2.5	3.5	2.0	3.5	1.0	2.5
50	80	3.0	4.0	2.5	3.5	2.0	3.5	1.0	2.5
40	60	3.0	4.0	2.0	3.0	1.5	3.0	1.0	2.0
40	50	2.5	3.5	2.0	3.0	2.0	2.5	1.0	2.0
40	60	2.0	3.0	2.0	3.0	2.0	3.0	1.0	2.5
60	90	3.5	5.0	3.0	4.5	2.5	4.0	1.5	3.0
60	90	3.5	5.0	3.0	4.5	2.5	4.0	1.5	3.0
50	80	3.5	5.0	3.0	4.5	2.5	4.0	1.5	3.0
60	90	4.0	5.0	3.5	4.5	3.0	4.0	1.5	2.5
60	90	4.0	5.0	3.5	4.5	3.0	4.0	1.5	2.5
50	80	3.5	4.5	3.0	4.0	2.5	3.5	1.0	2.0
50	90	3.5	4.5	3.5	4.5	3.0	4.0	1.5	2.5
50	90	3.5	4.5	3.5	4.5	3.0	4.0	1.5	2.5
50	90	3.5	4.5	3.5	4.5	3.0	4.0	1.5	2.5
40	60	2.5	4.0	2.5	4.0	2.0	3.0	1.0	2.5
40	60	2.5	4.0	2.5	4.0	2.0	3.0	1.0	2.5
---	75	---	4.0	---	3.5	2.0	3.0	1.5	2.5
40	65	2.5	4.0	2.0	3.5	2.0	3.5	1.5	2.5
50	70	2.5	4.0	2.0	3.5	2.0	3.5	1.5	2.5
50	80	3.0	5.0	2.5	4.5	2.5	4.0	1.5	2.5
50	80	3.0	5.0	2.5	4.5	2.5	4.0	1.5	2.5
---	---	---	---	---	---	2.0	3.0	1.0	2.0
50	80	3.0	4.5	3.0	4.0	3.0	4.0	2.0	3.0
---	---	---	---	---	---	1.5	2.5	1.0	1.5
---	---	---	---	---	---	1.5	2.5	1.0	1.5
---	---	---	---	---	---	1.5	2.5	1.0	1.5
50	80	3.0	6.0	3.0	5.0	2.5	4.0	2.0	3.0
40	60	3.0	6.0	3.0	5.0	2.5	4.0	2.0	3.0
---	---	2.5	4.5	2.0	4.0	2.0	3.5	1.5	2.0
---	---	---	---	---	---	1.5	2.5	1.0	1.5
---	---	---	---	---	---	1.5	2.5	1.0	1.5
40	80	3.0	5.0	2.5	4.5	2.5	4.0	2.0	3.0
40	80	3.0	5.0	2.5	4.5	2.5	4.0	2.0	3.0
35	75	3.0	4.5	2.5	4.5	2.5	4.0	2.0	3.0
---	---	---	---	---	---	2.0	3.0	1.5	3.0

that the main limitation is steep slope and that there is a hazard of erosion and possibly limitations to use of equipment. The letter *o* shows that the soils have slight or no limitations that restrict their use for trees.

The last part of the symbol, another number, differentiates groups of soils that have identical first and second parts in their identifying symbol. For example, soils in woodland group 3w1 require different management or they are suited to other species of trees than soils in group 3w2 because of differences in soil properties or other factors.

In table 3 each woodland suitability group has a verbal rating for its various management hazards or limitations. These ratings are slight, moderate, or severe. They are described in the following paragraphs.

Hazard of erosion refers to the potential hazard of soil loss in common woodland management. The haz-

TABLE 3.—*Woodland management*

[Fluvaquents, loamy; Made land; Saprists and Aquents; and Urban land-Colonie complex are too variable

Woodland group	Potential productivity		Concerns of management	
	Species	Estimated site index	Erosion hazard	Equipment restrictions
Group 2o1: Deep or moderately deep, moderately well drained to excessively drained, nearly level to sloping, medium textured and moderately fine textured soils. Content of lime is low to high. Herkimer: He Howard: HrA, HrB, HrC Hudson: HuB Lansing: LaB, LaC Mohawk: MsB, MsC Nellis: NeB, NeC Nunda: NuB, NuC Palatine: PaB, PaC Palmyra: PmA, PmB, PmC Phelps: PpA, PpB, Pr Scio: ScA, ScB Unadilla: UnB Wassaic: WaA, WaB, WaC	Sugar maple	65–70	Slight	Slight
Group 2o2: Deep, well drained and moderately well drained, level, medium-textured soils that formed in recent alluvial deposits. Content of lime is medium. Hamlin: Ha Teel: Te	Sugar maple	65–70	Slight	Slight
Group 2r1: Deep, well-drained, sloping, medium-textured soil. Content of lime is low or very low. Unadilla: UnC	Sugar maple	65–70	Moderate	Slight
Group 2r2: Deep or moderately deep, excessively drained to moderately well drained, sloping and moderately steep, medium textured or moderately fine textured soils. Content of lime is medium or high. Howard: HrD Hudson: HuC Lansing: LaD Mohawk: MsD Nellis: NeD Nunda: NuD Palatine: PaD	Sugar maple	65–70	Moderate	Moderate
Group 2r3: Well-drained, moderately steep, medium-textured soil. Content of lime is low or very low. Unadilla: UnD	Sugar maple	65–70	Severe	Moderate
Group 2r4: Deep, moderately well drained and well drained, moderately steep and very steep, medium and moderately fine textured soils. Content of lime is medium to high. Hudson: HuD, HVF Lansing: LMF Nunda: NVF	Sugar maple	65–70	Severe	Severe
Group 2r5: Deep, well drained to excessively drained, very steep, medium-textured soils that formed in glacial outwash deposits. Content of lime is medium or high. Howard: HTF	Sugar maple	65–70	Moderate	Severe
Group 3o1: Deep or moderately deep, moderately well drained to somewhat excessively drained, level to sloping, medium-textured soils. Content of lime is low to high. Alton: AlB Amenia: AmA, AmB Broadalbin: BoB, BoC Copake: Cr Lordstown: LoA, LoB, LoC Manlius: MnB, MoC Mardin: MrB, MrC	Sugar maple	60–65	Slight	Slight

and productivity

to rate without onsite investigation. Rock outcrop does not support commercial tree growth]

Concerns of management—Continued				Species to be favored—	
Seedling mortality	Plant competition		Windthrow hazard	In stand	For planting
	Hardwoods	Conifers			
Slight	Moderate	Severe	Slight	Sugar maple, white ash, basswood, white pine, hemlock, yellow birch.	White pine, red pine, Norway spruce, white spruce, larches.
Slight	Moderate	Severe	Slight	Sugar maple, white pine, white ash, basswood.	White pine, Norway spruce, black walnut, larches.
Slight	Moderate	Severe	Slight	Sugar maple, white pine, basswood, white ash, black cherry.	White pine, Norway spruce, white spruce, larches, black locust.
Slight	Moderate	Severe	Slight	Sugar maple, white pine, red oak, black cherry, white ash, basswood.	Norway spruce.
Slight	Moderate	Severe	Slight	Sugar maple, basswood, white ash, black walnut, red oak, black cherry.	White pine, black walnut, yellow-poplar.
Slight	Moderate	Severe	Slight	Sugar maple, white pine, basswood, white ash, black cherry.	White pine, Norway spruce, white spruce, larches, black locust.
Slight	Moderate	Severe	Slight	Sugar maple, white pine, red oak, hemlock.	White pine, red pine, larches.
Slight	Slight	Moderate	Slight	Sugar maple, basswood, white oak, red oak, black cherry.	White pine, Norway spruce, white spruce, larches.

TABLE 3.—*Woodland management*

Woodland group	Potential productivity		Concerns of management	
	Species	Estimated site index	Erosion hazard	Equipment restrictions
Group 3r1: Deep or moderately deep, moderately well drained to excessively drained, moderately steep, medium-textured soils. Content of lime is very low to high. Broadalbin: BoD Lordstown: LoD Manlius: MoD Mardin: MrD	Sugar maple	60–65	Slight	Moderate
Group 3r2: Moderately deep, well drained to excessively drained, steep, medium-textured soils. Content of lime is low or very low. Lordstown: LRE Manlius: MPE	Sugar maple	60–65	Severe	Severe
Group 3s1: Deep, moderately well drained, nearly level and gently sloping soils that have a mantle of sandy material over clay. Content of lime is medium. Claverack: ClA, ClB	Sugar maple	60–65	Slight	Slight
Group 3w1: Deep or moderately deep, somewhat poorly drained, level or gently sloping, medium-textured or moderately fine textured soils. Content of lime is medium to high. Brockport: Br and Brockport part of TvA and TvB Churchville: ChA, ChB Hornell: HoA, HoB Odessa: OdB Rhinebeck: RhA, RhB	Sugar maple	60–65	Slight	Moderate
Group 3w2: Deep, somewhat poorly drained, nearly level or gently sloping, medium-textured soils that have dense fragipans at a depth of 16 to 26 inches. The pan is nearly impervious to roots and water. The soils formed in low-lime glacial till. Mosherville: MtA, MtB	Sugar maple	60–65	Slight	Moderate
Group 3w3: Deep and moderately deep, somewhat poorly drained and poorly drained, nearly level to sloping, medium-textured soils. Content of lime is medium to high. Angola: AnB, AoA, AoB Appleton: ApA, ApB Burdett: BuA, BuB, BuC, BvA, BvB, BvC Darien: DaA, DaB, DaC Fredon: Fr Hornell: HoC Manheim: MmA, MmB	Red maple	70–80	Slight	Moderate
Group 3w4: Deep or moderately deep, poorly drained, nearly level or gently sloping, medium-textured soils that formed in medium- or high-lime glacial till. Ilion: IlA, IlB, InB Varick: VaA, VaB	White pine	70–80	Slight	Severe
Group 3x1: Deep, moderately well drained and somewhat poorly drained, extremely stony, gently sloping and sloping, medium-textured soils. Content of lime is low to medium. Burdett: BXB Nunda: NWC	Sugar maple	60–65	Slight	Moderate
Group 4d1: Shallow, moderately well drained to excessively drained, gently sloping and sloping, medium-textured soils. Content of lime is low. Arnot: ArB, AtC, AvB Nassau: NaB	Sugar maple	52–59	Slight	Slight
Group 4s1: Deep, moderately well drained to excessively drained, nearly level to sloping, coarse-textured soils. Content of lime is low. Colonie: CoA, CoC Elnora: En Otisville: OtB Plainfield: PsA, PsB	White pine	60–70	Slight	Slight

and productivity—Continued

Concerns of management—Continued				Species to be favored—	
Seedling mortality	Plant competition		Windthrow hazard	In stand	For planting
	Hardwoods	Conifers			
Slight	Slight	Moderate	Slight	Sugar maple, white pine, red oak, white ash.	White pine, red pine, Norway spruce, larches.
Slight	Slight	Moderate	Slight	Sugar maple, black cherry, white ash, red oak, hemlock.	White pine, red pine, larches.
Slight	Slight	Moderate	Slight	Sugar maple, black cherry, red oak, white pine.	White pine, Norway spruce, white spruce.
Slight	Moderate	Severe	Moderate	Sugar maple, white pine, red oak, white ash, basswood, hemlock.	White pine, Norway spruce, white spruce.
Moderate	Moderate	Severe	Moderate	Sugar maple, white ash, red oak, black cherry, hemlock.	White pine, white spruce, Norway spruce, larches.
Moderate	Moderate	Severe	Moderate	Red maple, white pine, basswood, white-cedar.	White pine, white-cedar, white spruce, Norway spruce.
Severe	Severe	Severe	Severe	White pine, red maple, hemlock, shagbark hickory.	White pine, white spruce.
Slight	Slight	Moderate	Slight	Sugar maple, white pine, red oak, white ash, black cherry.	White pine, red pine, Norway spruce, white spruce.
Moderate	Slight	Moderate	Moderate	Sugar maple, white pine, red oak, hemlock.	White pine, red pine, larches.
Severe	Slight	Moderate	Slight	White pine, red oak, sugar maple	White pine, larches.

TABLE 3.—*Woodland management*

Woodland group	Potential productivity		Concerns of management	
	Species	Estimated site index	Erosion hazard	Equipment restrictions
Group 4s2: Deep, well drained to excessively drained, steep, coarse-textured soils. Content of lime is low. Colonie: CPE	White pine	60–70	Slight	Moderate
Group 4w1: Deep, somewhat poorly drained to very poorly drained nearly level, medium-textured soils. Content of lime is low or medium. Raynham: Ra Sun: Su Wayland: Wy	Sugar maple	52–59	Slight	Severe
Group 4w2: Deep, somewhat poorly drained to very poorly drained, level, coarse-textured soils that formed in water-deposited sand. Content of lime is low or medium. Granby: Gr Junius: Ju	Sugar maple	52–59	Slight	Moderate
Group 4x1: Shallow, moderately well drained to excessively drained, moderately steep, medium-textured soils that formed in a thin mantle of glacial till overlying acid shale, siltstone, and sandstone bedrock. Arnot: AtD Nassau: NaD	Sugar maple	52–59	Slight	Moderate
Group 5d1: Shallow, well-drained, gently sloping, medium-textured soils. Content of lime is medium. Farmington: FaB	White pine	50–60	Slight	Slight
Group 5w1: Deep to shallow, poorly drained and very poorly drained, nearly level, medium-textured to moderately fine textured soils that formed in medium- to high-lime lacustrine sand, silt, and clay, low-lime glacial till, or organic deposits. Carlisle muck: Ca Cheektowaga: Ce Fonda: Fo Joliet: Jo Madalin: Ma, Md Palms: Pb Tuller: Tu, TvA, TvB	Red maple	50–60	Slight	Severe
Group 5x1: Shallow, well-drained and somewhat excessively drained, sloping and moderately steep, medium-textured soils that formed in low- or medium-lime glacial till that is underlain by bedrock at a depth of 10 to 20 inches. Farmington: FBD Hollis: HGC	Sugar maple	45–50	Slight	Moderate
Group 5x2: Shallow, well-drained, very steep, medium-textured soils. There are many outcrops of rock. Content of lime is low or medium. Arnot: AZF Farmington: RLF	Sugar maple	45–50	Moderate	Severe

ard is *slight* if expected soil loss is small; *moderate*, if some soil loss is expected and care is needed during logging and construction to reduce soil losses; and *severe*, if special methods of operation are necessary for preventing excessive soil loss.

Equipment limitations depend on soil characteristics that restrict or prohibit the use of harvesting equipment, either seasonally or continually. *Slight* means no restrictions in the kind of equipment or time of year it is used; *moderate* means that use of equipment is restricted for 3 months of the year or less; *severe* means that special equipment is needed and that its use is severely restricted for more than 3 months of the year.

Seedling mortality refers to mortality of naturally occurring or planted tree seedlings, as influenced by kinds of soil or topographic conditions. Plant competition is assumed not to be a factor. *Slight* means a loss of 0 to 25 percent; *moderate* means a loss of 25 to 50 percent; and *severe* means a loss of more than 50

and productivity—Continued

Concerns of management—Continued				Species to be favored—	
Seedling mortality	Plant competition		Windthrow hazard	In stand	For planting
	Hardwoods	Conifers			
Severe	Slight	Moderate	Slight	White pine, sugar maple, red oak, black locust.	White pine, black locust, larches.
Severe	Severe	Severe	Severe	Sugar maple, red maple, white pine, white-cedar.	White pine, white spruce.
Slight	Moderate	Moderate	Slight	Sugar maple, white pine, hemlock	White pine, Norway spruce, white spruce.
Moderate	Slight	Moderate	Moderate	Sugar maple, red oak, white pine, hemlock.	White pine, larches.
Severe	Slight	Slight	Moderate	White pine, red oak, hemlock, sugar maple.	White pine, red pine.
Severe	Severe	Severe	Severe	Red maple, white-cedar	Generally unplantable.
Severe	Slight	Slight	Moderate	White pine, red oak, sugar maple, red maple.	White pine.
Severe	Slight	Moderate	Moderate	Sugar maple, white pine, red oak, hemlock.	White pine, red pine, larches.

percent of the seedlings. Seed supplies are assumed to be adequate.

Plant competition is the degree of invasion of undesirable plants into openings in the tree canopy. Considered in the ratings are available water capacity, fertility, drainage, and degree of erosion. Conifers and hardwoods are rated separately in table 3. *Slight* means that plant competition does not prevent adequate natural regeneration and early growth or interfere with seedling development; *moderate* means that competition delays natural or artificial establishment and growth rate but does not prevent the development of fully stocked, normal stands; *severe* means that competition prevents adequate natural or artificial regeneration unless the site is prepared properly and maintenance practices are used.

Hazard of windthrow depends on the soil characteristics that enable trees to resist being blown down by wind. *Slight* means that most trees withstand the wind; *moderate* means that some trees are expected to

blow down during excessive wetness and high wind; *severe* means that many trees are expected to blow down during periods when the soil is wet and winds are moderate or high.

Table 3 also lists suitable species to favor in existing stands and suitable species for planting. The estimated site index in table 3 is the average height, in feet, that the dominant and codominant trees reach at 50 years of age on the soils of each group.

Wildlife [6]

The kind and number of wildlife that live in a given area are closely related to land use; to the resulting kinds, amounts, and patterns of vegetation; and to the supply and distribution of water. These, in turn, are generally related to the kinds of soil. In table 4 the soils are rated for seven wildlife habitat elements and three general types of wildlife habitat.

On soils rated *good,* habitat is generally easily created, improved, or maintained. There are few or no soil limitations in habitat management, and satisfactory results are well assured.

On soils rated *fair,* habitat usually can be created, improved, or maintained, but the soils have moderate limitations that affect the creation, improvement, or maintenance of the habitat. A moderate intensity of management and fairly frequent attention may be required to assure satisfactory results.

On soils rated *poor,* habitat can usually be created, improved, or maintained, but soil limitations are severe. Habitat management may be difficult and expensive and may require intensive effort. Satisfactory results are questionable.

On soils rated *very poor,* it is impractical to create, improve, or maintain habitat because of the very severe soil limitations. Unsatisfactory results are probable.

Present land use, the location of a soil in relation to other soils, and mobility of wildlife are not considered in the ratings.

Habitat elements

Each soil is rated in table 4 according to its suitability for various kinds of plants and water developments that make up wildlife habitat. These ratings can be used as an aid 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 habitat elements; and (3) avoiding soils that would be difficult or not feasible to manage.

Grain and seed crops.—Among these crops are seed-producing annuals, such as corn, sorghum, wheat, barley, oats, millet, buckwheat, and sunflower. Soils well suited to these plants with a rating of "good" are deep, nearly level or very gently sloping, medium textured, well drained or moderately well drained, and free or nearly free of stones. The capacity of these soils to hold water is high. The soils are not subject to frequent flooding. A wide variety of grain crops can be safely planted each year. Soils that are not so well suited require more intensive management and are suited to fewer crops.

Domestic grasses and legumes.—In this group are domestic grasses and legumes that are established by planting. Among these are alfalfa, trefoil, clover, bluegrass, switchgrass, fescue, brome, timothy, orchardgrass, and reed canarygrass. Soils that are rated "good" have slopes of 0 to 15 percent; are well drained, moderately well drained, or somewhat poorly drained; and have a moderately high or high capacity to hold water. 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 serious concerns because the soils are seldom tilled.

Wild herbaceous plants.—In this group 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 with a rating of "good" vary widely in texture, drainage, and slope. Drainage ranges between well drained and somewhat poorly drained. Slope is not a limiting factor. Stoniness and occasional flooding are not serious concerns.

Hardwood plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. These plants also serve as cover for wildlife. They are generally established naturally but can be planted. Among the native kinds are oak, beech, cherry, maple, birch, poplar, apple, hawthorn, dogwood, viburnum, grape, and briers. Soils that are "good" for 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.

Several varieties of fruiting shrubs that are raised commercially for planting are also in the group. Among the shrubs that can be grown on soils rated "good" are autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky dogwood. In addition, highbush cranberry, silky dogwood, and other shrubs with similar site requirements can be planted on soils that have a rating of "fair." Hardwoods that are not available commercially can commonly be transplanted successfully.

Coniferous plants.—This element consists of cone-bearing evergreen trees and shrubs that are used by wildlife mainly as cover, although some provide browse and seeds. Among these are Norway spruce, white pine, white-cedar, and hemlock. It is important that living 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 that are rated "good" are those on which conifers grow at a moderate to rapid rate. These are the deeper soils that are well drained or moderately well drained or somewhat poorly drained and have good

[6] This section was prepared by ROBERT E. MYERS, wildlife biologist, Soil Conservation Service, Syracuse, N.Y.

TABLE 4.—*Wildlife habitat*

[A rating of *good* means that limitations are slight, *fair* means that limitations are moderate, *poor* means that limitations are severe, and *very poor* means that it is impractical to attempt to improve, maintain, or create habitat. Fluvaquents loamy, Made land, and Urban land-Colonie complex are too variable to rate]

Soil series and map symbols	Elements of wildlife habitat							Kinds of habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants	Coniferous plants	Wetland plants	Shallow-water areas	Openland	Woodland	Wetland
Alton:										
AlB	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Amenia:										
AmA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AmB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Angola:										
AnB	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
AoA	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Poor.
AoB	Fair	Fair	Fair	Fair	Fair	Fair	Very poor.	Fair	Fair	Very poor.
Appleton:										
ApA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ApB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Arnot:										
ArB	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
AtC, AtD	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
AvB	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
AZF	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Broadalbin:										
BoB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BoC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BoD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Brockport:										
Br	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Burdett:										
BuA	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
BuB	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BuC	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BvA	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
BvB	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BvC	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BXB	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Carlisle:										
Ca	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Cheektowaga:										
Ce	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

TABLE 4.—*Wildlife habitat*—Continued

Soil series and map symbols	Elements of wildlife habitat							Kinds of habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants	Coniferous plants	Wetland plants	Shallow-water areas	Openland	Woodland	Wetland
Churchville:										
ChA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ChB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Claverack:										
ClA	Poor	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
ClB	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Colonie:										
CoA, CoC	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
CPE	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Copake:										
Cr	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Darien:										
DaA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DaC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Elnora:										
En	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Farmington:										
FaB	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
FBD	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Fonda:										
Fo	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Fredon:										
Fr	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Granby:										
Gr	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Hamlin:										
Ha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Herkimer:										
He	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Hollis:										
HGC	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Hornell:										
HoA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
HoB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HoC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Howard:										
HrA, HrB, HrC.	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

TABLE 4.—*Wildlife habitat*—Continued

Soil series and map symbols	Elements of wildlife habitat							Kinds of habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants	Coniferous plants	Wetland plants	Shallow-water areas	Openland	Woodland	Wetland
HrD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
HTF	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Hudson:										
HuB	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HuC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HuD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HVF	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor	Poor	Good	Very poor.
Ilion:										
IlA	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
IlB	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
InB	Very poor.	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Joliet:										
Jo	Poor	Poor	Fair	Poor	Poor	Good	Poor	Poor	Poor	Fair.
Junius:										
Ju	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Lansing:										
LaB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaC	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LaD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LMF	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Lordstown:										
LoA, LoB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
LoC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LoD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
LRE	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Madalin:										
Ma	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Madalin variant:										
Md	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Manheim:										
MmA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
MmB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Manlius:										
MnB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MoC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MoD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

TABLE 4.—*Wildlife habitat*—Continued

Soil series and map symbols	Elements of wildlife habitat							Kinds of habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants	Coniferous plants	Wetland plants	Shallow-water areas	Openland	Woodland	Wetland
MPE	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mardin:										
MrB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MrC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MrD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Mohawk:										
MsB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MsD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mosherville:										
MtA	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
MtB	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Nassau:										
NaB, NaD	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Nellis:										
NeB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
NeD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Nunda:										
NuB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NuC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NuD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
NVF	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
NWC	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Odessa:										
OdB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Otisville:										
OtB	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Palatine:										
PaB, PaC	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
PaD	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Palms:										
Pb	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Palmyra:										
PmA, PmB, PmC.	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

TABLE 4.—*Wildlife habitat*—Continued

Soil series and map symbols	Elements of wildlife habitat							Kinds of habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants	Coniferous plants	Wetland plants	Shallow-water areas	Openland	Woodland	Wetland
Phelps:										
PpA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PpB, Pr	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Plainfield:										
PsA, PsB	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Raynham:										
Ra	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Rhinebeck:										
RhA	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RhB	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Rock outcrop:										
RLF	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Saprists and Aquents:										
SA	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Scio:										
ScA	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ScB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sun:										
Su	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
Teel:										
Te	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Tuller:										
Tu, TvA	Very poor.	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Poor	Very poro.	Poor.
TvB	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Unadilla:										
UnB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UnC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UnD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Varick:										
VaA	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
VaB	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Wassaic:										
WaA, WaB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WaC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Wayland:										
Wy	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

available water capacity. Cover is more easily and quickly established than on less suited soils. However, more management is required to eliminate invading hardwoods. In addition, stands must be thinned more frequently or planted farther apart to prevent canopy closure.

On soils rated "poor," canopy closure is retarded because of slow growth. Seedling mortality is high, and considerable time is needed for conifers to reach adequate size to provide effective cover.

Wetland plants.—These are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. Among them are smartweeds, wild millet, rushes, sedges, rice cutgrass, mannagrass, and cattails. These plants supply food and cover for wetland forms of wildlife.

Soils that have a rating of "good" are nearly level and are poorly drained or very poorly drained. Soils that have a rating of "fair" are nearly level and are somewhat poorly drained. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water areas.—Open water is essential for waterfowl courtship, mating, and brood rearing. It is also essential for other forms of wildlife associated with wetlands. Many upland types of wildlife, such as deer, use these areas as a source of drinking water.

These are areas of shallow water, generally not exceeding 5 feet in depth, near food and cover for wetland wildlife. They may be natural wet areas or those created by the construction of a low dike to impound a shallow body of water—commonly called a marsh—or by the excavation or blasting of potholes and level ditches. Water supply for these impoundments is either surface runoff, high ground water table, or a combination of the two.

Deep water farm ponds are not considered in this habitat element. A detailed field investigation is needed to determine feasibility of water impoundments.

Limitations of the soil for use as reservoir areas and embankments for ponds are shown in the section "Engineering."

Types of wildlife

Table 4 rates the soils according to their suitability for the three types of wildlife habitat: openland, woodland, and wetland. These ratings can be used as an aid in (1) planning the broad use of land for wildlife refuge, nature study areas, or other developments for wildlife; and (2) determining areas that are suitable for acquisition for wildlife development.

Each rating under "kinds of wildlife habitat" in table 4 is based on the ratings listed for selected essential habitat elements in the first part of the table.

Openland wildlife.—Ratings are based on the ratings shown for grain and seed crops, domestic grasses and legumes, wild herbaceous plants, hardwood plants, and coniferous plants. Examples of wildlife species that utilize openland habitat are pheasants, meadowlarks, field sparrows, doves, woodcock, cottontail rabbits, red foxes, and woodchucks. These birds and mammals normally make their homes in areas of cropland, pasture, meadow, lawns, and in areas overgrown with grasses, herbs, and shrubs.

Woodland habitat.—Ratings are based on the ratings listed for all the above elements except grain and seed crops. Among the birds and mammals that prefer woodland are ruffed grouse, thrushes, vireos, scarlet tanagers, gray and red squirrels, gray foxes, white-tailed deer, and raccoons.

Wetland habitat.—Ratings are based on those shown for wetland plants and shallow water areas. Ducks, geese, rails, herons, shore birds, redwing blackbirds, mink, muskrats, and beavers are familiar examples of birds and mammals that normally make their home in and around ponds, marshes, swamps, and other wet areas.

Engineering [7]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning boards, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect the construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, systems for disposal of sewage and refuse, and other structural works.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay (fig. 13).
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, and 7. These tables show, respectively: estimated soil properties significant to engineering;

[7] EDWARD A. FERNAU, senior soils engineer, New York State Department of Transportation, Soil Mechanics Bureau, and DONALD W. SHANKLIN, assistant State conservation engineer, Soil Conservation Service, helped prepare this section.

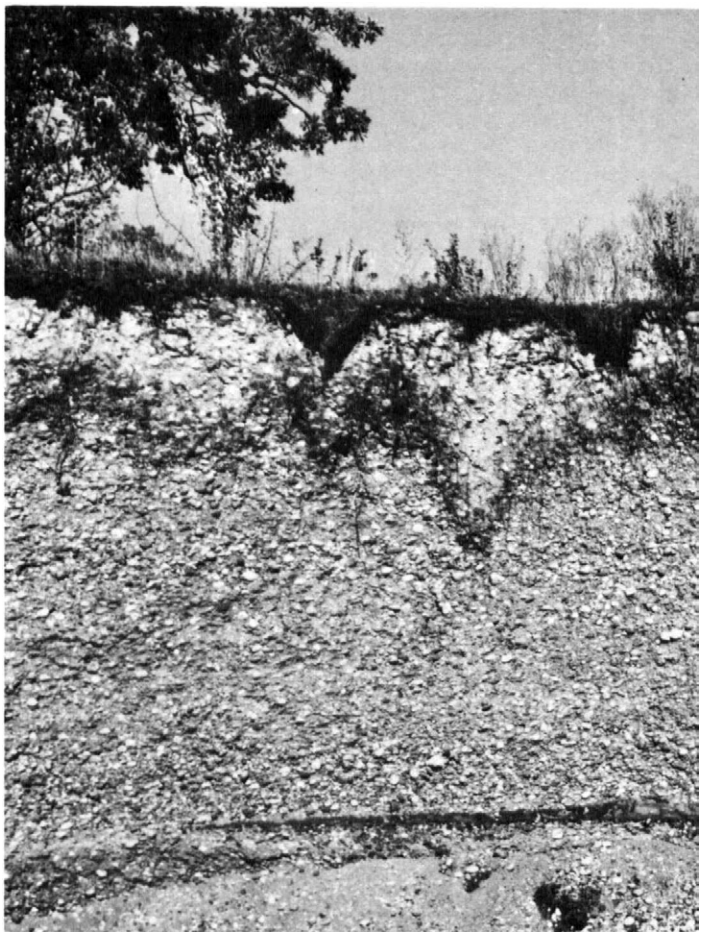

Figure 13.—**Howard soils are a good source of gravel.**

interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this publication, can be used to make interpretations, in addition to those given in tables 5 and 6. It can also be used to make other useful maps.

This information, however, does not eliminate the need for detailed investigation at sites selected for engineering works, especially works that involve any significant soil loading or require excavations to depths greater than those shown in the tables. In addition, the inspection of sites, especially the smaller ones, is critical, because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning in soil science that may not be familiar to engineers. The Glossary defines many of these terms.

Engineering classification system

The two systems most commonly used in classifying soil samples for engineering uses are the Unified system used by the Soil Conservation Service engineers, Department of Defense, and others; and the AASHTO system adopted by the American Association of State Highway and Transportation Officials.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content (*11*). Only material smaller than 3 inches is used for classification. Soils are grouped into 15 classes, which include eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect use in highway construction and maintenance (*1*). This system also classifies only material smaller than 3 inches. A soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of particle-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation), and, at the other extreme, in group A–7, the clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. The AASHTO classification for tested soils is shown in table 7; the estimated classification is given in table 5 for all soils mapped in the survey area.

Estimated soil properties

Estimated soil properties significant to engineering are given in table 5. These estimates are made for typical soil profiles, by horizons sufficiently dissimilar to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other areas. Following are explanations of some of the columns in table 5.

Hydrologic soil groups are used to estimate runoff from rainfall. Soil properties that influence the minimum rate of infiltration obtained for a bare soil after prolonged wetting are considered, for example, depth of seasonal high water table, intake rate and permeability after prolonged wetting, and depth to very slowly permeable layer. The vegetative cover, the management, and the topography are not considered.

The soils are classified as four groups, A through D.

A. Low runoff potential. Soils having high infiltration rates even when thoroughly wetted, mainly deep, well-drained to excessively drained sand or gravel. The rate of water transmission is high.

B. Moderately low runoff potential. Soils having moderate infiltration rates when thoroughly wetted, mainly deep, moderately well drained to well drained soils that have moderately

TABLE 5.—*Estimated physical and*

[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. fully the instructions for referring to other series that appear in the first

Soil series and map symbols	Hydrologic soil group	Depth to—		Depth from surface	USDA texture	Classification
		Bedrock	Seasonal high water table			Unified
		Feet	*Feet*	*Inches*		
Alton: AlB	B	>5	>3½	0–42	Very gravelly sandy loam	GM or SM
				42–66	Very gravelly sand	GP
				66–80	Silt and clay	ML or CL
Amenia: AmA, AmB	B	>4	1½–2	0–24	Loam, gravelly loam	ML, SM, or ML-CL
				24–33	Loam, gravelly loam	ML or SM
				33–50	Gravelly fine sandy loam	GM or SM
Angola: AnB, AoA, AoB	C	1½–3	½–1	0–15	Silt loam, channery silt loam	ML or CL
				15–24	Silty clay loam, shaly silt loam.	ML or CL
				24	Shale bedrock.	
Appleton: ApA, ApB	C	>3½	½–1½	0–17	Silt loam	ML
				17–26	Silt loam, gravelly silt loam	ML, GM, or SM
				26–50	Gravelly silt loam	ML or SC
*Arnot: ArB, AtC, AtD, AvB, AZF For Angola part of AvB, see Angola series. Rock outcrop part of AZF too variable to estimate.	D	1–2	1–2	0–16	Channery silt loam	ML, SM-SC, or SM
				16	Siltstone bedrock.	
Broadalbin: BoB, BoC, BoD	C	>4	1½–3	0–20	Fine sandy loam, silt loam	ML or SM
				20–52	Gravelly loam, gravelly fine sandy loam.	ML, SM, or GM
Brockport: Br	D	2–3	½–1½	0–8	Silt loam	MH or OH
				8–22	Silty clay	ML or CL
				22–28	Very shaly silty clay loam, weathered bedrock.	
				28	Dark-gray shale.	
*Burdett: BuA, BuB, BuC, BvA, BvB, BvC, BXB. For Scriba parts of BvA, BvB, BvC, and BXB, see Scriba series.	C	>4	½–1½	0–6	Channery silt loam	ML or CL
				16–26	Gravelly silty clay loam	ML, CL, or GM
				26–44	Gravelly silty clay loam	GM, GC, or SM
				44–54	Gravelly silty clay loam	GC or SC
Carlisle: Ca	D	>5	0	0–56	Organic material	Pt
Cheektowaga: Ce	D	>5	½–1	0–9	Fine sandy loam	SM or ML
				9–26	Loamy fine sand	SM
				26–52	Silty clay	ML or CL
Churchville: ChA, ChB	D	>5	½–1½	0–13	Silty clay loam, silty clay	ML or CL
				13–32	Clay, silty clay loam	MH or CH
				32–41	Silty clay loam, shaly silty clay loam.	CL
				41–84	Shaly loam	SM, SC, GM, or GC
Claverack: ClA, ClB	C	>5	1½–3	0–30	Loamy fine sand	SM
				30–50	Silty clay	ML or CL
*Colonie: CoA, CoC, CPE For Plainfield part of CPE, see Plainfield series.	A	>6	>3½	0–36	Loamy fine sand	SM
				36–101	Fine sand	SM
Copake: Cr	B	>5	>4	0–8	Silt loam	ML
				8–27	Loam, fine sandy loam	ML
				27–54	Very gravelly loamy sand	GM or GW-GM

chemical properties

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care-
column of this table. The symbol > means more than; < means less than]

Classification Continued	Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	K factor
AASHTO		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*	
A–2	0–25	40–65	35–60	20–40	10–25	>6.0	0.05–0.11	5.1–7.3	0.17
A–1	10–25	30–50	30–50	15–35	0–5	>6.0	0.02–0.04	6.1–6.5	0.17
A–6 or A–7	0–5	100	95–100	85–100	75–100	0.06–0.2	0.11–0.18	7.4–8.4	0.17
A–4	0–5	80–95	70–90	60–85	40–70	0.6–2.0	0.12–0.15	6.1–7.8	0.28
A–4, A–2	0–5	65–85	60–80	50–75	35–60	0.6–2.0	0.08–0.14	6.1–7.8	0.43
A–4, A–2	0–5	55–75	50–70	40–65	20–40	0.06–0.2	0.06–0.10	7.4–8.4	0.43
A–6 or A–7	0–5	75–95	70–90	65–90	50–85	0.6–2.0	0.15–0.19	5.1–7.3	0.43
A–6 or A–7	0–5	80–95	75–90	65–90	50–85	0.06–0.2	0.11–0.19	5.1–7.3	0.28
A–4, A–6	5–10	75–95	75–90	65–90	65–75	0.6–2.0	0.12–0.18	6.1–7.3	0.28
A–4, A–6	0–5	65–95	60–90	50–85	40–65	0.6–2.0	0.10–0.18	6.6–7.8	0.17
A–4	0–5	65–90	60–85	50–80	35–60	0.06–0.2	0.07–0.17	7.4–8.4	0.17
A–4	5–25	60–90	50–85	45–75	40–60	0.6–2.0	0.08–0.15	4.5–5.5	0.17
A–4	0–5	80–95	80–90	55–85	40–70	0.6–2.0	0.12–0.15	5.1–7.3	0.43
A–2 or A–4	5–10	60–85	60–80	40–75	30–55	0.06–0.2	0.08–0.14	5.1–7.8	0.6
A–7	0	95–100	95–100	85–100	80–90	0.2–0.6	0.16–0.19	5.6–7.3	0.43
A–7	0–5	95–100	95–100	85–100	85–95	0.06–0.2	0.11–0.13	5.6–7.3	0.28
A–7 or A–4	0–5	70–95	70–90	65–85	50–75	0.6–2.0	0.13–0.16	5.1–7.3	0.43
A–4 or A–6	0–5	70–80	60–80	55–75	45–60	0.06–0.2	0.08–0.13	5.6–7.3	0.17
A–2, A–4, or A–6	5–10	60–80	50–70	45–70	30–50	0.06–0.2	0.08–0.13	5.6–7.3	0.17
A–4	5–10	60–85	60–70	55–70	40–50	0.06–0.2	0.08–0.13	7.4–8.4	0.17
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A–4	0	100	95–100	85–95	40–55	>6.0	0.10–0.14	5.6–7.3	0.28
A–2	0	100	95–100	55–85	15–30	>6.0	0.05–0.07	5.6–7.3	0.17
A–6 or A–7	0	100	95–100	90–100	90–95	<0.2	0.12–0.14	6.1–7.3	0.28
A–7	0	95–100	90–100	80–100	75–95	0.6–2.0	0.14–0.17	6.1–7.3	0.43
A–7	0	95–100	90–100	80–100	75–95	<0.2	0.10–0.13	6.1–7.8	0.28
A–4	0–5	85–95	80–90	70–80	55–70	<0.2	0.10–0.15	7.4–8.4	0.28
A–4	0–5	70–80	65–75	45–65	35–50	<0.2	0.09–0.13	7.4–8.4	0.28
A–2	0	100	95–100	65–85	20–35	>6.0	0.06–0.08	5.1–7.3	0.17
A–6 or A–7	0	100	95–100	90–100	90–95	<0.2	0.12–0.14	6.6–7.8	0.28
A–2	0	100	95–100	65–85	20–35	>6.0	0.06–0.08	4.5–7.3	0.17
A–2	0	100	95–100	60–80	20–35	>6.0	0.03–0.04	4.5–7.3	0.17
A–4	0–5	90–100	90–100	80–90	65–85	2.0–6.0	0.16–0.20	5.6–6.5	0.17
A–4	0–5	90–95	85–95	40–90	55–70	2.0–6.0	0.12–0.15	5.6–6.5	0.43
A–2	0–5	40–60	35–55	20–40	5–15	>6.0	0.02–0.04	5.6–6.5	0.17

TABLE 5.—*Estimated physical and*

Soil series and map symbols	Hydrologic soil group	Depth to—		Depth from surface	USDA texture	Classification
		Bedrock	Seasonal high water table			Unified
		Feet	*Feet*	*Inches*		
Darien: DaA, DaB, DaC	C	>5	½–1½	0–10	Silt loam, shaly silt loam	ML
				10–31	Silty clay loam, shaly silty clay loam.	CL
				31–56	Shaly silty clay loam	CL
Elnora: En	B	>5	1½–3	0–54	Loamy fine sand	SM
*Farmington: FaB, FBD	D	1–2	>4	0–16	Silt loam to gravelly fine sandy loam.	ML, SM, or GM
				16	Limestone bedrock.	
Rock outcrop part of FBD too variable to estimate.						
Fluvaquents: FL. Material too variable to estimate.						
Fonda: Fo	D	>5	0–1	0–6	Mucky silty clay loam	ML, OL, or CL
				6–50	Silty clay, clay	CL or ML
Fredon: Fr	C	>5	0–½	0–9	Silt loam	ML
				9–19	Gravelly sandy loam to silt loam.	ML
				19–31	Very gravelly sandy loam to silt loam.	GM
				31–45	Stratified sand and gravel	GM or GP
				45–51	Silt and very fine sand	ML or SM
Granby: Gr	D	>5	0–½	0–26	Loamy fine sand	SM
				26–50	Sand	SW-SM or SM
Hamlin: Ha	B	>5	>3	0–70	Silt loam, very fine sandy loam.	ML or CL
Herkimer variant: He	B	>5	2–3	0–29	Shaly silt loam	ML, GM, or SM
				29–52	Gravelly sand	GP or GW
*Hollis: HGC	D	1–1½	>4	0–14	Fine sandy loam	SM
				14	Bedrock.	
Rock outcrop part too variable to rate.						
Hornell: HoA, HoB, HoC	D	2–3	½–1½	0–8	Silt loam	ML or CL
				8–27	Silty clay, silty clay loam	CL
				27–32	Silty clay loam, shaly silty clay loam.	CL, ML, GM, or GC
				32	Shale bedrock.	
Howard: HrA, HrB, HrC, HrD, HTF	A	>5	>3	0–9	Gravelly silt loam	ML or GM
				9–19	Very gravelly sandy loam to very gravelly loam.	GM, GC, or GW-GM
				19–60	Very gravelly sandy loam to very gravelly sandy clay loam.	GW-GM or GM
				60–64	Very gravelly loamy sand	GW, GP, or GW-GM
Hudson: HuB, HuC, HuD, HVF	C	>5	1½–2	0–12	Silty clay loam	ML or MH
				12–26	Clay to silty clay loam	MH, CH, or CL
				26–50	Silt and clay	CL or ML
Ilion: IlA, IlB, InB	D	>5	0–½	0–14	Silt loam	ML, OL, or CL
				14–39	Channery silty clay loam	GC or CL
				39–57	Gravelly silt loam	GC or CL
Joliet: Jo	D	1–1½	0–½	0–13	Silt loam	ML
				13–19	Gravelly loam	GM
				19	Limestone bedrock.	

chemical properties—Continued

Classification Continued	Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	K factor
AASHTO		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*	
A–4	0	80–95	75–85	70–85	60–75	0.6–2.0	0.12–0.17	5.1–7.3	0.43
A–6	0–5	85–95	75–85	65–80	55–70	<0.2	0.10–0.14	5.1–7.3	0.17
A–6	5–10	75–85	65–75	60–70	50–60	<0.2	0.08–0.13	7.4–8.4	0.17
A–2	0	100	95–100	90–100	20–35	>6.0	0.05–0.10	4.5–6.0	0.17
A–2 or A–4	0–5	55–95	50–90	35–85	20–80	0.6–2.0	0.14–0.19	5.6–7.3	0.28
A–6 or A–7	0	100	95–100	90–100	80–90	0.6–2.0	0.15–0.18	6.1–7.3	0.43
A–6 or A–7	0	100	95–100	90–100	90–100	<0.2	0.12–0.14	6.1–7.8	0.28
A–4	0	90–95	85–95	75–90	60–75	0.6–2.0	0.12–0.18	5.6–6.0	0.17
A–4	0	70–80	65–75	60–75	50–65	0.6–2.0	0.11–0.15	5.6–6.5	0.28
A–2	0–5	30–50	50–70	30–65	10–30	0.6–2.0	0.03–0.08	6.6–7.3	0.28
A–1 or A–2	0–10	20–40	10–30	5–25	0–20	>6.0	0.01–0.03	6.6–7.3	0.28
A–2 or A–4	0	85–100	80–95	60–90	30–70	>6.0	0.08–0.12	7.4–8.4	0.17
A–2	0	95–100	90–100	60–80	20–35	>6.0	0.07–0.08	5.6–7.3	0.17
A–2	0	95–100	90–100	45–70	5–15	>6.0	0.04–0.08	6.6–8.4	0.17
A–4	0	100	95–100	90–100	55–100	0.6–2.0	0.17–0.20	6.1–7.8	0.64
A–2, A–4	0–10	50–80	45–75	35–70	25–65	0.6–2.0	0.09–0.15	6.1–7.3	0.28
A–1	0–10	20–40	10–30	5–20	0–5	>6.0	0.01–0.03	7.4–8.4	0.28
A–2 or A–4	0–5	90–100	75–95	50–80	30–50	2.0–6.0	0.10–0.14	4.5–5.5	0.17
A–4 or A–6	0	95–100	95–100	80–90	70–90	0.2–0.6	0.15–0.20	4.5–5.5	0.43
A–6 or A–7	0	95–100	95–100	80–90	85–95	<.06	0.11–0.14	4.5–5.5	0.28
A–4 or A–6	0	65–75	60–75	50–70	45–65	<.06	0.06–0.11	5.6–6.0	0.17
A–4	0	65–75	60–70	50–65	40–60	0.6–6.0	0.10–0.14	5.1–7.3	0.17
A–2 or A–1	0–5	30–40	25–35	20–30	10–25	0.6–6.0	0.06–0.08	5.1–7.3	0.17
A–1	5–10	30–45	25–40	20–30	10–15	0.6–6.0	0.05–0.07	5.1–7.3	0.17
A–1	5–10	30–45	25–35	15–25	0–10	>6.0	0.01–0.03	7.4–8.4	0.17
A–7 or A–6	0	95–100	95–100	90–100	85–95	0.2–0.6	0.14–0.17	5.6–7.3	0.43
A–7	0	95–100	95–100	90–100	70–95	<0.2	0.12–0.14	5.6–7.3	0.28
A–6 or A–4	0	95–100	95–100	90–100	70–95	<0.2	0.12–0.14	7.4–8.4	0.28
A–7 or A–4	0–5	80–95	80–90	70–80	55–70	0.2–0.6	0.14–0.18	5.6–7.8	0.43
A–4	5–10	60–75	55–70	50–60	35–55	<0.2	0.08–0.12	5.6–8.4	0.28
A–4	5–10	60–75	55–70	50–60	35–55	<0.2	0.10–0.14	7.8–8.4	0.17
A–4	0–5	85–95	80–90	70–80	55–70	0.6–2.0	0.14–0.18	6.1–7.8	0.28
A–4	0–5	60–75	55–70	50–60	35–50	0.6–2.0	0.08–0.12	6.1–7.8	0.17

TABLE 5.—*Estimated physical and*

Soil series and map symbols	Hydrologic soil group	Depth to—		Depth from surface	USDA texture	Classification
		Bedrock	Seasonal high water table			Unified
		Feet	*Feet*	*Inches*		
Junius: Ju	C	>5	0–½	0–26	Loamy fine sand	SM
				26–48	Loamy sand	SM
				48–51	Very fine sandy loam	ML
*Lansing: LaB, LaC, LaD, LMF. For Mohawk part of LMF, see Mohawk series.	B	>5	>3½	0–12	Silt loam	ML or SM
				12–32	Gravelly silt loam	GM, GC, SM, or SC
				32–50	Gravelly silt loam	GM, GC, SM, or SC
Lordstown: LoA, LoB, LoC, LoD, LRE. Rock outcrop part of LRE too variable to estimate.	C	2–3	>4	0–11	Gravelly silt loam	ML, SM, or GM
				11–26	Channery silt loam	GM
				26	Bedrock.	
Madalin: Ma	D	>5	0–½	0–9	Silty clay loam	ML, MH, OH
				9–21	Clay	MH, CH
				21–58	Silty clay, silt, clay	ML, CL, CH
Madalin variant: Md	D	2–3	0–½	0–10	Silty clay loam	ML, MH
				10–27	Silty clay	MH, CH, CL
				27	Limestone bedrock.	
Made land: Mg. Material too variable to estimate.						
Manheim: MmA, MmB	C	>4	½–1½	0–13	Silt loam	ML or OL
				13–50	Gravelly silt loam	ML, CL, GM, or GC
*Manlius: MnB, MoC, MoD, MPE. Rock outcrop part of MPE too variable to estimate.	C	1½–3	>4	0–11	Silt loam, shaly silt loam	ML or GM
				11–16	Very shaly silt loam, very shaly loam.	GM, ML, or SM
				16–28	Very shaly silt loam, very shaly loam.	SM-SC or CL-ML
				28	Shale bedrock.	
Mardin: MrB, MrC, MrD	C	>5	1½–2	0–14	Gravelly loam	ML, GM, or SM
				14–27	Gravelly silt loam	GM, ML, or SM
				27–55	Gravelly silt loam	GM, ML, or SM
Mohawk: MsB, MsC, MsD	B	>5	>3½	0–68	Silt loam	CL-ML, ML, CL, GM or GC
Mosherville: MtA, MtB	C	>5	½–1½	0–18	Loam	ML or SM
				18–39	Very fine sandy loam	SM or SW-SM
				39–52	Fine sandy loam	SM or SW-SM
				52–60	Gravelly loam	GM or SM
Nassau: NaB, NaD	D	1–1½	>4	0–8	Shaly silt loam	GM
				8–15	Very shaly silt loam	GM
				15	Shale and slate.	
Nellis: NeB, NeC, NeD	B	>5	>3½	0–33	Loam	ML or SM
				33–51	Gravelly loam	GM or GC
Nunda: NuB, NuC, NuD, NVF, NWC	C	>5	1½–2½	0–15	Channery silt loam	GM, GC, or ML
				15–20	Channery loam	GM
				20–25	Gravelly loam	GM or GC
				25–54	Gravelly silty clay loam, gravelly loam.	GC

chemical properties—Continued

Classification Continued	Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	K factor
AASHTO		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*	
A–2	0	100	95–100	60–80	20–35	>6.0	0.06–0.08	6.1–7.3	0.17
A–2	0	100	95–100	50–75	15–30	>6.0	0.06–0.08	6.1–7.3	0.17
A–4	0	100	95–100	80–95	50–65	>6.0	0.10–0.14	6.6–7.8	0.64
A–4	0–5	75–90	70–85	65–75	45–60	0.6–2.0	0.12–0.17	5.1–7.3	0.28
A–2 or A–4	0–5	60–75	55–70	50–65	30–45	0.6–2.0	0.10–0.14	5.6–7.3	0.17
A–2	5–10	50–65	45–60	40–55	20–35	<0.2	0.08–0.14	7.4–8.4	0.17
A–4	5–10	60–75	50–70	40–70	35–65	0.6–2.0	0.10–0.14	4.5–5.5	0.17
A–2 or A–4	5–10	40–60	35–55	30–50	25–45	0.6–2.0	0.06–0.11	4.5–6.0	0.28
A–7	0	100	95–100	85–100	80–95	0.2–0.6	0.14–0.17	5.6–7.8	0.43
A–7	0	100	95–100	85–100	70–100	<0.2	0.10–0.13	5.6–7.8	0.28
A–7	0	100	95–100	85–100	70–100	<0.2	0.11–0.14	7.4–8.4	0.28
A–7	0	100	95–100	85–100	70–100	0.2–0.6	0.14–0.17	5.6–7.8	0.43
A–7	0	100	95–100	85–100	70–100	<0.2	0.11–0.14	5.6–7.8	0.28
A–4 or A–6	0	80–95	75–90	70–85	50–80	0.6–2.0	0.14–0.18	6.1–7.3	0.28
A–4 or A–6	0–5	60–80	55–75	50–70	40–65	<0.2	0.08–0.12	6.1–8.4	0.28
A–7, A–4, or A–2	5–10	60–95	55–90	45–85	30–75	0.6–2.0	0.14–0.18	4.5–5.5	0.24
A–4 or A–2	10–25	50–85	45–75	40–65	25–60	0.6–2.0	0.10–0.12	4.5–5.5	0.24
A–2 or A–4	10–25	50–70	45–65	25–65	20–60	0.6–2.0	0.08–0.10	5.1–6.0	0.24
A–4	0–5	60–80	55–75	50–70	35–55	0.6–2.0	0.10–0.14	4.5–6.0	0.17
A–4	5–10	60–80	55–75	50–70	35–65	0.6–2.0	0.08–0.12	4.5–6.0	0.28
A–2 or A–4	5–10	50–80	45–75	40–70	30–65	<0.2	0.01–0.03	5.1–7.3	0.28
A–4	0–5	65–95	60–90	55–85	40–75	0.6–2.0	0.12–0.18	6.1–7.8	0.28
A–2 or A–4	0–5	75–90	70–85	50–70	30–60	0.6–2.0	0.10–0.14	5.1–6.5	0.43
A–2	5–10	65–80	60–75	50–65	10–30	<0.2	0.07–0.11	5.6–7.3	0.64
A–2	5–10	65–80	60–75	50–65	10–30	<0.2	0.07–0.11	6.6–7.8	0.64
A–2	5–10	45–60	40–55	30–45	5–30	<0.2	0.05–0.09	7.4–8.4	0.28
A–2 or A–4	0–5	45–55	45–55	40–50	15–45	0.6–2.0	0.08–0.16	4.5–5.5	0.17
A–2 or A–4	5–20	30–50	30–50	25–45	10–40	0.6–2.0	0.07–0.10	4.5–5.5	0.43
A–4	0–5	75–85	75–85	70–80	35–60	0.6–2.0	0.08–0.20	5.6–7.3	0.28
A–2, A–4	0–5	55–65	55–65	50–60	20–40	0.2–0.6	0.07–0.11	7.4–8.4	0.43
A–2 or A–4	0–5	60–85	55–80	40–75	30–70	0.6–2.0	0.13–0.19	5.1–6.0	0.43
A–2 or A–4	5–10	50–70	45–65	40–60	25–40	0.2–0.6	0.08–0.14	5.1–6.0	0.17
A–4	5–10	50–70	60–65	35–55	40–50	0.2–0.6	0.08–0.14	5.1–6.0	0.17
A–4 or A–6	5–10	60–70	60–70	55–65	40–50	<0.2	0.08–0.14	6.6–8.4	0.17

TABLE 5.—*Estimated physical and*

Soil series and map symbols	Hydrologic soil group	Depth to—		Depth from surface	USDA texture	Classification
		Bedrock	Seasonal high water table			Unified
Odessa: OdB	D	>10	½–1½	0–11	Silt loam	ML, OL, or CL
				11–50	Silty clay	ML, CL, or CH
Otisville: OtB	A	>5	>4	0–24	Gravelly loamy sand	GW-GM or GM
				24–36	Very gravelly loamy sand	GW-GM
				36–50	Sand and gravel	GW-GM
Palatine: PaB, PaC, PaD	B	1½–3	>4	0–11	Silt loam	ML or OL
				11–18	Shaly silt loam	ML, GM, or SM
				18–28	Very shaly silt loam	GM
				28	Shale.	
Palms: Pb	D	>5	0	0–24	Muck	Pt
				24–56	Silty clay loam	MH, ML, or CL
Palmyra: PmA, PmB, PmC	B	>5	>4	0–9	Gravelly silt loam	GM, SM, or ML
				9–21	Gravelly loam	GM, SM, or ML
				21–50	Gravel and sand	GW, GP, GM, or GW-GM
Phelps: PpA, PpB, Pr	B	>6	1½–2½	0–13	Gravelly loam, gravelly silt loam.	SM
				13–35	Gravelly silt loam	GM
				35–50	Gravel and sand	GW, GP, or GW-GM
Plainfield: PsA, PsB	A	>5	>3½	0–17	Loamy sand	SM
				17–78	Coarse sand	SP or SM
Raynham: Ra	C	>5	½–1	0–50	Silt loam	ML
Rhinebeck: RhA, RhB	D	>5	1–1½	0–7	Silty clay loam	ML or MH
				7–21	Silty clay	MH, CH, or CL
				21–28	Clay	MH, CH, or CL
				28–70	Silt and clay	ML or CL
*Rock outcrop: RLF. Too variable to estimate. For Farmington part, see Farmington series.						
Saprists and Aquents: SA. Material too variable to estimate.						
Scio: ScA, ScB	B	>5	1½–2½	0–33	Silt loam	ML
				33–50	Very fine sandy loam	ML
Scriba Mapped only with Burdett soils.	C	>4	½–1½	0–15	Channery silt loam	ML or CL
				15–54	Very gravelly loam	GM, GC, SM, or SC
Sun: Su	D	>5	0–½	0–7	Loam	ML
				7–17	Fine sandy loam	SM
				17–38	Gravelly fine sandy loam	SM or GM
				38–54	Very gravelly fine sandy loam.	SM or GM
Teel: Te	B	>5	1–2	0–56	Silt loam	ML
*Tuller: Tu, TvA, TvB For Brockport part of TvA and TvB, see Brockport series.	D	1–1½	0–1½	0–14	Channery silt loam	ML or GM
				14	Sandstone and shale.	

chemical properties—Continued

Classification Continued	Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	K factor
AASHTO		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*	
A–7 or A–6	0	100	95–100	90–100	70–90	0.2–0.6	0.16–2.0	5.1–6.5	0.49
A–7 or A–6	0	100	95–100	90–100	90–95	<0.2	0.11–0.14	5.6–7.8	0.28
A–1	0–5	35–45	30–40	25–35	5–15	>6.0	0.02–0.12	4.5–5.5	0.17
A–1	0–10	25–45	20–40	15–35	5–10	>6.0	0.01–0.04	4.5–5.5	0.17
A–1	0–10	25–45	20–40	15–35	5–10	>6.0	0.01–0.02	5.1–6.0	0.17
A–7, A–6, or A–4	0–10	90–100	85–100	80–100	60–95	0.6–2.0	0.16–0.20	5.6–6.5	0.28
A–7, A–6, or A–4	0–10	60–80	50–75	45–70	35–70	0.6–2.0	0.11–0.15	6.1–7.3	0.28
A–4 or A–2	5–10	30–55	25–50	20–45	15–45	0.6–2.0	0.06–0.10	7.3–8.4	0.28
						2.0–6.0	0.35–0.45	5.1–6.0	
A–7 or A–5	0	90–100	90–100	85–95	80–90	0.6–2.0	0.14–0.17	6.1–8.4	0.43
A–4	0–5	70–80	65–75	60–70	45–65	0.6–2.0	0.12–0.16	6.1–6.6	0.17
A–4	0–5	70–80	65–75	60–70	40–55	0.6–2.0	0.10–0.14	6.1–6.6	0.28
A–1	5–10	40–50	35–40	20–30	0–15	>6.0	0.01–0.03	6.6–8.4	0.17
A–2 or A–4	0–5	65–75	60–70	45–65	25–40	0.6–2.0	0.10–0.16	5.6–7.3	0.17
A–2	0–5	45–55	40–50	35–45	20–30	0.6–2.0	0.07–0.15	5.6–7.3	0.28
A–1	5–10	30–45	25–35	15–30	0–10	>6.0	0.01–0.02	5.6–7.3	0.17
A–1	0	90–100	90–100	35–60	10–20	>6.0	0.04–0.08	5.1–6.5	0.17
A–1	0	90–100	90–100	20–60	0–15	>6.0	0.02–0.04	5.6–7.3	0.17
A–4	0	100	95–100	90–100	70–90	0.06–0.2	0.18–0.22	5.1–6.5	0.49
A–6 or A–7	0	100	95–100	85–100	70–95	0.2–0.6	0.16–0.21	5.6–7.3	0.49
A–6 or A–7	0	100	95–100	85–100	80–100	<0.2	0.12–0.14	5.6–7.3	0.28
A–6 or A–7	0	100	95–100	85–100	80–100	<0.2	0.12–0.14	6.1–7.3	0.28
A–4 or A–6	0	100	95–100	85–100	70–100	<0.2	0.10–0.14	7.4–8.4	0.28
A–4	0	100	95–100	90–100	70–90	0.6–2.0	0.16–0.20	4.5–6.0	0.43
A–4	0	100	95–100	90–100	50–60	0.6–2.0	0.03–0.18	4.5–6.0	0.64
A–5 or A–4	0–5	70–85	65–80	60–75	50–70	0.6–2.0	0.12–0.16	5.1–6.5	0.28
A–4 or A–2	0–5	60–70	50–65	45–60	30–50	<0.2	0.00–0.04	5.6–7.8	0.28
A–4	00–5	85–95	80–90	75–85	50–65	0.6–2.0	0.10–0.15	5.6–7.3	0.28
A–2 or A–4	0–5	75–85	70–80	40–70	30–45	<0.2	0.09–0.12	5.6–7.3	0.28
A–2 or A–4	0–5	50–75	45–70	25–60	20–40	<0.2	0.06–0.12	6.6–7.3	0.28
A–2	0–5	45–75	40–70	20–40	15–35	2.0–6.0	0.06–0.12	7.4–7.8	0.28
A–4	0	100	95–100	90–100	70–100	0.6–2.0	0.12–0.20	6.1–7.8	0.49
A–4	5–10	55–75	50–70	45–65	45–60	0.6–2.0	0.09–0.15	5.1–6.0	0.28

TABLE 5.—*Estimated physical and*

Soil series and map symbols	Hydrologic soil group	Depth to—		Depth from surface	USDA texture	Classification
		Bedrock	Seasonal high water table			Unified
		Feet	*Feet*	*Inches*		
Unadilla: UnB, UnC, UnD	B	>5	>3	0–9	Silt loam	ML
				9–50	Very fine sandy loam	ML
				50–60	Sand and gravel	GW, GP, or GW-GM
*Urban land: UR. Too variable to estimate. For Colonie part, see Colonie series.						
Varick: VaA, VaB	D	1½–3	0–½	0–8	Silt loam	ML or CL
				8–13	Loam	ML, CL, or SM
				13–30	Shaly silty clay loam	ML, CL, or SM
Wassaic: WaA, WaB, WaC	B	2–3	1½–2½	0–7	Silt loam	ML or SM
				7–19	Gravelly silt loam	SM or SC
				19–27	Silty clay loam	CL or ML
				27	Limestone.	
Wayland: Wy	D	>5	0–½	0–38	Silt loam	ML or CL
				38–54	Silt and silty clay	ML or CL

TABLE 6.—*Engineering*

[An astesisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. carefully the instructions for referring to other

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
Alton: AlB	Poor: gravelly	Poor to fair above a depth of 5 feet: fines. Unsuited below a depth of 5 feet.	Good	Fine-grained material below a depth of 5 feet.
Amenia: AmA, AmB	Fair: gravelly	Unsuited	Fair to good	Seasonal high water table.
Angola: AnB, AoA, AoB	Fair to poor: coarse fragments.	Unsuited	Poor: bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; seasonal high water table.
Appleton: ApA, ApB	Fair: coarse fragments.	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table.
*Arnot: ArB, AtC, AtD, AvB, AZF. For Angola part of AvB, see Angola series. For Rock outcrop part of AZF, see Rock outcrop.	Poor: coarse fragments; bedrock at a depth of 10 to 20 inches.	Unsuited: bedrock at a depth of 10 to 20 inches.	Poor: bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.

chemical properties—Continued

Classification Continued	Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available water capacity	Reaction	K factor
AASHTO		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*	[redacted]
A–4	0	100	95–100	90–100	60–90	0.6–2.0	0.18–0.20	5.1–5.5	0.43
A–4	0	100	95–100	90–100	60–90	0.6–2.0	0.17–0.20	5.1–5.5	0.64
A–2	0–5	30–50	25–45	20–40	0–10	>6.0	0.01–0.02	5.1–6.5	0.17
A–4	0	75–90	70–85	65–85	55–80	0.2–0.6	0.17–0.22	5.6–7.3	0.43
A–4	0–5	90–100	75–85	65–80	45–65	<0.2	0.15–0.19	5.6–7.3	0.28
A–4	0–5	80–90	75–85	65–85	45–80	<0.2	0.12–0.17	5.6–7.3	0.17
A–4	0	75–100	70–85	60–80	45–60	0.6–2.0	0.13–0.21	5.6–7.3	0.28
A–4	0–10	65–80	60–75	55–70	35–50	0.6–2.0	0.12–0.16	5.6–7.3	0.28
A–6	0–5	80–90	75–85	65–80	55–65	0.6–2.0	0.10–0.14	5.6–7.3	0.28
A–5 or A–6	0	100	95–100	90–100	70–95	<0.2	0.18–0.22	6.1–7.3	0.49
A–5 or A–6	0	100	95–100	90–100	70–95	<0.2	0.14–0.17	6.6–7.8	0.49

interpretations

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow series that appear in the first column of this table]

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Very rapid permeability above a depth of 5 feet.	High permeability; good stability.	Well drained and somewhat excessively drained.	Fast intake rate; low available water capacity.	Very rapid permeability; droughty; gravelly.	Droughty, gravelly; moderate erodibility.
Seasonal high water table; slow permeability.	Good stability; medium to low permeability.	Seasonal high water table; slow permeability.	Medium intake rate; moderate available water capacity; seasonal high water table.	Seasonal high water table; seepage.	Moderate erodibility; channel siltation potential.
Slow permeability; bedrock at a depth of 20 to 40 inches.	Fair to good stability; limited borrow material.	Bedrock at a depth of 20 to 40 inches; seasonal high water table.	Bedrock at a depth of 20 to 40 inches; seasonal high water table.	Bedrock at a depth of 20 to 40 inches.	Moderate erodibility; bedrock at a depth of 20 to 40 inches; seepage.
Slow permeability; seasonal high water table.	Good stability; medium to low permeability.	Seasonal high water table; slow permeability.	Seasonal high water table.	Seasonal high water table; seepage.	Moderate erodibility; channel siltation potential.
Bedrock at a depth of 10 to 20 inches; outcrops of rock in places.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; well drained and moderately well drained.	Low or very low available water capacity; bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
Broadalbin: BoB, BoC, BoD.	Fair: coarse fragments.	Unsuited	Fair to good: medium strength; high erodibility.	Subject to seepage and sloughing above fragipan on slopes; high erodibility.
Brockport: Br	Fair: thin layer of material.	Unsuited	Poor: bedrock at a depth of 20 to 40 inches.	Seasonal high water table; bedrock at a depth of 20 to 40 inches.
*Burdett: BuA, BuB, BuC, BvA, BvB, BvC, BXB. For Scriba parts of BvA, BvB, BvC, and BXB, see Scriba series.	Poor: channery	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; subject to seepage and sloughing on slopes.
Carlisle: Ca	Poor: organic material possibly can be used as amendment for mineral soil.	Unsuited	Unsuited: organic material.	Prolonged high water table; organic material; highly compressible; poor stability.
Cheektowaga: Ce	Poor: poorly drained; thin layer of material.	Poor to unsuited for sand: excessive fines. No gravel.	Poor: poorly drained	Prolonged high water table; poor stability; lacustrine silt and clay in substratum.
Churchville: ChA, ChB	Poor: clayey	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; poor stability; lacustrine silt and clay to a depth of 40 inches; more stable till below a depth of 40 inches.
Claverack: ClA, ClB	Poor: sandy	Poor for sand: excessive fines. No gravel.	Poor: thin layer of sand over silt and clay.	Seasonal high water table; poor stability; lacustrine silt and clay in substratum.
*Colonie: CoA, CoC, CPE. For Plainfield part of CPE, see Plainfield series.	Poor: sandy	Fair for sand: excessive fines. No gravel.	Good: high erodibility where water is allowed to concentrate.	High erodibility in cuts where water is allowed to concentrate.
Copake: Cr	Good	Poor: excessive fines; improves with depth.	Fair to good: gravelly material at lower depths.	Subject to flooding
Darien: DaA, DaB, DaC	Fair: coarse fragments.	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; subject to seepage and sloughing on slopes; moderate erodibility in cuts.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Slow permeability	Fair to good stability; medium to low permeability; medium piping potential.	Slow permeability; fragipan at a depth of 18 to 36 inches; seepage at a depth of 18 to 36 inches.	Moderate available water capacity; medium intake rate; rooting depth restricted by fragipan.	Fragipan at a depth of 18 to 36 inches; high erodibility.	High erodibility; channel siltation potential.
Very slow permeability; bedrock at a depth of 20 to 40 inches.	Fair stability; low permeability.	Bedrock at a depth of 20 to 40 inches; seasonal high water table; very slow permeability.	Slow intake rate; seasonal high water table; bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches.	Moderate erodibility; heavy texture; restricted rooting depth.
Slow permeability; seasonal high water table.	Good stability; slow permeability.	Slow permeability; seasonal high water table.	Seasonal high water table; slow intake rate; restricted rooting zone.	Seasonal high water table; random seepage.	High erodibility in shallow cuts; channel siltation potential.
Moderately rapid permeability; prolonged high water table; organic material.	Very poor stability; highly compressible; organic material.	Very high shrinkage when first drained; moderately rapid permeability; generally more than 4½ feet deep.	Fast intake rate; high available water capacity.	Level	Level.
Prolonged high water table; rapid permeability between depths of 20 and 40 inches; slow permeability below a depth of 40 inches.	High erodibility; high piping potential; poor compaction characteristics in substratum.	Prolonged high water table; poor stability of ditchbanks; slow permeability below a depth of 20 to 40 inches.	Prolonged high water table; fast intake rate.	Nearly level	Nearly level.
Seasonal high water table; slow permeability.	High to moderate erodibility; poor to fair compaction characteristics; medium piping potential.	Seasonal high water table; slow permeability; poor stability of ditchbanks.	Seasonal high water table; slow intake rate.	High to moderate erodibility; seasonal high water table; clayey.	High to moderate erodibility; clayey; channel siltation potential.
Rapid permeability in upper 20 to 40 inches; very slow permeability in substratum; seasonal high water table.	High erodibility; medium piping potential; poor compaction characteristics in substratum.	Seasonal high water table; poor stability of ditchbanks; very slow permeability in substratum.	Medium to fast intake rate; seasonal high water table; low to moderate available water capacity.	High erodibility; rapid permeability in upper 20 to 40 inches; channel siltation potential.	High erodibility; channel siltation potential; low to moderate available water capacity.
Rapid permeability; deep; well drained to excessively drained.	High erodibility; medium to high piping potential; medium permeability.	Well drained to excessively drained; rapid permeability.	Fast intake rate; low available water capacity.	High erodibility; rapid permeability; channel siltation potential.	High erodibility; low available water capacity; channel siltation potential.
Rapid permeability below a depth of 20 to 36 inches.	High permeability below a depth of 20 to 36 inches.	Well drained; rapid permeability below a depth of 20 to 36 inches.	Medium intake rate; moderate to high available water capacity.	Nearly level; rapid permeability below a depth of 20 to 36 inches.	Nearly level; moderate erodibility.
Slow permeability; seasonal high water table.	Good stability; low permeability; moderate erodibility.	Seasonal high water table; slow permeability; seepage in ditchbanks.	Seasonal high water table; slow intake rate.	Moderate erodibility; seepage.	Moderate erodibility; channel siltation potential.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Sand and gravel	Topsoil	Fill material	Highway location
Elnora: En	Poor: sandy	Fair for sand: excessive fines. Unsuited for gravel.	Good: high erodibility.	Seasonal high water table.
*Farmington: FaB, FBD For Rock outcrop part of FBD, see Rock outcrop.	Poor: outcrops of rock on surface; bedrock at a depth of 10 to 20 inches.	Unsuited	Poor: bedrock at a depth of 10 to 20 inches.	Limestone bedrock at a depth of 10 to 20 inches; moderate to high erodibility in soil mantle.
Fluvaquents, loamy: FL.	Poor: wet in places in natural state; very gravelly and cobbly in places.	Generally unsuited: granular in places.	Poor: highly variable; wet in places in natural state.	Subject to flooding; prolonged high water table.
Fonda: Fo	Poor: very poorly drained; clayey.	Unsuited	Poor: very poorly drained; low strength.	Prolonged high water table; poor stability; lacustrine silt and clay.
Fredon: Fr	Poor: poorly drained	Poor: excessive fines.	Poor: poorly drained	Seasonal high water table; high frost-action potential in upper 20 inches.
Granby: Gr	Poor: poorly drained and very poorly drained; sandy.	Fair for sand: excessive fines. Unsuited for gravel.	Poor: poorly drained and very poorly drained; high erodibility.	Prolonged high water table.
Hamlin: Ha	Good	Unsuited	Fair: low strength; high erodibility.	Subject to flooding; fair stability.
Herkimer variant: He.	Poor: coarse fragments.	Unsuited: fragments of shale.	Fair to good: improves with depth.	Seasonal high water table.
*Hollis: HGC For Rock outcrop part, see Rock outcrop.	Poor: outcrops of rock on surface; bedrock at a depth of 10 to 20 inches.	Unsuited	Poor: bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; outcrops of rock in places.
Hornell: HoA, HoB, HoC	Poor: clayey	Unsuited	Poor: bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; seasonal high water table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Rapid permeability; seasonal high water table.	High erodibility; high piping potential; medium permeability.	Seasonal high water table; poor stability of ditchbanks; rapid permeability.	Medium to fast intake rate; seasonal high water table.	Nearly level; rapid permeability.	Nearly level; high erodibility.
Bedrock at a depth of 10 to 20 inches; moderate permeability in soil mantle; outcrops of rock in places.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; well drained.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.
Variable permeability; prolonged high water table.	Variable material; prolonged high water table; subject to flooding.	Subject to flooding; prolonged high water table.	Prolonged high water table.	Nearly level	Nearly level.
Prolonged high water table; slow or very slow permeability.	Poor stability; poor workability; poor compaction characteristics.	Prolonged high water table; slow or very slow permeability; unstable ditchbanks.	Prolonged high water table.	Nearly level	Nearly level.
Seasonal high water table; moderate to rapid permeability, increasing with depth.	Seasonal high water table; stable material; medium permeability.	Seasonal high water table; moderate to rapid permeability, increasing with depth; lenses of sand in places.	Seasonal high water table.	Nearly level	Nearly level.
Prolonged high water table; rapid permeability.	Prolonged high water table; high piping potential; medium permeability; high erodibility.	Prolonged high water table; unstable ditchbanks; rapid permeability.	Prolonged high water table.	Nearly level	Nearly level.
Moderate permeability.	High erodibility; high piping potential; medium compressibility.	Well drained; unstable ditchbanks.	Medium intake rate; high available water capacity.	Nearly level	Nearly level.
Rapid permeability; seasonal high water table.	Seasonal high water table; medium to high permeability.	Well drained and moderately well drained.	Medium intake rate; low to moderate available water capacity.	Nearly level	Nearly level.
Bedrock at a depth of 10 to 20 inches; outcrops of rock in places; moderately rapid permeability in soil mantle.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; somewhat excessively drained.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; outcrops of rock in places.	High erodibility; bedrock at a depth of 10 to 20 inches.
Bedrock at a depth of 20 to 40 inches; seasonal high water table; very slow permeability.	Bedrock at a depth of 20 to 40 inches; seasonal high water table; low permeability; medium compressibility.	Bedrock at a depth of 20 to 40 inches; seasonal high water table; clayey.	Bedrock at a depth of 20 to 40 inches; seasonal high water table.	Bedrock at a depth of 20 to 40 inches; seepage in cuts.	Moderate erodibility; bedrock at a depth of 20 to 40 inches.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
Howard: HrA, HrB, HrC, HrD, HTF.	Poor: gravelly	Good for gravel: poor for sand; excess fines.	Good	Features generally favorable.
Hudson: HuB, HuC, HuD, HVF.	Poor: clayey	Unsuited	Poor: poor workability; general low strength.	Seasonal high water table; medium to high compressibility; moderate shrink-swell potential; poor stability.
Ilion: IlA, IlB, InB	Poor: poorly drained	Unsuited	Poor: poorly drained	Prolonged high water table; moderate erodibility in cuts.
Joliet: Jo	Poor: poorly drained; bedrock at a depth of 10 to 20 inches.	Unsuited: bedrock at a depth of 10 to 20 inches.	Poor: poorly drained; bedrock at a depth of 10 to 20 inches.	Limestone bedrock at a depth of 10 to 20 inches; prolonged high water table.
Junius: Ju	Poor: sandy; poorly drained.	Fair for sand: excessive fines. No gravel.	Poor: poorly drained	Prolonged high water table.
*Lansing: LaB, LaC, LaD, LMF. For Mohawk part of LMF, see Mohawk series.	Fair: coarse fragments.	Unsuited	Good to fair: medium strength.	Features generally favorable.
*Lordstown: LoA, LoB, LoC, LoD, LRE. For Rock outcrop part of LRE, see Rock outcrop.	Poor: gravelly	Unsuited: bedrock at a depth of 20 to 40 inches.	Poor: bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches.
Madalin: Ma	Poor: poorly drained and very poorly drained; clayey.	Unsuited	Poor: poorly drained and very poorly drained; low strength.	Prolonged high water table; poor stability; lacustrine silt and clay.
Madalin variant: Md	Poor: poorly drained and very poorly drained; clayey.	Unsuited	Poor: poorly drained and very poorly drained; low strength; bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; prolonged high water table; poor stability; lacustrine silt and clay.
Made land: Mg. Material too variable to estimate.				
Manheim: MmA, MmB	Fair: fragments of shale.	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; subject to seepage and sloughing on slopes.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Rapid permeability	Medium to high permeability; good stability.	Well drained to excessively drained.	Fast intake rate; very low to moderate available water capacity.	Rapid permeability; droughty; gravelly.	Rapid permeability; moderate erodibility; droughty; gravelly.
Seasonal high water table; slow or very slow permeability.	Low strength; moderate shrink-swell potential; high compressibility; poor workability and compaction characteristics.	Seasonal high water table; unstable cut slopes; slow or very slow permeability.	Slow intake rate; moderate to high available water capacity.	Clayey; moderate erodibility.	Clayey; moderate erodibility; channel siltation potential.
Slow or very slow permeability; prolonged high water table.	Prolonged high water table; low permeability; good workability.	Prolonged high water table; slow or very slow permeability.	Prolonged high water table.	Prolonged high water table; seepage in cuts.	Prolonged high water table.
Limestone bedrock at a depth of 10 to 20 inches; moderate permeability; prolonged high water table.	Limestone bedrock at a depth of 10 to 20 inches; prolonged high water table.	Bedrock at a depth of 10 to 20 inches; prolonged high water table.	Bedrock at a depth of 10 to 20 inches; prolonged high water table.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; moderate erodibility.
Prolonged high water table; rapid permeability.	Prolonged high water table; high piping potential; high erodibility; medium permeability.	Prolonged high water table; unstable ditchbanks; rapid permeability.	Prolonged high water table.	Nearly level	Nearly level.
Moderate to very slow permeability, decreasing with increasing depth.	Good stability; medium to low permeability.	Well drained except for small, wet spots in places.	Medium intake rate; moderate to high available water capacity.	Seepage in places in cuts.	Moderate to low erodibility.
Bedrock at a depth of 20 to 40 inches; moderate permeability.	Medium to low permeability; bedrock at a depth of 20 to 40 inches.	Well drained; bedrock at a depth of 20 to 40 inches.	Medium intake rate; low to moderate available water capacity.	Bedrock at a depth of 20 to 40 inches; outcrops of rock in places; droughty.	Moderate erodibility; outcrops of rock in places; droughty.
Prolonged high water table; slow permeability.	Poor stability; poor workability; poor compaction characteristics.	Prolonged high water table; slow permeability; unstable ditchbanks.	Prolonged high water table.	Nearly level	Nearly level.
Bedrock at a depth of 20 to 40 inches; prolonged high water table; slow permeability.	Bedrock at a depth of 20 to 40 inches poor stability; poor compaction characteristics.	Bedrock at a depth of 20 to 40 inches; prolonged high water table; slow permeability.	Prolonged high water table.	Bedrock at a depth of 20 to 40 inches; nearly level.	Bedrock at a depth of 20 to 40 inches; nearly level.
Slow permeability; seasonal high water table.	Good stability; medium to low permeability.	Seasonal high water table; slow permeability.	Seasonal high water table.	Seasonal high water table; seepage in cuts.	Moderate erodibility; channel siltation potential.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
*Manlius: MnB, MoC, MoD, MPE. For Rock outcrop part of MPE, see Rock outcrop.	Poor: fragments of shale.	Unsuited: bedrock at a depth of 20 to 40 inches.	Poor: shale bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches.
Mardin: MrB, MrC, MrD	Poor: gravelly	Unsuited	Good	Fragipan at a depth of 18 to 26 inches; subject to seepage and sloughing above fragipan on slopes.
Mohawk: MsB, MsC, MsD.	Fair: coarse fragments.	Unsuited	Fair: excessive fines; medium strength.	Subject to seepage and sloughing.
Mosherville: MtA, MtB	Fair: coarse fragments.	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; subject to seepage above fragipan; subject to seepage and sloughing on slopes; high frost-action potential.
Nassau: NaB, NaD	Poor: fragments of shale; bedrock at a depth of 10 to 20 inches.	Unsuited: shaly; bedrock at a depth of 10 to 20 inches.	Poor: bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.
Nellis: NeB, NeC, NeD	Fair: coarse fragments.	Unsuited	Fair to good: improves with depth.	Features generally favorable.
Nunda: NuB, NuC, NuD, NVF, NWC.	Poor: channery	Unsuited	Fair: excessive fines	Seasonal high water table; subject to seepage and sloughing on slopes.
Odessa: OdB	Fair to poor: clayey	Unsuited	Poor: low strength; poor workability.	Seasonal high water table; medium to high compressibility; moderate shrink-swell potential; poor stability.
Otisville: OtB	Poor: gravelly	Good for gravel; fair for sand.	Good	Features generally favorable.
Palatine: PaB, PaC, PaD	Poor: fragments of shale.	Unsuited: bedrock at a depth of 20 to 40 inches.	Poor: bedrock at a depth of 20 to 40 inches.	Shale bedrock at a depth of 20 to 40 inches.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Moderate permeability; bedrock at a depth of 20 to 40 inches.	Medium to low permeability; bedrock at a depth of 20 to 40 inches; moderate erodibility.	Well drained to excessively drained; bedrock at a depth of 20 to 40 inches.	Medium intake rate; low or moderate available water capacity.	Bedrock at a depth of 20 to 40 inches; outcrops of rock in places; droughty.	Moderate erodibility; outcrops of rock in places; droughty.
Seasonal high water table; very slow permeability in fragipan.	Good stability; medium to low permeability.	Seasonal high water table; very slow permeability in fragipan.	Medium intake rate; low to moderate available water capacity; seasonal high water table.	Seasonal high water table; seepage in cuts.	Moderate erodibility.
Moderate permeability.	Fair stability; medium to low permeability; moderate erodibility.	Well drained and moderately well drained; features generally favorable.	Medium intake rate; moderate to high available water capacity.	Seepage in places in cuts.	Moderate erodibility; channel siltation potential.
Slow permeability in fragipan; seasonal high water table.	Good to fair stability; medium to low permeability; high erodibility; high piping potential.	Seasonal high water table; slow permeability in fragipan at a depth of 16 to 26 inches.	Seasonal high water table.	Seasonal high water table; fragipan at a depth of 16 to 26 inches.	High erodibility; channel siltation potential.
Bedrock at a depth of 10 to 20 inches; moderate permeability.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; somewhat excessively drained.	Medium intake rate; low or very low available water capacity; bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.
Moderate to moderately slow permeability.	Good stability; medium to low permeability; moderate erodibility.	Well drained ------	Medium intake rate; high available water capacity.	Moderate to high erodibility.	Moderate to high erodibility; channel siltation potential.
Slow permeability; seasonal high water table.	Good stability; low permeability.	Slow permeability; seasonal high water table.	Slow intake rate; high available water capacity.	Seasonal high water table; seepage in places in cuts.	Moderate erodibility.
Seasonal high water table; very slow permeability.	Low strength; moderate shrink-swell potential; high compressibility; poor workability and compaction characteristics.	Seasonal high water table; unstable cut slopes; very slow permeability.	Slow intake rate; moderate to high available water capacity; seasonal high water table.	Clayey; moderate erodibility.	Clayey; moderate erodibility; channel siltation potential.
Very rapid permeability.	High permeability; good stability.	Excessively drained.	Fast intake rate; very low available water capacity.	Very rapid permeability; droughty; gravelly.	Very rapid permeability; droughty; gravelly.
Moderate permeability; bedrock at a depth of 20 to 40 inches.	Medium to low permeability; bedrock at a depth of 20 to 40 inches.	Well drained and somewhat excessively drained; bedrock at a depth of 20 to 40 inches.	Medium intake rate; low or moderate available water capacity.	Bedrock at a depth of 20 to 40 inches.	Moderate erodibility; channel siltation potential.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
Palms: Pb	Unsuited: muck possibly can be used as amendment for mineral soils.	Unsuited	Unsuited: muck	Prolonged high water table; organic material; high compressibility; poor stability.
Palmyra: PmA, PmB, PmC.	Poor: gravelly	Fair to good: excessive fines in upper 24 inches.	Good	Features generally favorable; moderate frost-action potential.
Phelps: PpA, PpB, Pr	Poor: gravelly	Fair to good: excessive fines in upper 36 inches.	Good	Seasonal high water table; moderate frost-action potential.
Plainfield: PsA, PsB	Poor: sandy	Good for sand. Unsuited for gravel: no gravel.	Good: high erodibility where water is allowed to concentrate.	High erodibility in cuts where water is allowed to concentrate.
Raynham: Ra	Poor: poorly drained	Unsuited	Poor: poorly drained; low strength; high erodibility.	Prolonged high water table; high frost-action potential; fair stability.
Rhinebeck: RhA, RhB	Poor: clayey	Unsuited	Poor: low strength; poor workability.	Seasonal high water table; medium to high compressibility; moderate shrink-swell potential; poor stability.
*Rock outcrop: RLF. For Farmington part, see Farmington series.	Unsuited: no topsoil	Unsuited	Unsuited: needs blasting.	Exposed bedrock
Saprists and Aquents: SA.	Unsuited: shallow-water ponding.	Unsuited: shallow-water ponding.	Unsuited: shallow-water ponding.	Shallow-water ponding; variable thickness of organic material.
Scio: ScA, ScB	Good	Unsuited	Fair: low strength; high erodibility.	Seasonal high water table; high frost-action potential; fair stability.
Scriba. Mapped only with Burdett soils.	Poor: channery	Unsuited	Fair: somewhat poorly drained.	Seasonal high water table; subject to seepage and sloughing on slopes; subject to seepage above fragipan.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Moderately rapid permeability; prolonged high water table; organic material.	Very poor stability; high compressibility; very low strength; organic material.	Very high shrinkage when first drained; moderately rapid permeability; organic material 16 to 50 inches deep.	Fast intake rate; high available water capacity.	Level	Level.
Very rapid permeability below a depth of 36 inches.	Medium to high permeability; good stability.	Well drained to excessively drained.	Medium to fast intake rate; low to moderate available water capacity.	Very rapid permeability in substratum.	Gravelly; low to moderate erodibility; channel siltation potential.
Seasonal high water table; rapid permeability in substratum.	Seasonal high water table; medium to high permeability; good stability.	Seasonal high water table; rapid permeability in substratum.	Fast intake rate; moderate to high available water capacity.	Seepage in places in cuts.	Gravelly; low to moderate erodibility.
Very rapid permeability; excessively drained.	High erodibility; medium to high piping potential; rapid permeability.	Excessively drained.	Fast intake rate; low available water capacity.	High erodibility; very rapid permeability; channel siltation potential.	High erodibility; low available water capacity; channel siltation potential.
Prolonged high water table; slow permeability.	High erodibility; high piping potential; medium compressibility; poor workability.	Prolonged high water table; slow permeability; unstable ditchbanks.	Prolonged high water table.	Nearly level	Nearly level; high erodibility.
Seasonal high water table; slow permeability.	Low strength; moderate shrink-swell potential; high compressibility; poor workability and compaction characteristics; moderate erodibility.	Seasonal high water table; unstable cut slopes; slow permeability.	Seasonal high water table; very slow intake rate.	Clayey; moderate erodibility.	Clayey; moderate erodibility; channel siltation potential.
Exposed bedrock	Exposed bedrock	Exposed bedrock	Exposed bedrock	Exposed bedrock	Exposed bedrock.
Shallow-water ponding.	Shallow-water ponding; organic material.	Shallow-water ponding.	Shallow-water ponding.	Shallow-water ponding; level.	Shallow-water ponding; level.
Seasonal high water table; moderate permeability.	High erodibility; high piping potential; medium compressibility.	Seasonal high water table; unstable ditchbanks; moderate permeability.	Medium intake rate; high available water capacity.	High erodibility	High erodibility; channel siltation potential.
Slow permeability in fragipan; seasonal high water table.	Good stability; low permeability; few large stones.	Slow permeability; seasonal high water table; fragipan at a depth of 10 to 18 inches.	Seasonal high water table; slow intake rate.	Few large stones; fragipan at a depth of 10 to 18 inches.	Few large stones; moderate erodibility.

TABLE 6.—*Engineering*

Soil series and map symbol	Suitability as source of—			Soil features affecting—
	Topsoil	Sand and gravel	Fill material	Highway location
Sun: Su	Poor: very poorly drained and poorly drained.	Unsuited	Poor: very poorly drained and poorly drained.	Prolonged high water table.
Teel: Te	Good	Unsuited	Fair: low strength; high erodibility.	Subject to flooding; seasonal high water table; fair stability.
*Tuller: Tu, TvA, TvB For Brockport part of TvA and TvB, see Brockport series.	Poor: channery	Unsuited: bedrock at a depth of 10 to 20 inches.	Poor: bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; prolonged high water table.
Unadilla: UnB, UnC, UnD.	Good	Unsuited: excessive fines; possible sand and gravel below a depth of 4 feet.	Fair to good: improves with depth; high erodibility.	High frost-action potential; fair to good stability.
*Urban land: UR. Urban land part too variable to estimate. For Colonie part, see Colonie series.				
Varick: VaA, VaB	Poor: poorly drained	Unsuited: bedrock at a depth of 20 to 40 inches.	Poor: poorly drained; bedrock at a depth of 20 to 40 inches.	Prolonged high water table; bedrock at a depth of 20 to 40 inches.
Wassaic: WaA, WaB, WaC.	Fair to poor: coarse fragments.	Unsuited	Poor: bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches.
Wayland: Wy	Poor: very poorly drained and poorly drained.	Unsuited	Poor: very poorly drained and poorly drained.	Prolonged high water table; subject to flooding.

fine to moderately coarse texture. The rate of water transmission is moderate.

C. Moderately high runoff potential. Soils having slow infiltration rates when thoroughly wetted, mainly soils having a layer that impedes downward movement of water, soils of moderately fine to fine texture, or soils having a moderately high water table. These soils may be somewhat poorly drained. The rate of water transmission is slow.

D. High runoff potential. Soils having very slow infiltration rates when thoroughly wetted, mainly clay soils that have a high swelling potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. The rate of water transmission is very slow.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Diversions	Waterways
Reservoirs	Embankments				
Prolonged high water table; slow permeability.	Good stability; medium to low permeability.	Prolonged high water table; slow permeability.	Prolonged high water table.	Nearly level	Nearly level.
Seasonal high water table; moderate permeability.	High erodibility; high piping potential; medium compressibility.	Subject to flooding; seasonal high water table; moderate permeability; unstable ditchbanks.	Subject to flooding; medium intake rate; high available water capacity.	Subject to flooding; nearly level.	Subject to flooding; nearly level.
Bedrock at a depth of 10 to 20 inches; prolonged high water table; moderate permeability.	Bedrock at a depth of 10 to 20 inches; medium to low permeability.	Bedrock at a depth of 10 to 20 inches; prolonged high water table.	Prolonged high water table.	Bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; moderate erodibility.
Moderate permeability.	High erodibility; high piping potential; medium compressibility.	Well drained	Medium intake rate; high available water capacity.	Moderate permeability; high erodibility.	High erodibility; channel siltation potential.
Bedrock at a depth of 20 to 40 inches; prolonged high water table; slow or very slow permeability.	Bedrock at a depth of 20 to 40 inches; prolonged high water table; slow permeability.	Bedrock at a depth of 20 to 40 inches; prolonged high water table.	Poorly drained	Bedrock at a depth of 20 to 40 inches; prolonged seepage.	Prolonged seepage; moderate to high erodibility.
Fractured limestone bedrock at a depth of 20 to 40 inches; moderate permeability.	Medium to low permeability; limited material because of bedrock at a depth of 20 to 40 inches.	Features generally favorable; bedrock at a depth of 20 to 40 inches.	Medium intake rate; moderate available water capacity.	Bedrock at a depth of 20 to 40 inches.	Moderate erodibility.
Subject to flooding; prolonged high water table; slow permeability.	Prolonged high water table; low to medium permeability; medium compressibility; moderate erodibility.	Subject to flooding; prolonged high water table.	Prolonged high water table.	Nearly level; prolonged high water table.	Nearly level; prolonged high water table.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years. This is largely determined by mottling in the soil profile left by the process of oxidation and reduction.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. Loam, for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains particles coarser than sand, an appropriate modifier is added, as for example, gravelly loamy sand. Sand, silt, clay, and some of the other terms used in the USDA textural classification are defined in the Glossary of this soil survey.

Permeability is the quality that enables a soil to transmit water or air. It is estimated on the basis of those soil characterisics observed in the field, particu-

TABLE 7.—*Engineering*

[Tests performed by the New York State Department of Transportation, Soil Mechanics Bureau, in accordance

Soil name and location	Parent material	SCS report number	Depth from surface	Moisture-density data				Percolation rate [5]	Linear shrinkage	Reaction	Organic matter [6]	Estimated coarse fragments greater than 3 inches
				Maximum dry density [2]	Optimum moisture [3]	In-place dry density [3]	In-place moisture content [4]					
			Inches	*Pounds per cubic foot*	*Percent*	*Pounds per cubic foot*	*Percent*	*Minutes per inch*	*Percent*	*pH*	*Percent*	*Percent*
Arnot channery silt loam:												
Town of Glenville, junction of Ridge and Church Roads, 50 yards east of Glenville Hill Firehouse. (Modal)	Thin glacial till derived mainly from underlying siltstone and sandstone bedrock.	S69NY47										
		3–1	0–7	103	19	72	15	---	4	5.2	5.3	1
		3–2	7–16	117	14	90	14	7.5	4	5.5	1.2	1
			[8] 16									
Brockport silt loam:												
Town of Glenville, ⅛ mile east of State Highway 50 and 50 yards north of Glenridge Road. (Modal)	Thin glacial till derived mainly from underlying shale bedrock.	S69NY47										
		1–1	0–8	79	37	---	38	---	15	6.7	8.0	---
		1–2	8–22	98	25	83	31	---	11	6.3	1.4	---
		1–3	[9] 22–28	---	---	---	---	---	---	---	---	---
			[8] 28–34									
Burdett channery silt loam:												
Town of Charleston, 500 feet northwest of Begley Road and 900 feet southwest of intersection with Esperance Road. (Modal)	Contrasting silty glacial till deposit underlain by calcareous glacial till derived mainly from shale and from limestone and sandstone in places.	S69NY29										
		10–1	0–9	100	20	70	23	---	5	5.0	4.8	2
		10–2	9–16	108	17	96	15	---	4	5.4	2.1	5
		10–3	16–26	115	15	97	14	22.5	4	5.7	1.1	5–10
		10–4	26–44	120	12	---	12	---	6	6.0	0.8	15
		10–5	44–54	125	11	---	12	---	4	8.1	---	15
Burdett silt loam:												
Town of Duanesburg, 15 feet north of Fitzdom Road and 60 feet from junction with Levy Road. (Thinner silty mantle than modal)	Contrasting silty glacial till deposit underlain by calcareous glacial till derived mainly from shale.	S69NY47										
		6–1	0–7	97	22	79	22	---	6	6.2	5.2	2
		6–2	7–12	109	17	---	14	---	4	6.1	1.8	2
		6–3	12–15	111	16	---	13	---	4	6.0	0.9	2
		6–4	15–46	113	15	114	12	5.5	8	6.6	0.5	5–10
		6–5	46–51	122	12	123	12	---	4	8.2	---	10–15
Churchville silty clay loam:												
Town of Glen, 100 feet north of Logtown Road and 800 feet west of Olmstead Road. (Modal)	Lacustrine silt and clay deposit underlain by glacial till derived mainly from shale and from limestone and sandstone in places.	S69NY29										
		8–1	0–7	91	28	---	25	---	10	6.6	5.0	---
		8–2	7–13	93	26	---	26	-	11	7.4	1.6	---
		8–3	13–21	92	27	89	28	---	12	7.8	.7	---
		8–4	21–32	92	29	90	30	31.5	11	8.1	---	---
		8–5	32–41	111	17	99	24	---	5	8.4	---	---
		8–6	41–84	123	11	119	13	---	4	8.5	---	5

test data

with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO)]

Mechanical analysis [1]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
3-inch	1½-inch	¾-inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO [7]	Unified
											Percent			
100	97	91	82	79	72	53	45	27	9	3	35	6	A–4	ML
100	99	95	87	81	71	49	43	30	17	8	22	5	A–4	SM–SC
---	---	---	100	98	95	88	74	45	29	21	71	28	A–7–5	MH and OH
---	---	---	100	98	96	94	90	81	55	44	48	20	A–7–6	CL–ML
100	85	58	22	11	7	7	---	---	---	---	---	---	---	---
100	89	85	78	76	72	60	51	31	12	4	37	8	A–4	ML
100	94	89	80	78	74	62	54	34	19	10	28	7	A–4	CL–ML
100	93	87	76	71	66	55	47	26	14	9	24	7	A–4	CL–ML
100	91	81	64	57	50	40	34	21	13	8	23	6	A–4	GM–GC
100	92	84	70	66	58	46	40	26	16	10	24	8	A–4	GC
---	100	97	92	90	85	73	62	38	16	6	41	12	A–7–6	ML and OL
100	90	87	80	75	65	50	45	31	14	9	25	4	A–4	CL–ML
100	93	91	85	80	72	62	56	41	25	15	25	8	A–4	CL
100	90	86	79	72	60	48	43	33	21	14	29	11	A–6	SC
100	96	92	81	70	57	45	40	29	20	10	23	8	A–4	SC
---	---	---	100	99	97	89	82	69	53	34	45	15	A–7–5	ML
---	---	---	100	99	97	93	87	73	64	47	47	18	A–7–6	CL–ML
---	---	---	---	100	99	97	93	85	75	61	53	24	A–7–6	MH–CH
---	---	---	100	98	96	94	90	81	67	53	56	25	A–7–5	MH–CH
100	99	95	89	86	79	67	61	48	31	16	26	8	A–4	CL
100	99	92	78	72	63	48	40	23	11	5	20	4	A–4	SM–SC

TABLE 7.—*Engineering*

Soil name and location	Parent material	SCS report number	Depth from surface	Moisture-density data				Percolation rate [5]	Linear shrinkage	Reaction	Organic matter [6]	Estimated coarse fragments greater than 3 inches
				Maximum dry density [2]	Optimum moisture [3]	In-place dry density [3]	In-place moisture content [4]					
			Inches	*Pounds per cu-cu foot*	*Percent*	*Pounds per cubic foot*	*Percent*	*Minutes per inch*	*Percent*	*pH*	*Percent*	*Percent*
Darien silt loam:												
Town of Minden, 50 feet east of Salt Springville Road and 1,900 feet north of intersection with Dingman Road. (Modal)	Glacial till derived mainly from shale and some limestone.	S69NY29										
		6-1	0-7	99	22	94	18	---	7	6.6	5.0	2
		6-2	7-10	107	23	---	15	---	8	6.2	1.7	2
		6-3	10-15	109	18	---	15	---	6	6.3	1.0	5
		6-4	15-31	111	16	113	14	18.4	9	7.2	0.8	5
		6-5	31-56	115	15	109	13	---	6	7.6	---	5
Hamlin silt loam:												
Town of Palatine, on Montgomery County Home Farm, 200 feet north of Mohawk River and 300 feet west of Knauderack Creek. (Modal)	Silty alluvium.	S69NY29										
		2-1	0-10	106	18	80	18	---	6	7.7	4.8	---
		2-2	10-24	100	21	84	21	0.6	6	7.9	1.8	---
		2-3	24-37	109	18	90	21	---	6	8.0	1.3	---
		2-4	[10] 37-70	108	18	84	23	---	5	8.1	1.2	---
Howard gravelly silt loam:												
Town of Glenville, 100 yards southeast of intersection of New York Highway 5 and Vley Road. (Modal)	Calcareous glacial outwash derived mainly from sandstone and limestone.	S69NY47										
		4-1	0-9	102	20	79	25	---	6	5.5	6.9	5
		4-2	9-19	120	13	---	8	---	6	5.9	1.7	10-15
		4-3	19-50	128	10	---	11	0.8	4	6.2	1.2	10-15
		4-4	50-61	129	10	---	11	---	3	6.6	1.2	10-15
		4-5	61-64	133	9	---	9	2.4	1	8.3	---	5-10
Ilion silt loam:												
Town of Duanesburg, 230 yards east of Herrick Road and 200 yards north of Finch Road. (Modal)	Thin colluvial deposit underlain by calcareous glacial till derived mainly from shale, sandstone, and some limestone.	S69NY47										
		7-1	0-9	88	29	---	34	---	8	5.8	5.3	5
		7-2	9-14	109	18	---	22	---	4	7.4	0.7	5
		7-3	14-39	122	12	119	15	<120	6	8.2	0.4	10-15
		7-4	39-57	128	10	---	12	---	6	8.0	---	15
Madalin silty clay loam:												
Town of Minden, 1,000 feet east of Paris Road and 1,500 feet north of Fordsbush Road. (Modal)	Lacustrine silt and clay.	S69NY29										
		4-1, 2	0-9	85	32	70	26	---	10	7.2	6.4	---
		4-3	9-21	90	30	72	27	---	12	7.3	1.4	---
		4-4	21-30	94	27	89	25	18.2	10	8.1	0.7	---
		4-5	30-58	94	27	92	25	---	9	8.0	---	---
Manlius silt loam:												
Town of Minden, 700 feet east of Brookmans Corners Road and 2,900 feet north of intersection with Starkville Road. (Modal)	Thin glacial till derived mainly from gray shale.	S69NY29										
		5-1	0-7	95	24	75	13	---	6	5.0	6.1	---
		5-2	7-11	100	23	---	12	8.7	6	5.1	5.4	---
		5-3	11-16	110	17	---	10	---	2	5.1	2.4	---
		5-4	16-28	109	18	---	11	---	2	5.1	2.0	---
		5-5	[8] 28-42									

test data—Continued

Mechanical analysis [1]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
3-inch	1½-inch	¾-inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO [7]	Unified
											Percent			
100	99	97	90	85	81	73	64	42	23	11	38	10	A–4	ML
100	93	90	82	78	73	66	58	40	24	15	34	15	A–6	CL
100	98	94	87	81	72	65	59	45	29	22	36	14	A–6	CL
100	98	94	86	80	73	65	59	45	29	21	34	17	A–6	CL
100	98	93	81	74	66	60	53	38	25	16	32	12	A–6	CL
---	---	---	---	100	99	77	68	44	22	11	30	7	A–4	CL–ML
---	---	---	---	---	100	97	86	60	26	13	35	9	A–4	CL–ML
---	---	---	---	---	100	78	66	38	20	12	24	5	A–4	CL–ML
---	---	---	---	---	100	80	68	38	18	10	24	8	A–4	CL
100	92	80	71	69	60	49	45	35	17	7	38	10	A–4	GM
100	76	55	37	29	20	12	11	8	5	3	27	7	A–2–4	GM–GC
100	85	65	44	37	21	11	10	7	4	3	24	4	A–1–a	GW–GM
100	85	70	45	35	21	11	9	6	4	3	24	4	A–1–a	GW–GM
100	87	70	42	32	18	8	---	---	---	---	---	[11]NP	A–1–a	GW–GM
100	98	88	82	80	77	68	57	33	16	10	45	12	A–7–5	ML and OL
100	98	93	89	85	78	59	51	34	19	12	24	7	A–4	CL–ML
100	90	85	74	69	60	49	44	31	19	12	22	7	A–4	GM–GC
100	91	84	73	67	58	46	41	29	16	10	21	7	A–4	GM–GC
---	---	---	---	100	97	93	88	77	56	37	51	13	A–7–5	MH and OH
---	---	---	---	100	99	98	94	85	78	66	63	33	A–7–5	MH–CH
---	---	---	---	100	99	99	95	85	78	49	49	23	A–7–6	CL–ML
---	---	---	---	100	99	99	99	95	78	55	43	16	A–7–6	CL–ML
---	---	100	95	89	74	65	59	42	22	10	43	11	A–7–5	ML and OL
---	100	98	88	81	73	68	60	38	17	7	42	12	A–7–5	ML and OL
---	100	99	85	72	61	58	50	35	18	8	36	9	A–4	ML
---	100	96	68	45	27	23	20	13	9	5	32	8	A–2–4	SM–SC

TABLE 7.—*Engineering*

Soil name and location	Parent material	SCS report number	Depth from surface	Moisture-density data				Percolation rate [5]	Linear shrinkage	Reaction	Organic matter [6]	Estimated coarse fragments greater than 3 inches
				Maximum dry density [2]	Optimum moisture [2]	In-place dry density [3]	In-place moisture content [4]					
			Inches	*Pounds per cu cu foot*	*Percent*	*Pounds per cubic foot*	*Percent*	*Minutes per inch*	*Percent*	*pH*	*Percent*	*Percent*
Mohawk silt loam:												
Town of Glen, 20 feet west of Hall Road and ¼ mile north of Logtown Road. (Modal)	Glacial till derived mainly from dark shale and from limestone and sandstone in places.	S69NY29										
		9–1	0–9	104	19	---	16	---	6	6.0	3.6	1
		9–2	9–19	108	18	98	15	---	6	6.5	1.9	1
		9–3	19–27	107	18	98	13	14.0	6	6.7	2.1	2–5
		9–4	27–55	110	17	99	18	---	6	7.2	---	5–10
		9–5	55–68	118	13	---	16	---	6	8.1	---	5–10
Nunda channery silt loam:												
Town of Duanesburg, 210 yards east of Herrick Road and 135 yards south of Finch Road. (Modal)	Contrasting silty till deposit underlain by neutral to calcareous glacial till derived mainly from shale.	S69NY47										
		8–1	0–7	99	20	---	25	---	5	5.1	4.8	10
		8–2	7–15	105	20	---	25	---	4	5.4	2.9	10
		8–3	15–20	119	13	---	17	---	3	5.8	1.4	10
		8–4	20–25	120	13	---	13	---	3	6.0	0.6	---
		8–5	25–42	121	12	---	15	---	6	7.0	0.5	10–15
		8–6	42–54	118	14	---	15	---	7	7.0	---	10–15
Palatine silt loam:												
Town of Minden, 600 feet north of State Highway 5S and ¼ mile west of Sanders Road. (Modal)	Thin glacial till derived mainly from black calcareous shale.	S69NY29										
		3–1	0–11	89	29	81	27	5.3	9	6.5	5.9	---
		3–2	11–18	---	---	---	17	---	8	6.8	3.6	---
		3–3	[12] 18–28 [8] 28–42									
Plainfield loamy sand:												
Town of Glenville, 100 yards west of State Highway 50 and 200 yards south of Charlton Road. (Modal)	Deltaic sands.	S69NY47										
		2–1	0–8	117	13	101	8	---	2	5.0	5.0	---
		2–2	8–17	119	11	98	5	0.4	---	5.5	1.3	---
		2–3	17–32	108	14	97	5	---	---	6.1	0.5	---
		2–4	32–55	110	13	103	5	---	---	6.3	---	---
		2–5	55–78	120	12	104	8	0.4	---	6.9	---	---
Rhinebeck silty clay loam:												
Town of Canajoharie, near Marshville, 1,300 feet northwest of intersection of Frederick Street and McEwan Road. (Modal)	Lacustrine silt and clay.	S69NY29										
		7–1	0–7	88	30	74	30	---	8	6.3	4.5	---
		7–2	7–13	91	30	---	23	---	6	6.0	2.1	---
		7–3	13–21	94	27	83	27	0.4	8	6.9	1.0	---
		7–4	21–28	92	28	89	27	3.1	10	7.2	0.9	---
		7–5	28–70	96	25	90	27	---	6	8.1	---	---
Scriba channery silt loam:												
Town of Duanesburg, 30 feet south of Thousand Acre Road and 100 yards east of intersection with Youngs Road. (Modal)	Glacial till derived mainly from sandstone and shale.	S69NY47										
		9–1	0–7	97	21	---	33	---	5	5.1	6.0	5
		9–2	7–11	103	21	---	24	---	2	5.2	2.8	10
		9–3	11–15	121	13	---	14	---	3	5.5	0.8	10
		9–4	15–43	121	13	---	12	---	4	6.4	0.5	15–20
		9–5	43–54	125	11	---	13	---	4	7.1	---	15–20

test data—Continued

Mechanical analysis [1]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
3-inch	1½-inch	¾-inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO [7]	Unified
											Percent			
100	97	96	92	89	84	71	62	42	23	11	34	8	A-4	CL-ML
100	99	95	88	85	80	69	61	42	24	16	29	9	A-4	CL-ML
100	93	92	90	86	81	67	59	40	28	17	31	9	A-4	CL-ML
100	97	94	88	85	79	65	58	40	22	14	29	8	A-4	CL-ML
100	88	78	68	64	56	40	36	25	11	7	22	5	A-4	GM-GC
100	84	72	55	50	44	34	28	15	5	2	39	8	A-2-4	GM
100	87	81	68	62	58	50	44	29	13	7	33	8	A-4	GM-GC
100	76	66	54	48	41	31	26	16	8	3	21	3	A-2-4	GM-GC
100	80	69	55	50	45	35	30	20	12	8	21	5	A-2-4	GM-GC
100	93	84	69	63	55	44	40	29	19	13	25	11	A-6	GC
100	91	81	68	62	55	45	40	31	20	13	25	9	A-4	GC
---	---	---	---	100	99	96	88	67	45	19	45	12	A-7-5	ML and CL
---	100	99	70	70	70	70	60	39	19	11	44	13	A-7-5	ML
---	---	100	95	91	39	16	13	7	2	1	---	NP	A-1-b	SM
---	---	100	93	88	35	16	14	6	2	1	---	NP	A-1-b	SM
---	---	---	100	99	32	7	---	---	---	---	---	NP	A-1-b	SP-SM
---	---	100	98	97	34	7	---	---	---	---	---	NP	A-1-b	SP-SM
---	---	100	95	90	24	7	---	---	---	---	---	NP	A-1-b	SP-SM
---	---	---	---	100	97	93	86	69	51	29	46	15	A-7-5	ML
---	---	---	---	100	96	94	90	82	68	41	41	13	A-7-6	CL-ML
---	---	---	---	100	99	98	95	88	77	51	42	16	A-7-6	CL-ML
---	---	---	---	---	100	99	98	96	84	59	52	22	A-7-5	MH-CH
---	---	---	---	100	99	98	97	93	58	28	34	13	A-6	CL
100	92	84	75	72	67	56	46	22	5	2	44	10	A-5	ML and OL
100	97	93	83	77	71	57	47	23	5	3	24	2	A-4	ML
100	94	88	79	75	68	53	45	24	10	6	19	6	A-4	CL-ML
100	89	81	71	67	60	46	40	24	15	8	21	7	A-4	GM-GC
100	94	88	77	72	63	44	39	28	14	7	18	5	A-4	SM-SC

TABLE 7.—*Engineering*

Soil name and location	Parent material	SCS report number	Depth from surface	Moisture-density data				Percolation rate [5]	Linear shrinkage	Reaction	Organic matter [6]	Estimated coarse fragments greater than 3 inches
				Maximum dry density [2]	Optimum moisture [2]	In-place dry density [3]	In-place moisture content [4]					
			Inches	*Pounds per cu-cu foot*	*Percent*	*Pounds per cubic foot*	*Percent*	*Minutes per inch*	*Percent*	*pH*	*Percent*	*Percent*
Teel silt loam:												
Town of Mohawk, 120 feet south of State Highway 5 and 1,700 feet west of Canal Lock No. 13, near the village of Randall. (Modal)	Silty alluvium.	S69NY29										
		1–1	0–13	93	26	76	25	---	7	6.2	6.8	---
		1–2	13–21	94	24	83	24	3.0	7	7.2	3.4	---
		1–3	21–38	90	27	75	30	---	7	7.6	3.2	---
		1–4	38–66	86	31	70	44	---	8	7.5	2.8	---
Varick silt loam:												
Town of Duanesburg, 20 feet south of U.S. Route 20 and ¼ mile west of intersection with Schoharie Turnpike. (Modal)	Thin glacial till derived mainly from shale underlain by siltstone bedrock.	S69NY47										
		10–1	0–8	97	23	---	---	---	8	6.5	4.8	1–2
		10–2	8–13	118	13	---	---	---	4	6.9	0.9	1–2
		10–3	13–30 [8] 30	119	13	---	---	---	7	7.3	0.5	5–10
Wassaic silt loam:												
Town of Glenville, 200 yards southwest of junction of Tovareuna and Potter Roads. (Modal)	Thin multiple glacial till deposits underlain by limestone bedrock.	S69NY47										
		5–1	0–7	102	18	90	14	---	4	5.8	4.9	2–5
		5–2	7–13	113	16	87	12	6.3	4	5.9	2.2	5–10
		5–3	13–19	121	12	87	8	---	2	5.9	1.0	5–10
		5–4	19–27 [8] 27	113	16	103	7	---	7	6.9	1.0	5–10

[1] Mechanical analyses according to the AASHTO Designation T 88. Results by this procedure may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO 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 analyses used in this table are not suitable for use in naming textural classes for soil.

[2] Based on AASHTO Designation T 99–57, method C.

[3] Based on ASTM Designation T 99-57, method C *(2)*.

[4] Based on ASTM Designation D2216–63T.

larly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts. The estimated values shown represent the downward movement of water in a saturated soil through an individual soil horizon. Each soil horizon is rated independently of the other horizons.

Available water capacity is the ability of soils to hold water for use by plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and terms used to describe soil reaction are explained in the Glossary.

The K factor is the soil erodibility factor used with the universal soil loss equation. This equation, A=RKLSPC, is used for the design of water erosion-control systems. A is the annual average soil loss in tons per acre; R is the rainfall factor; L is length of slope; S is percent of slope; P is the conservation practice factor; and C is the cropping and management factor. Values shown in the table represent the norm or average for the particular horizon.

The following soil erodibility ratings can be derived

test data—Continued

Mechanical analysis [1]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
3-inch	1½-inch	¾-inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.005 mm			AASHTO [7]	Unified
											Percent			
---	---	---	---	100	98	83	74	53	24	11	40	11	A-6	ML and OL
---	---	---	---	100	95	76	65	36	16	9	38	12	A-6	CL–ML
---	---	---	---	100	98	85	75	48	22	11	40	11	A-6	ML
---	---	---	---	---	100	96	86	62	28	14	40	11	A-6	ML
100	89	85	78	74	69	55	47	27	13	5	36	10	A-4	CL–ML
---	---	100	97	91	80	53	45	25	15	5	18	4	A-4	CL–ML
---	100	98	89	81	69	52	46	34	23	14	25	9	A-4	CL
100	95	91	83	79	73	57	47	25	10	4	34	6	A-4	ML
100	90	84	75	70	64	47	41	25	11	5	27	6	A-4	SM–SC
100	92	87	78	75	67	47	41	26	10	6	18	3	A-4	SM
100	98	94	88	84	76	61	56	44	30	22	30	13	A-6	CL

[5] Based on "Standard Percolation Test," designated in New York State Department of Health Bulletin No. 1.
[6] Wet combustion method based on 1942 Cornell University agronomy test procedure modified by the Soil Mechanics Bureau.
[7] Based on AASHTO Designation M 145–49.
[8] Bedrock.
[9] Insufficient material for complete analysis.
[10] Water at 70 inches.
[11] NP = Nonplastic.
[12] Weathered shale.

from the K factors. These represent only relative potential erodibility since they do not include the other values used in the universal soil loss equation.

K factor	*Soil erodibility rating*
0.10–0.20	Low
0.24–0.32	Medium
0.37–0.49	High
0.55–0.64	Very high

Engineering interpretations

The interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Montgomery and Schenectady Counties. Table 6 rates the soils as a source for topsoil, sand and gravel, and fill material. It also lists soil features that affect highway location, farm ponds, farm drainage, irrigation, diversions, and waterways.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, natural fertility of the material, and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability; also considered

in the ratings is damage to the area from which topsoil is taken.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 6 provide guidance about where to look for probable sources. A soil rated as a good or fair source of sand or gravel generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials; nor do they indicate quality of the deposit.

Fill material is soil used in embankments for roads or for raising depressions. The suitability ratings reflect: (1) the predicted performance of soil after it has been placed in a fill that has been properly compacted and provided with adequate drainage and (2) the relative ease of excavating the material at borrow areas.

The soil features that have been considered as the most significant for highway and road location are: load-supporting capacity and stability of the subgrade, stability and erodibility of the cut slopes, wetness and flooding condition of the subgrade, and depth to bedrock. The stability of the subgrade materials relates to the compressibility and strength of the soil should loads or structures be placed in it. The stability of the materials on cut slopes relates to the strength in resisting slope failure or sliding. The AASHTO and Unified classifications of the soil materials generally indicate the strength, load-supporting capacity, and workability.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage potential. This soil feature is related to soil permeability and the depth to and nature of the bedrock.

Embankments require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material is unfavorable.

Drainage of cropland and pasture is affected by such soil properties as permeability, texture, and structure; depth to fragipan, rock, or other layers that influence the rate of water movement; depth to the water table, drainage class, slope, stability in ditchbanks, susceptibility to flooding, salinity or alkalinity, and availability of drainage outlets.

Irrigation of a soil is affected by such features as slope; susceptibility to flooding, water erosion, or soil blowing; texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of fragipans or other layers that restrict movement of water; amount of retained water available to plants; need for drainage; and depth to water table or bedrock.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff and seepage so that it soaks into the soil or flows slowly to a stable outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures has suitable outlets for runoff and is not difficult to vegetate.

Waterway layout and construction is affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones or rock outcrops; steepness of slopes, seepage, and natural soil drainage; available water capacity; susceptibility to siltation; and the ease of establishing and maintaining vegetation.

Soil test data

Table 7 contains engineering test data for some of the major soil series in Montgomery and Schenectady Counties. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Compaction, or moisture-density, data are important in earthwork. If a soil material is compacted at successively higher moisture content,[8] with a compactive effort that remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. Beyond that point, the density decreases as the moisture content increases. The highest dry density obtained in the compactive test is termed *maximum dry density*. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Percolation rate refers to the field test values for the downward and lateral movement of water through the soil. The percolation rate as expressed in table 7 is given in minutes per inch.

Linear shrinkage is the decrease in one dimension, expressed as a percentage of the original dimension, of the soil mass when the moisture content is reduced from the given value to the shrinkage limit.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the soil material changes from the semisolid to the plastic state; and the *liquid limit* is the moisture content at which the soil 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. The liquid limits and plasticity indexes in table 7 are based on tests of soil samples.

Engineering properties of geologic deposits and bedrock

The geologic deposits of Montgomery and Schenectady Counties are glacial till; outwash; and lacustrine, alluvial, eolian, and organic deposits. The engineering

[8] Moisture content: The ratio of the weight of water contained in a soil to the dry weight of the soil. It is generally expressed as percentage.

significance of each geologic deposit depends to a great extent on its mode of deposition and the texture of the material. The internal structure and position on the landscape are also important. In Montgomery and Schenectady Counties, the geologic deposits are divided into the following categories: deep glacial till; shallow to bedrock deposits; assorted coarse-grained deposits; assorted fine-grained deposits; and organic deposits.

DEEP GLACIAL TILL

Glacial till deposits are highly variable mixtures of all soil particle sizes ranging from channery fragments to clay. The soils that formed in these deposits are well graded and generally are firm to dense. As a rule, no sorting has occurred, although isolated pockets of sorted material may exist. These soils are derived from local sources and, in general, reflect the properties of the underlying bedrock. Bedrock is usually more than 40 inches beneath the surface, but some shallow rock or outcrop may occur.

Soils formed in unsorted, heterogeneous glacial till deposits are those of the Amenia, Appleton, Burdett, Darien, Ilion, Lansing, Manheim, Mardin, Mohawk, Nellis, Nunda, Scriba, and Sun series. Broadalbin and Mosherville soils formed in a mantle of silty material 16 to 36 inches thick over glacial till. Churchville soils formed in fine-grained, assorted material underlain by glacial till at depths of 20 to 36 inches.

Soils that formed in glacial till are the most dense and compact of the unconsolidated materials of the area, because most of the till deposits have been subjected to the compactive weight of overriding ice. Very few of the soils that formed in this heterogeneous material occupy flat areas. They range from gently sloping to very steep, and cut and fill earthwork is involved in most construction. The soils provide stable, relatively incompressible foundations for engineering works. When properly compacted, fill material from these soils provides stable embankments.

SHALLOW TO BEDROCK DEPOSITS

The engineering properties of these soils depend on the closeness of bedrock to the surface. The landforms on which these soils are found are controlled by the bedrock configuration, and outcrops may occur.

The Arnot, Farmington, Hollis, Joliet, Nassau, and Tuller soils formed in 10 to 20 inches of heterogeneous material over bedrock. Angola, Brockport, Hornell, Lordstown, Manlius, Palatine, Varick, and Wassaic soils formed in 20 to 40 inches of heterogeneous material over bedrock. Madalin variant formed in fine-grained, assorted material that is 20 to 40 inches deep over bedrock.

Bedrock of Montgomery and Schenectady Counties is described in the subsection "Physiography and geology." Hollis soils formed over very hard granitic rocks. Farmington, Joliet, and Wassaic soils formed over relatively hard limestone. Angola, Brockport, Hornell, Manlius, and Palatine soils formed over relatively soft shales. These shales are generally rippable by heavy equipment, but are hard in places. The Nassau soils formed over harder shales that are generally rippable. Soils of the Arnot, Lordstown, Madalin, Tuller, and Varick series formed over interbedded sandstone, siltstone, and shale.

Soils that formed in shallow to bedrock deposits generally furnish satisfactory foundations for engineering works, as does the underlying rock. The topography is such that cut and fill earthwork is necessary for any extensive work. To insure the stability of embankments on steep slopes, keying measures may be needed. Fill material is limited because of the shallow depth to bedrock.

ASSORTED COARSE-GRAINED DEPOSITS

Materials sorted by water into layered or stratified deposits, dominantly of gravel and sand, are included in this category. They occupy such geologic landforms as outwash terraces; ice-contact deposits; and coarse parts of deltas, dunes, flood plains, and alluvial fans. The strata within these deposits may be well sorted or poorly sorted, and particle sizes range from cobbles to silt. A cementing of particles occurs in places, although the deposits are usually loose and porous.

Alton, Copake, Fredon, Herkimer, Howard, Otisville, Palmyra, and Phelps soils formed in the gravelly deposits of outwash, ice-contact, or alluvial fan origin. Alton soils are underlain by assorted fine-grained material at a depth of about 5 feet. Cheektowaga, Claverack, Colonie, Elnora, Granby, Junius, and Plainfield soils formed in sandy deposits of deltaic or eolian origin. Cheektowaga and Claverack soils are underlain by assorted, fine-grained material at a depth of 20 to 40 inches. Fluvaquents, loamy, are alluvial soils on flood plains.

Coarse-grained deposits generally have relatively high strengths and low settlement characteristics. However, where vibratory loads are applied to the soil, particle rearrangement causes settlement. Because of their loose and porous nature, most of these deposits are not highly erodible. However, Cheektowaga, Claverack, Colonie, and Elnora soils are subject to soil blowing where topsoil is removed. Elnora and Junius soils, which contain fine sand, are highly susceptible to frost action. Cuts and excavations in these materials may be dry during the construction season, and it is difficult to foresee the potentially adverse moisture conditions that develop in wet seasons of the year.

These deposits of sand and gravel have many uses as construction material. Depending on gradation, soundness, and plasticity, they may be used as—

1. Fill material for highway embankments.
2. Fill material for parking areas and developments.
3. Fill material to advance the progress of construction operations by reducing stress on underlying soils.
4. Subbase for pavements.
5. Wearing surfaces for driveways, parking lots, and some roads.
6. Material for highway shoulders.
7. Free draining backfill for structures and pipes.

8. Outside shells of dams for impounding water.
9. Slope protection blankets to drain and help stabilize wet, cut slopes.
10. Sources of sand and gravel for general use.

ASSORTED FINE-GRAINED DEPOSITS

Fine-grained deposits consist of materials transported by water and deposited in a quiet environment, generally in glacial lakes. Some deposits are floodplain deposits from slack-water environments. Distinct layers of laminations, generally of silt- and clay-sized particles, occur. Although most of these deposits are silty, there is generally enough clay to make them plastic and sticky.

Soils that formed in deep, lake-laid silt and clay deposits are those of the Fonda, Hudson, Madalin, Odessa, and Rhinebeck series. The Raynham, Scio, and Unadilla series are silty, lake-laid soils; Hamlin, Teel, and Wayland soils are alluvial in origin. Unadilla soils are generally underlain by deposits of sand and gravel at a depth of 50 inches.

Because of their fine texture, these deposits have relatively low strengths. They are generally highly compressible. Settlements occur over long periods, because pore water must be expelled. The silt and very fine sand of the Raynham, Scio, and Unadilla series are less compressible, but they are highly erodible and susceptible to frost. Frost is generally not a problem in the clay soils because of the very slow vertical permeability. Hamlin, Teel, and Wayland soils are flood plain soils that are subject to inundation.

The fine-grained, assorted deposits are more difficult to use in engineering works than most other mineral soil material in the counties. Engineering works are generally elevated on embankments and fills where the soils are flat and wet, as in the case of Fonda soils. Sites for high fills and heavy structures or buildings on all soils that formed in these finer sediments must be investigated for strength, settlement characteristics, and depth of water table.

ORGANIC DEPOSITS

Organic deposits are for the most part an accumulation of plant and animal remains. In places, they include a minimal amount of inorganic material. They occur in very poorly drained depressions.

Carlisle and Palms soils formed in organic deposits. Saprists and Aquents, popularly termed fresh-water marsh, contain organic deposits in the Saprists part of the unit. Aquents are mineral deposits that are associated with Saprists. The organic soils are entirely unsuitable for foundations, because they are very weak and highly compressible. The organic material should generally be removed and replaced by suitable backfill. Filling over organic deposits causes long-term settlements because of the eventual decay of the organic material.

Town and Country Planning

This section of the soil survey provides information on the properties of soils and their effect on selected nonfarm uses of the land. It should help community planners, developers, and individual landowners determine the most suitable use for a particular area. Other useful information can be found on the soil maps and in other parts of the survey, particularly in the sections "Descriptions of the Soils" and "Engineering." Although the soil maps and tables serve as a guide and can eliminate some sites from further consideration, they do not supplant direct, detailed, onsite investigations when a development is being planned. Not considered in this section are proximity to established business centers or transportation lines and other economic factors that are important and that often determine the ultimate use of an area.

Table 8 gives the estimated degree and kinds of limitations for some selected uses. Limitations are expressed as *slight, moderate,* or *severe.* If the rating is *moderate* or *severe,* the main limiting property or properties are listed. The ratings are based on the degree of the greatest single limitation. For example, if flooding severely limits the use of a soil in the disposal of sewage effluent from septic tanks, the limitation is rated *severe,* although the soil is well suited to that use in all other respects. A rating of *slight* indicates that the soil has properties favorable for the rated use. Soil limitations are minor and can be easily overcome. Good performance and low maintenance can be expected on the soil. A rating of *moderate* indicates that the soil has properties moderately favorable for the rated use. The limitations can be overcome or modified with special planning, design, or maintenance. During some seasons of the year the performance of the structure or other planned use may be somewhat less desirable than it would be on soils that have a slight limitation. A rating of *severe* indicates that the soil has one or more unfavorable properties for the rated use. Limitations are difficult and costly to modify or overcome. Major soil reclamation, special design, or intense maintenance is required. Some soils rated *severe* can be improved by reducing or removing the soil feature that limits its use. In most situations it is difficult and costly to alter the soil or to design a structure to compensate for soil limitations that are severe. A severe rating, however, does not mean that the soil cannot be used for the specific use.

The following paragraphs explain the column headings in table 8.

Dwellings (with basements).—Excluded are buildings that are more than three stories high and have excavations for basements 8 feet or more deep, and buildings that have foundation loads in excess of the normal weight of a three-story dwelling. Considered in rating the soils are the depth to the water table, shrink-swell potential, the depth to and the kind of bedrock, texture, the degree of slope, potential frost action, and the hazard of flooding. Flooding is a severe hazard for homesites. Depth to rock, depth to seasonal high water table, and natural soil drainage are less severe limitations for buildings that do not have a basement than for those that do. Methods of sewage disposal are not considered in the ratings for dwellings.

Shopping centers and small industrial buildings are

rated by the same criteria as dwellings that have basements, but slope is rated more critically.

Local roads and streets.—Considered in the column are the construction and maintenance of improved roads and streets that have some kind of all-weather surface, commonly asphalt or concrete. Such roads are expected to carry automobile traffic all year, but not fast-moving, heavy trucks. Properties that affect design and construction of roads and streets are the load-supporting capacity and stability of the subgrade and the workability and amount of cut and fill. The AASHTO and Unified classifications of the soil material and the shrink-swell potential give an indication of the traffic-supporting capacity. Wetness and flooding affect stability. Slope, depth to hard rock, stoniness, rockiness, and wetness affect the ease of excavation and the amount of cut and fill needed to reach an even grade. Soil limitation ratings in table 8 are not a substitute for basic soil data or for onsite investigations.

Septic tank absorption fields.—The main limiting soil features for absorption fields are restricted permeability, steepness of slope, insufficient depth to bedrock, a seasonal high water table, and flooding. Soils rated *slight* generally have few or no limitations. Those rated *moderate* may be borderline soils and should be investigated carefully at the exact site of installation. Some soils rated *moderate* require a larger field than those rated *slight*. All soils rated *severe* should be very carefully investigated to determine whether an absorption field can be expected to function adequately. The ratings in table 8 refer to year-round use of the soils. Limitations on soils for disposal fields, for summer camps, or for other part-time uses may be less severe than indicated in the table.

Lawns, landscaping, and golf fairways.—Ratings are for soil in place and not for areas where the original soil layers have been scalped or mixed by excavation. No importation of fill or topsoil is considered. The main features considered are natural drainage or wetness, slope, depth to bedrock, texture of the surface layer, surface stoniness and rockiness, and hazard of flooding. Golf fairways are subject to moderate traffic by foot and motorized golf carts and to frequent mowing. Traps, roughs, or greens are not considered in the ratings. The soil features are the same as those considered for lawns and landscaping.

Shallow excavations.—These excavations are less than six feet deep, for example, basements, ditches, graves, underground cables, pipelines, and sewers. Among the features that affect shallow excavations are drainage, seasonal water table, flooding, slope, texture, depth to bedrock, stoniness, and rockiness.

Athletic fields.—These areas are used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils are nearly level, are free of coarse fragments and rock outcrop, have good drainage, are not flooded during periods of heavy use, and are firm after rain but not dusty when dry. If grading and leveling are required, depth to rock is important.

Picnic areas.—These are attractive natural or landscaped tracts that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads. The best soils are firm when wet but not dusty when dry and are not flooded during the season of use. They are not limited by slopes or stoniness, both of which greatly increase the cost of leveling sites or of building access roads.

Paths and trails.—Considered in this column are facilities for local and cross-country travel by foot or on horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded no more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Camp areas.—These areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, no flooding during periods of heavy use, and a surface that is free of rocks and coarse fragments and is firm after rain but not dusty when dry.

Formation, Morphology, and Classification of the Soils

This section describes the major factors that affect the formation and morphology of the soils of Montgomery and Schenectady Counties and classifies the soils in higher categories.

Factors of Soil Formation

Soils formed through the interaction of five major factors—parent material, relief, climate, plant and animal life, and time. The relative influence of each factor generally varies from place to place. In places, one factor may dominate formation of a soil and determine most of its properties. Local variations in soils are largely the result of differences in parent material and relief.

Parent material

The soils of Montgomery and Schenectady Counties formed in mineral materials. Most of these materials were deposited as a result of glaciation of Wisconsin age. These materials are glacial till, glacial outwash of sorted sand and gravel, glacial lake-laid silt and clay, material transported by wind, recent stream alluvium, and organic materials. The mineral materials were derived from shale, sandstone, limestone, siltstone, and granite. In a few places soils are forming in decomposed and decomposing plant material that has accumulated in depressions.

As the glaciers moved over the counties, they carried large quantities of rock. Much of this rock was ground into fragments that range in size from boul-

TABLE 8.—*Limitations of the soils for*

[The soils are rated as follows: moderately well drained, seasonal wetness in places; somewhat

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
Alton:[1] AlB	Slight	Moderate: slope	Slight	Slight[2]
Amenia: AmA, AmB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Slight	Severe: slow permeability; temporary seasonal wetness.
Angola: AnB	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness; slow permeability.
AoA, AoB	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; slow permeability; seasonal wetness.
Appleton: ApA, ApB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
Arnot: ArB	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe:[2] bedrock at a depth of 10 to 20 inches.
AtC	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches.	Severe:[2] bedrock at a depth of 10 to 20 inches.
AtD	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 1 to 20 inches; slope.	Severe:[2] bedrock at a depth of 10 to 20 inches; slope.
AvB	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness in places.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness in places.	Severe: bedrock at a depth of 10 to 40 inches.	Severe:[2] bedrock at a depth of 10 to 40 inches; seasonal wetness in places.
AZF	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe:[2] slope; bedrock exposed or above a depth of 20 inches.
Broadalbin: BoB	Severe: temporary seasonal wetness.	Moderate: temporary seasonal wetness.	Slight	Severe: slow permeability; temporary seasonal wetness.
BoC	Severe: temporary seasonal wetness.	Severe: slope, temporary seasonal wetness.	Moderate: slope	Severe: slow permeability; temporary seasonal wetness.
BoD	Severe: slope	Severe: slope	Severe: slope	Severe: slope; slow permeability.

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poorly drained, seasonal wetness; and poorly drained and very poorly drained, prolonged wetness]

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Moderate: gravelly surface layer.	Severe: very gravelly subsoil and substratum.	Severe: gravelly surface layer.	Slight	Slight	Slight.
Slight	Severe: temporary seasonal wetness.	Moderate: slow permeability; temporary seasonal wetness.	Slight	Slight	Moderate: slow permeability; temporary seasonal wetness.
Moderate: seasonal wetness; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: seasonal wetness; bedrock at a depth of 20 to 40 inches.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery surface layer; seasonal wetness; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: seasonal wetness; channery surface layer; bedrock at a depth of 20 to 40 inches.	Moderate: seasonal wetness; coarse fragments on surface.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; channery surface layer.	Slight	Slight	Slight.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; rocky surface layer; slope.	Moderate: slope	Slight	Moderate: slope.
Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches; slope; rocky surface layer.	Severe: slope	Moderate: slope	Severe: slope.
Severe: bedrock at a depth of 10 to 40 inches.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness in places.	Severe: bedrock at a depth of 10 to 40 inches; channery surface layer; seasonal wetness in places.	Slight to moderate: seasonal wetness in places.	Slight to moderate: seasonal wetness in places.	Slight to severe: seasonal wetness in places.
Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.	Severe: slope; bedrock exposed or above a depth of 20 inches.
Slight	Severe: temporary seasonal wetness.	Severe: slow permeability.	Slight	Slight	Moderate: slow permeability.
Moderate: slope	Severe: temporary seasonal wetness.	Severe: slope	Moderate: slope	Slight	Moderate: slope; slow permeability.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
Brockport: Br	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; very slow permeability; seasonal wetness.
Burdett: BuA	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
BuB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
BuC	Severe: seasonal wetness.	Severe: slope; seasonal wetness.	Moderate: slope; seasonal wetness.	Severe: slow permeability; seasonal wetness.
BvA	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
BvB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
BvC	Severe: seasonal wetness.	Severe: slope; seasonal wetness.	Moderate: slope; seasonal wetness.	Severe: slow permeability; seasonal wetness.
BXB	Severe: seasonal wetness; extremely stony.	Severe: slope; seasonal wetness; extremely stony.	Moderate: slope; extremely stony; seasonal wetness.	Severe: slow permeability; seasonal wetness; extremely stony.
Carlisle: Ca	Severe: organic material; prolonged wetness; frequent ponding.	Severe: organic material; prolonged wetness; frequent ponding.	Severe: organic material; prolonged wetness.	Severe: subject to frequent ponding; prolonged wetness.
Cheektowaga: Ce	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: slow permeability; prolonged wetness.
Churchville: ChA	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: moderate shrink-swell potential; seasonal wetness.	Severe: slow permeability; seasonal wetness.

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Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Moderate: seasonal wetness; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; seasonal wetness.	Severe: seasonal wetness.	Severe: channery silt loam surface layer; seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; seasonal wetness.	Severe: seasonal wetness.	Severe: channery silt loam surface layer; seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; slope; seasonal wetness.	Severe: seasonal wetness.	Severe: slope; channery silt loam surface layer; seasonal wetness; slow permeability.	Moderate: slope; seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; channery silt loam surface layer; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; channery silt loam surface layer; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: channery silt loam surface layer; slope; seasonal wetness.	Severe: seasonal wetness.	Severe: slope; seasonal wetness; channery silt loam surface layer; slow permeability.	Moderate: slope; seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: extremely stony.	Severe: seasonal wetness; extremely stony.	Severe: slope; seasonal wetness; gravelly and extremely stony; slow permeability.	Moderate: slope; seasonal wetness; extremely stony.	Severe: extremely stony.	Severe: seasonal wetness.
Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: prolonged wetness; organic material.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness; frequent ponding.
Severe: prolonged wetness.	Severe: silty clay substratum; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: seasonal wetness; silty clay loam surface layer.	Severe: silty clay subsoil; seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness; silty clay loam surface layer.	Moderate: seasonal wetness; silty clay loam surface layer.	Severe: seasonal wetness.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
ChB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness; moderate shrink-swell potential.	Severe: slow permeability; seasonal wetness.
Claverack:				
ClA	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Moderate: subject to frost action.	Severe: very slow permeability in clayey substratum; temporary seasonal wetness.
ClB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Moderate: subject to frost action.	Severe: very slow permeability in clayey substratum; temporary seasonal wetness.
Colonie:				
CoA	Slight	Slight	Slight	Slight[2,3]
CoC	Moderate: slope	Moderate: slope. Severe in places.	Moderate: slope	Moderate:[2,3] slope
CPE	Severe: slope	Severe: slope	Severe: slope	Severe:[2] slope
Copake: Cr	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Darien:				
DaA	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
DaB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
DaC	Severe: seasonal wetness.	Severe: slope; seasonal wetness.	Moderate: slope; seasonal wetness.	Severe: slow permeability; seasonal wetness.
Elnora: En	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Moderate: subject to frost action.	Severe: temporary seasonal wetness.
Farmington:				
FaB	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe:[2] bedrock at a depth of 10 to 20 inches.
FBD	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; slope in places; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; slope in places; extremely rocky.	Severe:[2] bedrock at a depth of 10 to 20 inches; slope in places; extremely rocky.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Moderate: seasonal wetness; silty clay loam surface layer.	Severe: silty clay subsoil; seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness; silty clay loam surface layer.	Moderate: seasonal wetness; silty clay loam surface layer.	Severe: seasonal wetness.
Severe: loamy fine sand surface layer.	Severe: loamy fine sand surface layer and subsoil; clayey substratum; temporary wetness.	Moderate: loamy fine sand surface layer; temporary seasonal wetness.	Moderate: loamy fine sand surface layer; temporary seasonal wetness.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer; very slow permeability.
Severe: loamy fine sand surface layer.	Severe: loamy fine sand surface layer and subsoil; clayey substratum; temporary seasonal wetness.	Moderate: loamy fine sand surface layer; slope; temporary seasonal wetness.	Moderate: loamy fine sand surface layer; temporary seasonal wetness.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer; very slow permeability.
Severe: loamy fine sand surface layer and subsoil.	Severe: loamy fine sand subsoil; fine sand substratum.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.
Severe: loamy fine sand surface layer and subsoil.	Severe: loamy fine sand subsoil; fine sand substratum.	Moderate: slope; loamy fine sand surface layer.	Moderate: slope; loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: slope; loamy fine sand surface layer.
Severe: slope; loamy fine sand surface layer and subsoil.	Severe: slope; loamy fine sand subsoil; fine sand substratum.	Severe: slope ----	Severe: slope ----	Severe: slope ----	Severe: slope.
Moderate: subject to flooding.	Severe: subject to flooding.	Moderate: subject to flooding.	Moderate: subject to flooding.	Slight ----------	Severe: subject to flooding.
Moderate: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness; slow permeability.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: slope; seasonal wetness.	Severe: seasonal wetness.	Severe: slope; seasonal wetness; slow permeability.	Moderate: slope; seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: loamy fine sand surface layer.	Severe: loamy fine sand surface layer and subsoil; temporary seasonal wetness.	Moderate: loamy fine sand surface layer; temporary seasonal wetness.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Slight ----------	Slight ----------	Slight.
Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; slope in places; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: extremely rocky.	Severe: extremely rocky.	Severe: extremely rocky.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
Fluvaquents: FL	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.
Fonda: Fo	Severe: prolonged wetness; low strength.	Severe: prolonged wetness; low strength.	Severe: prolonged wetness; low strength.	Severe: very slow permeability; prolonged wetness.
Fredon: Fr	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness; subject to frost action.	Severe: prolonged wetness.
Granby: Gr	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: rapid permeability; prolonged wetness.
Hamlin: Ha	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Herkimer variant:[3] He	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Slight	Severe:[2] temporary seasonal wetness.
Hollis: HGC	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: slope; bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.
Hornell:				
HoA	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; very slow permeability; seasonal wetness.
HoB	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; very slow permeability; seasonal wetness.
HoC	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; slope; seasonal wetness.	Moderate: bedrock at a depth of 20 to 40 inches; slope; seasonal wetness.	Severe: bedrock at a depth of 20 to 40 inches; slow permeability; seasonal wetness.
Howard:[1]				
HrA	Slight	Slight	Slight	Slight:[2,3]
HrB	Slight	Moderate: slope	Slight	Slight[2]
HrC	Moderate: slope	Severe: slope	Moderate: slope	Moderate:[2] slope
HrD	Severe: slope	Severe: slope	Severe: slope	Severe:[2] slope

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Severe: prolonged wetness; subject to frequent flooding.	Severe: subject to frequent flooding; very gravelly in places; prolonged wetness.	Severe: prolonged wetness; subject to frequent flooding.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.
Severe: prolonged wetness.	Severe: clayey subsoil and substratum; prolonged wetness.	Severe: very slow permeability; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Severe: prolonged wetness; loamy fine sand surface layer.	Severe: subject to sloughing; prolonged wetness; loamy fine sand and fine sand throughout.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: subject to flooding.	Severe: subject to flooding.	Moderate: subject to flooding.	Moderate: subject to flooding.	Slight	Severe: subject to flooding.
Moderate: shaly surface layer.	Severe: very shaly subsoil and substratum.	Severe: shaly surface layer.	Slight	Slight	Moderate: temporary seasonal wetness.
Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: slope; bedrock at a depth of 10 to 20 inches; extremely rocky.	Severe: extremely rocky.	Severe: extremely rocky.	Severe: extremely rocky.
Moderate: seasonal wetness; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: very slow permeability; seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: very slow permeability; seasonal wetness.
Moderate: seasonal wetness; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: very slow permeability; seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: very slow permeability; seasonal wetness.
Moderate: slope; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; seasonal wetness.	Severe: slope; seasonal wetness; very slow permeability.	Moderate: slope; seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: gravelly surface layer.	Severe: very gravelly subsoil and substratum.	Severe: gravelly surface layer.	Slight	Slight	Slight.
Moderate: gravelly surface layer.	Severe: very gravelly subsoil and substratum.	Severe: gravelly surface layer.	Slight	Slight	Slight.
Moderate: slope; gravelly surface layer.	Severe: very gravelly subsoil and substratum.	Severe: slope; gravelly surface layer.	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope; very gravelly subsoil and substratum.	Severe: slope; gravelly surface layer.	Severe: slope	Moderate: slope	Severe: slope.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
HTF	Severe: slope	Severe: slope	Severe: slope	Severe:[2] slope
Hudson: HuB	Severe: temporary seasonal wetness; low strength.	Severe: temporary seasonal wetness; low strength.	Moderate: moderate shrink-swell potential; subject to frost action.	Severe: very slow permeability; temporary seasonal wetness.
HuC	Severe: temporary seasonal wetness; low strength.	Severe: slope; temporary seasonal wetness; low strength.	Moderate: slope; moderate shrink-swell potential; subject to frost action.	Severe: very slow permeability; temporary seasonal wetness.
HuD	Severe: slope; subject to landslides.	Severe: slope; subject to landslides.	Severe: slope; subject to landslides.	Severe: slope; very slow permeability; subject to landslides; temporary seasonal wetness.
HVF	Severe: slope; subject to landslides.	Severe: slope; subject to landslides.	Severe: slope; subject to landslides.	Severe: slope; very slow permeability; subject to landslides.
Ilion: IlA	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
IlB	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
InB	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
Joliet: Jo	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.
Junius: Ju	Severe: prolonged wetness.	Severe: prolonged wetness.	Moderate: prolonged wetness; subject to frost action.	Severe: prolonged wetness.
Lansing: LaB	Slight	Moderate: slope	Slight	Severe: moderate to slow permeability.
LaC	Moderate: slope	Severe: slope	Moderate: slope	Severe: moderate to slow permeability.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Severe: slope	Severe: slope; very gravelly subsoil and substratum.	Severe: slope; gravelly surface layer.	Severe: slope	Severe: slope	Severe: slope.
Moderate: silty clay loam surface layer.	Severe: silty clay subsoil and substratum; temporary seasonal wetness.	Severe: very slow permeability.	Moderate: silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Moderate: very slow permeability; silty clay loam surface layer.
Moderate: slope; silty clay loam surface layer.	Severe: silty clay subsoil and substratum; temporary seasonal wetness.	Severe: slope; very slow permeability.	Moderate: slope; silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Moderate: very slow permeability; slope; silty clay loam surface layer.
Severe: slope	Severe: slope; silty clay subsoil and substratum.	Severe: slope; very slow permeability.	Severe: slope	Moderate: slope; silty clay loam surface layer.	Severe: slope; subject to landslides.
Severe: slope	Severe: slope; silty clay subsoil and substratum; subject to landslides.	Severe: slope; very slow permeability.	Severe: slope	Severe: slope	Severe: slope; subject to landslides.
Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
Severe: very stony surface layer; prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: very slow permeability; prolonged wetness.
Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: bedrock at a depth of 10 to 20 inches; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Severe: prolonged wetness; loamy fine sand surface layer.	Severe: subject to sloughing; seasonal wetness; loamy fine sand surface layer.	Severe: prolonged wetness.	Severe: prolonged wetness.	Moderate: prolonged wetness.	Severe: prolonged wetness.
Slight	Slight	Moderate: moderate to slow permeability; slope.	Slight	Slight	Moderate: moderate to slow permeability.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope; moderate to slow permeability.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
LaD	Severe: slope	Severe: slope	Severe: slope	Severe: slope; moderate to slow permeability.
LMF	Severe: slope	Severe: slope	Severe: slope	Severe: slope; moderate to slow permeability.
Lordstown: LoA	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe:[2] bedrock at a depth of 20 to 40 inches.
LoB	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe:[2] bedrock at a depth of 20 to 40 inches.
LoC	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe:[2] bedrock at a depth of 20 to 40 inches.
LoD	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe:[2] bedrock at a depth of 20 to 40 inches; slope.
LRE	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: slope; extremely rocky.	Severe:[2] bedrock at a depth of 0 to 40 inches; slope; extremely rocky.
Madalin: Ma	Severe: prolonged wetness; low strength.	Severe: prolonged wetness; low strength.	Severe: prolonged wetness; low strength.	Severe: very slow permeability; prolonged wetness.
Madalin variant: Md	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.	Severe: prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; very slow permeability; prolonged wetness.
Made land: Mg. Not rated. Onsite investigation is needed.				
Manheim: MmA, MmB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Manlius: MnB	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe:[2] bedrock at a depth of 20 to 40 inches.
MoC	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Moderate: bedrock at a depth of 20 to 40 inches; slope.	Severe:[2] bedrock at a depth of 20 to 40 inches.
MoD	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe:[2] bedrock at a depth of 20 to 40 inches; slope.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Slight	Slight	Slight.
Moderate: gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Slight	Slight	Slight.
Moderate: slope; gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slope; gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: slope; gravelly surface layer; bedrock at a depth of 20 to 40 inches.	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope; extremely rocky.	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: slope; bedrock at a depth of 0 to 40 inches; extremely rocky.	Severe: slope; extremely rocky.	Severe: slope; extremely rocky.	Severe: slope; extremely rocky.
Severe: prolonged wetness.	Severe: silty clay subsoil and substratum; prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Severe: prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; silty clay subsoil; prolonged wetness.	Severe: prolonged wetness; bedrock at a depth of 20 to 40 inches.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: slope	Slight	Slight	Slight.
Moderate: slope; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: shaly surface layer; slope.	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: shaly surface layer; slope.	Severe: slope	Moderate: slope	Severe: slope.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
MPE	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: slope	Severe:[2] bedrock at a depth of 0 to 40 inches; slope; extremely rocky.
Mardin:				
MrB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Slight	Severe: very slow permeability; temporary seasonal wetness.
MrC	Severe: temporary seasonal wetness.	Severe: slope; temporary seasonal wetness.	Moderate: slope	Severe: very slow permeability; temporary seasonal wetness.
MrD	Severe: slope; temporary seasonal wetness.	Severe: slope; temporary seasonal wetness.	Severe: slope	Severe: slope; very slow permeability; temporary seasonal wetness.
Mohawk:				
MsB	Slight	Moderate: slope	Slight	Moderate: moderate permeability.
MsC	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope; moderate permeability.
MsD	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Mosherville: MtA, MtB	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Severe: slow permeability; seasonal wetness.
Nassau:				
NaB	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe:[2] bedrock at a depth of 10 to 20 inches.
NaD	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe: bedrock at a depth of 10 to 20 inches; slope.	Severe:[2] bedrock at a depth of 10 to 20 inches; slope.
Nellis:				
NeB	Slight	Moderate: slope	Slight	Severe: moderately slow permeability.
NeC	Moderate: slope	Severe: slope	Moderate: slope	Severe: moderately slow permeability.
NeD	Severe: slope	Severe: slope	Severe: slope	Severe: moderately slow permeability; slope.
Nunda:				
NuB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Slight	Severe: slow to very slow permeability; temporary seasonal wetness.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Severe: extremely rocky.	Severe: bedrock at a depth of 0 to 40 inches; slope; extremely rocky.	Severe: shaly surface layer; slope; extremely rocky.	Severe: slope; extremely rocky.	Severe: slope; extremely rocky.	Severe: slope; extremely rocky.
Moderate: gravelly surface layer.	Severe: temporary seasonal wetness; dense, thick fragipan.	Severe: gravelly surface layer; very slow permeability.	Slight	Slight	Moderate: very slow permeability.
Moderate: gravelly surface layer; slope.	Severe: temporary seasonal wetness; dense, thick fragipan.	Severe: gravelly surface layer; slope; very slow permeability.	Moderate: slope	Slight	Moderate: slope; very slow permeability.
Severe: slope	Severe: slope; temporary seasonal wetness; dense, thick fragipan.	Severe: gravelly surface layer; slope; very slow permeability.	Severe: slope	Moderate: slope	Severe: slope.
Slight	Slight	Moderate: slope	Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Moderate: seasonal wetness.	Severe: seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; shaly surface layer.	Slight	Slight	Slight.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; shaly surface layer; slope.	Moderate: slope	Slight	Moderate: slope.
Slight	Slight	Moderate: moderately slow permeability; slope.	Slight	Slight	Moderate: moderately slow permeability.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Moderate: channery silt loam surface layer.	Severe: temporary seasonal wetness.	Severe: slow to very slow permeability; channery silt loam surface layer.	Slight	Slight	Moderate: slow to very slow permeability.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
NuC	Severe: temporary seasonal wetness.	Severe: slope; temporary seasonal wetness.	Moderate: slope	Severe: slow to very slow permeability; temporary seasonal wetness.
NuD	Severe: slope; temporary seasonal wetness.	Severe: slope; temporary seasonal wetness.	Severe: slope	Severe: slope; slow to very slow permeability; temporary seasonal wetness.
NVF	Severe: slope	Severe: slope	Severe: slope	Severe: slope; slow to very slow permeability.
NWC	Severe: seasonal wetness in places; extremely stony.	Severe: slope; seasonal wetness in places; extremely stony.	Moderate: slope; extremely stony.	Severe: slope; slow to very slow permeability; extremely stony.
Odessa: OdB	Severe: seasonal wetness; low strength.	Severe: seasonal wetness; low strength.	Moderate: moderate shrink-swell potential; seasonal wetness.	Severe: very slow permeability; seasonal wetness.
Otisville: OtB	Slight	Moderate: slope	Slight	Slight [2]
Palatine:				
PaB	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe: [2] bedrock at a depth of 20 to 40 inches.
PaC	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Moderate: bedrock at a depth of 20 to 40 inches; slope.	Severe: [2] bedrock at a depth of 20 to 40 inches.
PaD	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe: [2] bedrock at a depth of 20 to 40 inches; slope.
Palms: Pb	Severe: organic material; prolonged wetness; frequent flooding.	Severe: organic material; prolonged wetness; frequent ponding.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.
Palmyra: [1]				
PmA	Slight	Slight	Slight	Slight [2]
PmB	Slight	Moderate: slope	Slight	Slight [2]
PmC	Moderate: slope	Severe: slope	Moderate: slope	Moderate: [2] slope
Phelps:				
PpA, PpB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Severe: subject to frost action.	Severe: temporary seasonal wetness.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Moderate: channery silt loam surface layer; slope.	Severe: temporary seasonal wetness.	Severe: slow to very slow permeability; channery silt loam surface layer.	Moderate: slope	Slight	Moderate: slow to very slow permeability; slope.
Severe: slope	Severe: slope; seasonal wetness in places.	Severe: slope; slow to very slow permeability.	Severe: slope	Moderate: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope; slow to very slow permeability.	Severe: slope	Severe: slope	Severe: slope.
Severe: extremely stony.	Severe: extremely stony.	Severe: slope; slow to very slow permeability; extremely stony.	Moderate: slope; extremely stony.	Severe: extremely stony.	Severe: extremely stony.
Moderate: seasonal wetness.	Severe: silty clay subsoil and substratum; seasonal wetness.	Severe: seasonal wetness.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: gravelly loamy sand surface layer.	Severe: very gravelly loamy sand subsoil and substratum.	Severe: gravelly loamy sand surface layer.	Moderate: gravelly loamy sand surface layer.	Moderate: gravelly loamy sand surface layer.	Moderate: gravelly loamy sand surface layer.
Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: slope	Slight	Slight	Slight.
Moderate: slope; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.	Severe: organic material; prolonged wetness.
Moderate: gravelly silt loam surface layer.	Severe: very gravelly substratum.	Severe: gravelly silt loam surface layer.	Slight	Slight	Slight.
Moderate: gravelly silt loam surface layer.	Severe: very gravelly substratum.	Severe: gravelly silt loam surface layer.	Slight	Slight	Slight.
Moderate: slope; gravelly silt loam surface layer.	Severe: very gravelly substratum.	Severe: slope; gravelly silt loam surface layer.	Moderate: slope	Slight	Moderate: slope.
Moderate: gravelly silt loam surface layer.	Severe: very gravelly subsoil and substratum; temporary seasonal wetness.	Severe: gravelly silt loam surface layer.	Slight	Slight	Slight.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
Pr	Severe: subject to flooding; temporary seasonal wetness.	Severe: subject to flooding; temporary seasonal wetness.	Severe: subject to flooding.	Severe: subject to flooding; temporary seasonal wetness.
Plainfield:				
PsA	Slight	Slight	Slight	Slight[2]
PsB	Slight	Moderate: slope	Slight	Slight[2]
Raynham:[1] Ra	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness; subject to frost action.	Severe: prolonged wetness; slow permeability.
Rhinebeck:				
RhA	Severe: seasonal wetness; low strength.	Severe: seasonal wetness; low strength.	Moderate: seasonal wetness; moderate shrink-swell potential.	Severe: very slow permeability; seasonal wetness.
RhB	Severe: seasonal wetness; low strength.	Severe: seasonal wetness; low strength.	Moderate: seasonal wetness; moderate shrink-swell potential.	Severe: slow permeability; seasonal wetness.
Rock outcrop: RLF	Severe: bare rock; slope.	Severe: slope; bare rock.	Severe: slope; bare rock.	Severe:[2] slope; bare rock.
Saprists and Aquents: Sa.	Severe: subject to flooding; prolonged wetness.	Severe: prolonged wetness; subject to flooding.	Severe: subject to flooding; prolonged wetness.	Severe: prolonged wetness; subject to flooding.
Scio:[1]				
ScA	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Severe: subject to frost action.	Severe: temporary seasonal wetness.
ScB	Severe: temporary seasonal wetness.	Severe: temporary seasonal wetness.	Severe: subject to frost action.	Severe: temporary seasonal wetness.
Sun: Su	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: slow permeability; prolonged wetness.
Teel: Te	Severe: subject to flooding; temporary seasonal wetness.	Severe: subject to flooding; temporary seasonal wetness.	Severe: subject to flooding.	Severe: subject to flooding; temporary seasonal wetness.
Tuller:				
Tu	Severe: bedrock at a depth of 10 to 20 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 20 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; seasonal wetness.
TvA	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Moderate: subject to flooding; gravelly loam surface layer.	Severe: subject to flooding; gravelly subsoil and substratum; temporary seasonal wetness.	Severe: gravelly loam surface layer.	Moderate: subject to flooding.	Slight	Severe: subject to flooding.
Severe: loamy sand surface layer.	Severe: sand subsoil and substratum.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
Severe: loamy sand surface layer.	Severe: sand subsoil and substratum.	Severe: slope	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.	Moderate: slope; loamy sand surface layer.
Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: seasonal wetness; silty clay loam surface layer.	Severe: silty clay subsoil and substratum; seasonal wetness.	Severe: seasonal wetness.	Moderate: prolonged wetness; silty clay loam surface layer.	Moderate: prolonged wetness; silty clay loam surface layer.	Severe: seasonal wetness.
Moderate: seasonal wetness; silty clay loam surface layer.	Severe: silty clay subsoil and substratum; seasonal wetness.	Severe: seasonal wetness.	Moderate: prolonged wetness; silty clay loam surface layer.	Moderate: prolonged wetness; silty clay loam surface layer.	Severe: seasonal wetness.
Severe: slope; bare rock.	Severe: slope; bare rock.	Severe: slope; bare rock.	Severe: slope; bare rock.	Severe: slope; bare rock.	Severe: slope; bare rock.
Severe: subject to flooding; prolonged wetness.	Severe: subject to flooding; prolonged wetness.	Severe: prolonged wetness; subject to flooding.	Severe: prolonged wetness; subject to flooding.	Severe: prolonged wetness.	Severe: prolonged wetness; subject to flooding.
Slight	Severe: temporary seasonal wetness.	Moderate: temporary seasonal wetness.	Slight	Slight	Slight.
Slight	Severe: temporary seasonal wetness.	Moderate: slope; temporary seasonal wetness.	Slight	Slight	Slight.
Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: subject to flooding.	Severe: subject to flooding; temporary seasonal wetness.	Moderate: subject to flooding.	Moderate: subject to flooding.	Slight	Severe: subject to flooding.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 20 inches; seasonal wetness; channery surface layer.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Severe: bedrock at a depth of 10 to 40 inches.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness; channery surface layer.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.

TABLE 8.—*Limitations of the soils for*

Soil series and map symbol	Community developments			
	Dwellings with basements	Shopping centers and small industrial buildings	Local roads and streets	Septic tank absorption fields
TvB	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches.	Severe: bedrock at a depth of 10 to 40 inches.
Unadilla:[1]				
UnB	Slight	Moderate: slope	Moderate: low strength; subject to frost action.	Slight[2]
UnC	Moderate: slope	Severe: slope	Moderate: low strength; subject to frost action.	Moderate:[2] slope
UnD	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Urban land:[4] UR	Slight	Slight	Slight	Slight[2,3]
Varick: VaA, VaB	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.	Severe: prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.
Wassaic:				
WaA, WaB	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; temporary seasonal wetness.
WaC	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Moderate: bedrock at a depth of 20 to 40 inches; slope.	Severe:[2] bedrock at a depth of 20 to 40 inches; temporary seasonal wetness.
Wayland: Wy	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness; slow permeability.

[1] Adjacent to streams and rivers, these soils may be subject to flooding during a high intensity storm or severe ice blockage.
[2] Hazard of pollution of water supply.

ders to clay. Some of these materials were later deposited directly by the ice in a heterogeneous mass called glacial till. Lansing, Mohawk, Darien, and Burdett soils in this survey area formed in glacial till.

As the glacial ice melted, the water carried and sorted enormous quantities of transported material. This material was redeposited in layers of sand and gravel as outwash plains and terraces. The sand and gravel pits in the counties are examples of these deposits. Howard soils formed in sandy and gravelly glacial outwash deposits.

Large quantities of finely ground rock were carried by melt water and were deposited in the quiet waters of glacial lakes and ponds. These particles were the size of silt and clay. Beds of silt and clay were left in many of these lakes and ponds when they were drained. Many beds of silt and clay were laid down in the large glacial lakes that formed when the Mohawk River Valley was blocked by ice. Hudson, Rhinebeck, Madalin, and Fonda soils formed in these lake-laid sediments.

In a few places in the northern part of the survey area, a windblown deposit of silt and very fine sand about 2 feet thick was laid down upon glacial till. The Broadalbin and Mosherville soils formed in these deposits.

After the ice disappeared and the surface of the area was exposed to the atmosphere, the soil-forming processes became active. The removal of glacial drift and its redeposition by stream continue as the existent streams build and alter their flood plains by dropping material in some places and washing it away in

town and country planning—Continued

Community developments—Continued		Recreational uses			
Lawns, landscaping, and golf fairways	Shallow excavations	Athletic fields	Picnic areas	Paths and trails	Camp areas
Severe: bedrock at a depth of 10 to 40 inches.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness.	Severe: bedrock at a depth of 10 to 40 inches; seasonal wetness; channery surface layer.	Moderate: seasonal wetness.	Moderate: seasonal wetness.	Severe: seasonal wetness.
Slight	Slight	Moderate: slope	Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Severe: loamy fine sand surface layer and subsoil.	Severe: loamy fine sand subsoil; fine sand substratum.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.	Moderate: loamy fine sand surface layer.
Severe: prolonged wetness.	Severe: bedrock at a depth of 20 to 40 inches; prolonged wetness.	Severe: prolonged wetness; bedrock at a depth of 20 to 40 inches.	Severe: prolonged wetness.	Severe: prolonged wetness.	Severe: prolonged wetness.
Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Slight	Slight	Slight.
Moderate: slope; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slope; bedrock at a depth of 20 to 40 inches.	Moderate: slope	Slight	Moderate: slope.
Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.	Severe: subject to frequent flooding; prolonged wetness.

[3] Limitation is severe if the seasonal high water table is within 3½ feet of the surface.

[4] Rating is for Colonie part of UR; Urban land part is used for homes and commercial and industrial developments.

others. Much of the material on the bottom lands of rivers and large creeks has been deposited so recently that little change has taken place in characteristics other than depositional layering. Hamlin and Teel soils are in recent alluvial deposits.

A few shallow ponds were created when the glacier receded. The remains of water-tolerant plants accumulated in these shallow waters. Carlisle and Palms soils formed in accumulations of muck.

Relief

Relief basically is the shape of the land surface and is commonly called the lay of the land. It is important in soil formation because of its influence on drainage, runoff, infiltration, and other related factors, including accelerated erosion. Slopes in the survey area range from nearly level to very steep. The valley of the Mohawk River is broad and U-shaped. Most of the valley wall rises abruptly for 200 to 300 feet to the gently rolling upland in Montgomery County. The uplands that are adjacent to Schoharie Creek and that extend into southern Schenectady County are more sloping and more dissected by streams. They are higher in elevation and range from 1,000 to 1,400 feet above sea level. The average elevation of most of the survey area ranges from 500 to 900 feet. On the uplands, the general features have been smoothed by glaciation. Thus, the landscape has smooth curves rather than sharp, abrupt features.

Runoff is more rapid on steep slopes than on more nearly level slopes. Thus, steep soils erode faster than more nearly level soils and are likely to be shallow and

have little profile development. Most soils in Montgomery and Schenectady Counties are nearly level or gently sloping. Runoff is slow to moderate, and the soils generally exhibit some evidence of wetness, 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 of time, the soils show considerable evidence of wetness. They have a dark-colored, thick surface layer that has high organic-matter content and a subsoil that has strong-gray mottles. Some soils, however, are wet because they have a high water table or because of their position on the landscape. Permeability of the soil material and the configuration of these level and gently sloping areas also influence the kind of soil that is formed. Soils formed in sloping or moderately steep areas where runoff is rapid are generally well drained and have a bright-colored, unmottled subsoil. They generally are leached to a greater depth than wetter soils in the same general area. Locally, the variations in the soils are largely the result of differences in parent material and relief.

Climate

The climate of Montgomery and Schenectady Counties is cool, humid, and continental, although it is tempered somewhat by oceanic influences. Winters are long and cold. Summers are short and mild. The average annual precipitation for the survey area ranges from 35 to 40 inches and is fairly evenly distributed throughout the year. Detailed information on climate is given in the section "Environmental factors affecting soil use."

Climate affects soil formation through its influence on chemical, physical, and biological processes. The chemical composition of the soil is altered in direct proportion to the amount of water passing through it. Leaching of soluble materials depends largely on the amount of rainfall. Freezing, thawing, and diurnal differences in temperature affect the physical weathering of rocks and soils. Temperature also affects biological activity. Decomposition of organic matter increases as the mean annual temperature increases. The climate throughout Montgomery and Schenectady Counties is fairly uniform, and differences in soils in the survey area are not directly attributable to differences in climate.

Plant and animal life

All living organisms in and on the soils influence soil formation. Organic matter from vegetation is generally responsible for the dark color of the surface layer and is a source of plant nutrients in the soil. Bacteria and fungi release plant nutrients by decomposing organic materials. Earthworms, small rodents, insects, and burrowing animals mix soil materials and help to keep the soil open and porous. Plant roots form channels in the soil that increase permeability. In Montgomery and Schenectady Counties, the native forests have had more influence on soil formation than other living organisms. The trees are mainly beech, sugar maple, red maple, white ash, red oak, birches, hickory, white pine, and hemlock.

By clearing the forests and cultivating the land, man has also greatly influenced the changes that occur in soils. He has added fertilizers, mixed some soil horizons, and even moved soil materials from place to place.

Time

Geologically, the soil materials of Montgomery and Schenectady Counties are young. The last glacier receded from the area about 10,000 to 15,000 years ago.

A considerable length of time is required for the factors of climate, plants and animals, and relief to bring about the changes in the parent material needed to form a soil. The youngest soils formed on the low bottom lands that are subject to overflow and that consequently may receive new sediment with each flood. These soils have weak structure and a weak color differentiation between horizons. An example is Hamlin soil. Soils that have well-developed horizons, such as the Howard soils, have been forming for a longer period of time.

Morphology

This section describes briefly the horizon nomenclature and the processes involved in horizon development.

The results of the soil-forming factors can be distinguished by the different layers, or soil horizons, seen in a soil profile. The soil profile extends from the surface downward to materials that are only slightly altered by the soil-forming processes.

Most soils contain three major horizons, called, A, B, and C (*9*). These major horizons may be further subdivided by the use of subscripts and letters to indicate changes within one horizon. An example would be the A2 horizon that represents a layer within the A horizon.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that has the largest accumulation of organic matter. The A horizon is also the layer that has maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, the horizon is called A2. In some soils in the survey area, the A2 horizon is brownish in color because of the oxidation of iron.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, the B horizon formed by alteration in place rather than from illuviation. The alteration may be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon is commonly blocky or prismatic in structure. It generally is firmer and lighter in color than the A1 horizon but darker in color than the C horizon.

The C horizon is below the A or B horizon. It consists of materials that are only slightly altered by the soil-forming processes but that may be modified by weathering.

The many processes involved in the formation of soil horizons in the soils of Montgomery and Schenectady

Counties include the accumulation of organic matter, the leaching of soluble salts, the reduction and translocation of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place throughout the profile, generally at the same time. They have been going on for thousands of years.

Organic matter accumulates when plant residue decomposes. This process darkens the surface layer and helps to form the A1 horizon. Once organic matter has been lost, it takes a long time to replace. The organic-matter content of the surface layer of the better drained soils averages about 3.5 percent. For the somewhat poorly drained to very poorly drained soils, the average is about 5.0 percent.

A subsoil, or B horizon, is present in most of the soils in Montgomery and Schenectady Counties. This horizon is distinct in some soils and hardly discernible in others. It is believed that some of the content of lime and other soluble salts is leached before translocation of iron and clay takes place. 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 profile.

Well drained and moderately well drained soils in Montgomery and Schenectady Counties have a yellowish-brown or strong-brown subsoil. These colors are mainly the result of thin coatings of iron oxides on sand and silt grains. However, in some soils, such as the Mohawk, Palatine, and Palmyra soils, the dark colors are inherited from the black shale which is a large part of the parent materials in which they formed. Weak to moderate subangular blocky structure has developed in many subsoils. These subsoils generally contain more clay than the overlying surface horizons.

The reduction and transfer of iron is associated mainly with the wetter, more poorly drained soils. This process is called gleying. Poorly drained to very poorly drained soils, such as Ilion, Madalin, and Fonda soils, have a subsoil and underlying material that are gray or grayish in color, indicating reduction and transfer of iron. Moderately well drained to somewhat poorly drained soils have yellowish-brown, strong-brown, and gray mottles, indicating the segregation of iron.

Fragipans developed in the subsoil of a few of the moderately well drained and somewhat poorly drained soils. These horizons are very firm and brittle when moist and hard when dry. Soil particles are tightly packed; therefore, bulk density is high, and pore space is low. Genesis of these horizons is not fully understood, but studies show that swelling and shrinking take place in alternating wet and dry periods. This might account for the tight packing of soil particles and also for a gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are most likely the cementing agents that cause brittleness and hardness.

Classification of Soils

Soils are classified so that their significant characteristics can be more easily remembered. Classification enables one to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help in understanding their behavior and their response to manipulation. First through classification, and then through use of soil maps, one can apply knowledge of soils to specific areas.

The narrow categories of classification, such as those used in detailed soil surveys, facilitate organization and application of knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison of large areas, such as countries and continents.

The current system of soil classification was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used in classification are soil properties that are observable and measurable. The properties are chosen so that the soils of similar genesis, or mode or origin, are grouped together. In table 9 the soil series of Montgomery and Schenectady Counties are placed in three categories of the current system (*7*). Classes of the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named by a word of three or four syllables ending in *sol* (Ent-i-sol).

SUBORDER: Each order is divided into suborders that are based mainly on those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range that is permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences that result from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* from Ent-i-sol).

GREAT GROUP: Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and others. The

names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquents (Hapl, meaning simple horizons, *aqu* for wetness or water, and *ent*, from Entisols).

SUBGROUP: Each great group is divided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of the 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 of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haplaquents (a typical Haplaquent).

FAMILY: Soil families are established within a subgroup mainly on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, clay composition, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, clay composition, and so on, that are used as family differentiae (see table 9). An example is the coarse-loamy, siliceous, acid, thermic family of Typic Haplaquents.

Environmental Factors Affecting Soil Use

This section provides general information on settlement, population, industry, transportation, and markets; farming; physiography and geology; drainage; water supply; and climate.

The survey area is 395,520 acres in size and is mainly smooth and gently rolling. In about 73 percent of the area slopes are less than 8 percent, and in nearly 15 percent they range from 8 to 15 percent. In the rest slopes are more than 15 percent and are dominantly more than 25 percent.

About 37 percent of the survey area is somewhat poorly drained, and 17 percent is poorly drained or very poorly drained. The rest is better drained.

Soils that formed in deep till deposits make up about 53 percent of the survey area, soils formed in till that is less than 40 inches deep to bedrock about 23 percent, soils formed in glacial outwash about 9 percent, soils formed in silt and clay deposited by still waters of glacial lakes about 8 percent, soils formed in alluvial material more than 4 percent, and soils formed in organic deposits less than 1 percent. The rest of the survey area has been altered by grading or mining.

Settlement and Development

German immigrants made the first permanent settlement in Montgomery County in 1723 at Stone Arabia. Canajoharie and Palatine were settled at about the same time. Prior to the American Revolution, Scottish and Irish immigrants arrived. After the Revolution, many New Englanders settled in the area, attracted by the confiscated land of Tories. Rapid settlement continued after the early wars, and population increased until about 1950. The population of Montgomery County was 45,699 in 1890; 59,142 in 1940; 59,594 in 1950; 57,240 in 1960; and 55,883 in 1970.

Schenectady County had a population of 160,979 in 1970. The population has decreased slightly during the past 20 years. The trend is toward a slight increase in rural population and a more pronounced decrease in urban population.

Montgomery County is essentially rural. Schenectady County is mainly industrial. Industry in the Mohawk Valley is sufficient to provide employment for many residents of both counties.

Amsterdam, the largest city in Montgomery County, had a population of 25,524 in 1970. Major industries include the manufacture of rugs, carpets, textiles, toy products, gloves, and electronic instruments. A large food-processing plant is in Canajoharie. Companies in the Fonda-Fultonville area manufacture gloves, aluminum products, and floor-cleaning appliances and products. A small plant at Glen manufactures scientific instruments. St. Johnsville has a textile mill and a dye works. Several sand and gravel companies and two limestone quarries are located in the county. A large construction firm maintains a headquarters and equipment depot at Fultonville. These and a few other smaller industries provide employment for many people.

Schenectady, the largest city in Schenectady County, had a population of 77,859 in 1970. The major industry is the General Electric Company, manufacturer of a wide range of electrical equipment. Their general offices, research laboratories, and broadcasting station are also located in the county. Other large industrial establishments include printing and bookbinding houses; lithographic plants; plants processing dairy products; and factories manufacturing cabinets, paints and varnishes, and building supplies.

The main east-west highway is the New York State Thruway, Interstate Route 90 in the national highway system. It connects Boston and Chicago and points west. Interchanges are located at Schenectady, Amsterdam, Fultonville, and Canajoharie. Other local highways provide a good network of roads.

Several railroads service Montgomery and Schenectady Counties and connect them with New York City, the New England States, Chicago, and points north. Passenger service has been curtailed drastically in recent years, but the volume of freight has increased. Many trucking firms provide service to the area, and bus transportation is available.

The New York State Barge Canal is an important waterway that follows the Mohawk River. It connects the Hudson River with the Finger Lakes Region of Central New York and the Great Lakes. Recreational use of this facility is increasing.

Businesses and industry in Montgomery and Schenectady Counties have access to world markets through the Ports of Albany and New York City. Nearby markets are available in the cities of Albany

TABLE 9.—*Classification of the soils*

Series	Family	Subgroup	Order
Alton	Loamy-skeletal, mixed, mesic	Dystric Eutrochrepts	Inceptisols.
Amenia	Coarse-loamy, mixed, mesic	Aquic Eutrochrepts	Inceptisols.
Angola	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Appleton	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Arnot[1]	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Broadalbin	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols.
Brockport	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Burdett	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols.
Cheektowaga	Sandy over clayey, mixed, mesic	Typic Haplaquolls	Mollisols.
Churchville	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Claverack	Sandy over clayey, mixed, nonacid, mesic	Aquic Udorthents	Entisols.
Colonie	Mixed, mesic	Alfic Udipsamments	Entisols.
Copake	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic	Dystric Eutrochrepts	Inceptisols.
Darien	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Elnora	Mixed, mesic	Aquic Udipsamments	Entisols.
Farmington	Loamy, mixed, mesic	Lithic Eutrochrepts	Inceptisols.
Fonda	Fine, illitic, nonacid, mesic	Mollic Haplaquepts	Inceptisols.
Fredon	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols.
Granby	Sandy, mixed, mesic	Typic Haplaquolls	Mollisols.
Hamlin	Coarse-silty, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols.
Herkimer variant	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Hollis	Loamy, mixed, mesic	Entic Lithic Haplorthods	Spodosols.
Hornell	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols.
Howard	Loamy-skeletal, mixed, mesic	Glossoboric Hapludalfs	Alfisols.
Hudson	Fine, illitic, mesic	Glossoboric Hapludalfs	Alfisols.
Ilion	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols.
Joliet	Loamy, mixed, mesic	Lithic Haplaquolls	Mollisols.
Junius	Mixed, mesic	Typic Psammaquents	Entisols.
Lansing	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols.
Lordstown	Coarse-loamy, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Madalin	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols.
Madalin variant	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols.
Manheim	Fine-loamy, mixed, mesic	Udollic Ochraqualfs	Alfisols.
Manlius	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Mardin	Coarse-loamy, mixed, mesic	Typic Fragiochrepts	Inceptisols.
Mohawk	Fine-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols.
Mosherville	Coarse-loamy, mixed, mesic	Aquic Fragiochrepts	Inceptisols.
Nassau	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Nellis	Coarse-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Nunda	Fine-loamy, mixed, mesic	Glossaquic Hapludalfs	Alfisols.
Odessa	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Otisville	Sandy-skeletal, mixed, mesic	Typic Udorthents	Entisols.
Palatine	Loamy-skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Palms	Loamy, mixed, euic, mesic	Terric Medisaprists	Histosols.
Palmyra	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Glossoboric Hapludalfs	Alfisols.
Phelps	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Glossaquic Hapludalfs	Alfisols.
Plainfield[2]	Mixed, mesic	Typic Udipsamments	Entisols.
Raynham	Coarse-silty, mixed, nonacid, mesic	Aeric Haplaquepts	Inceptisols.
Rhinebeck	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Scio	Coarse-silty, mixed, mesic	Aquic Dystrochrepts	Inceptisols.
Scriba	Coarse-loamy, mixed, mesic	Aeric Fragiaquepts	Inceptisols.
Sun	Coarse-loamy, mixed, nonacid, mesic	Aeric Haplaquepts	Inceptisols.
Teel	Coarse-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Tuller[3]	Loamy-skeletal, mixed, acid, mesic	Lithic Haplaquepts	Inceptisols.
Unadilla	Coarse-silty, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Varick	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols.
Wassaic	Fine-loamy, mixed, mesic	Glossoboric Hapludalfs	Alfisols.
Wayland	Fine-silty, mixed, nonacid, mesic	Mollic Fluvaquents	Entisols.

[1] These soils are taxadjuncts to the Arnot series, because they are 20 to 35 percent coarse fragments, rather than more than 35 percent as is defined as the range for the Arnot series.

[2] These soils are taxadjuncts to the Plainfield series, because they have higher reaction and dominantly lower values and chromas in the C horizon than is defined as the range for the series.

[3] These soils are taxadjuncts to the Tuller series, because they are 20 to 35 percent coarse fragments, rather than 35 percent as is defined as the range for the Tuller series.

and Troy to the east and Utica and Syracuse to the west.

Farm produce, such as fresh fruits, vegetables, and dairy products, is marketed locally for immediate use, shipped to other markets, or sent to local processing plants.

Farming

Indians once farmed the Mohawk Valley. Corn, beans, squash, and pumpkins, the chief crops, were grown mainly on the river flats.

Early settlers of the counties cleared small patches of soil and planted corn, wheat, potatoes, flax, and other such crops that were needed for food and clothing. Grain was the main crop until it became more profitable to grow that crop in the Great Plains region. As the importance of grain decreased, dairy farms increased. Today dairying is the main farm enterprise.

In 1969, the Census of Agriculture reported the following:

	Montgomery County	*Schenectady County*
Total farms (number)	735	274
Land in farms (acres)	161,303	34,522
Total cropland (acres)	118,122	21,098
Total cattle and calves (number)	37,690	3,994
Milk cows (number)	22,697	1,810

The importance of dairying in the counties, especially Montgomery, is reflected by the kinds of crops grown. In 1969 the main crops and their acreage were as follows:

	Montgomery County	*Schenectady County*
Field corn for grain (acres)	3,552	278
Field corn for silage (acres)	12,328	907
Hay (acres)	52,360	9,415
Vegetables (acres)	895	434

The long-term trend is toward a general decrease in the number of farms and an increase in the size of farms. In Montgomery County, for example, the average size of a farm in 1969 was 219 acres as compared to 198 acres in 1964, 179 acres in 1959, and 154 acres in 1954. Farms decreased in number from 1,074 in 1959, to 940 in 1964, to 735 in 1969. Of the 735 farm operators, 487 were full owners, 230 were part owners, and 18 were tenants.

Physiography and Geology [9]

Montgomery and Schenectady Counties lie within the Mohawk Valley physiographic province. The foothills of the Adirondack Mountains are to the north of the counties. The Helderberg Escarpment, the northern edge of the Allegheny Plateau, lies to the south. The Mohawk River transects Montgomery County in an east-west direction and extends through the northeast corner of Schenectady County.

Although the two counties are in a lowland physiographic province, relief is significant. The Mohawk River is entrenched in its valley. The band adjacent to the river is nearly level. Farther away from the river the topography becomes somewhat rolling. Elevation ranges from a low of 200 feet on the Mohawk River to a high of 1,450 feet in southern Montgomery County.

The bedrock in Schenectady County is mainly the Schenectady Formation of Ordovician age. This formation covers most of the county and is essentially shale that has interbedded sandstone lenses. Other minor bedrock outcrops in Schenectady County are the Canajoharie Shale located in the eastern part of the county and the Tribe Hill Formation of limestone and dolomite in the north-central part of the county.

The geology of Montgomery County is more complex, but the bedrock is mainly of Ordovician age. The southern quarter of the county is the Schenectady Formation of shale and interbedded sandstone and the Frankfort Formation of shale. The middle and upper parts of the county are Canajoharie Shale. In the rest of the county, generally in the northern part, are scattered and isolated formations, for example, the Little Falls Dolomite, the Tribes Hill Formation of limestone and dolomite, the Trenton Group of mainly limestone, Utica Shale, Cambrian age Potsdam Sandstone, and Precambrian age Lencogranite.

Several glacial advances and retreats occurred during the Pleistocene ice age in the two-county area. The glacial ice picked up soil material and pieces of bedrock with each southward movement; it ultimately redeposited a mixture of unconsolidated material of various sizes, shapes, and mineralogy. The last advance stripped earlier deposits and laid down the present mantle in which most of the soils formed.

The several modes of deposition that occurred either during or shortly after the glacial retreat gave rise to various types of materials. In the two counties three basic types of glacial materials were deposited: till, lacustrine or lake-laid materials, and outwash.

The main glacial deposit in the counties is glacial till, the material deposited beneath a moving glacier. The makeup of the till is influenced by local bedrock over which the glacier has moved and picked up rock particles. In this area extensive shale has contributed to the abundant, clay-rich soils. Some of the larger and more resistant particles found in both tills are of igneous and metamorphic origin. The more resistant particles originated in the Adirondack Mountains and were moved southward by the glacier. Lansing soils are examples of soils formed in till.

As the glacier retreated and melt water appeared, numerous lakes formed as a result of ice or drift material plugging melt-water channels. Most of these lakes were short-lived; others still exist. The largest lake in this area was Lake Albany, which extended into the southeastern part of Schenectady County. Mariaville Lake in Schenectady County is the largest of the Pleistocene lakes that have persisted to recent time (*6*). The two sources of material deposited in the lakes were the melting glacier and land erosion. Most of the lake deposits in this area are in the southeastern part of Schenectady County, the former site of glacial Lake Albany (fig. 14). The lacustrine deposits in this region are younger than the glacial till deposits. Therefore, till generally is found beneath the lacustrine deposits. Soils that formed on these deposits are fine grained.

[9] By BERNARD S. ELLIS, senior staff geologist, Soil Conservation Service, Syracuse, New York.

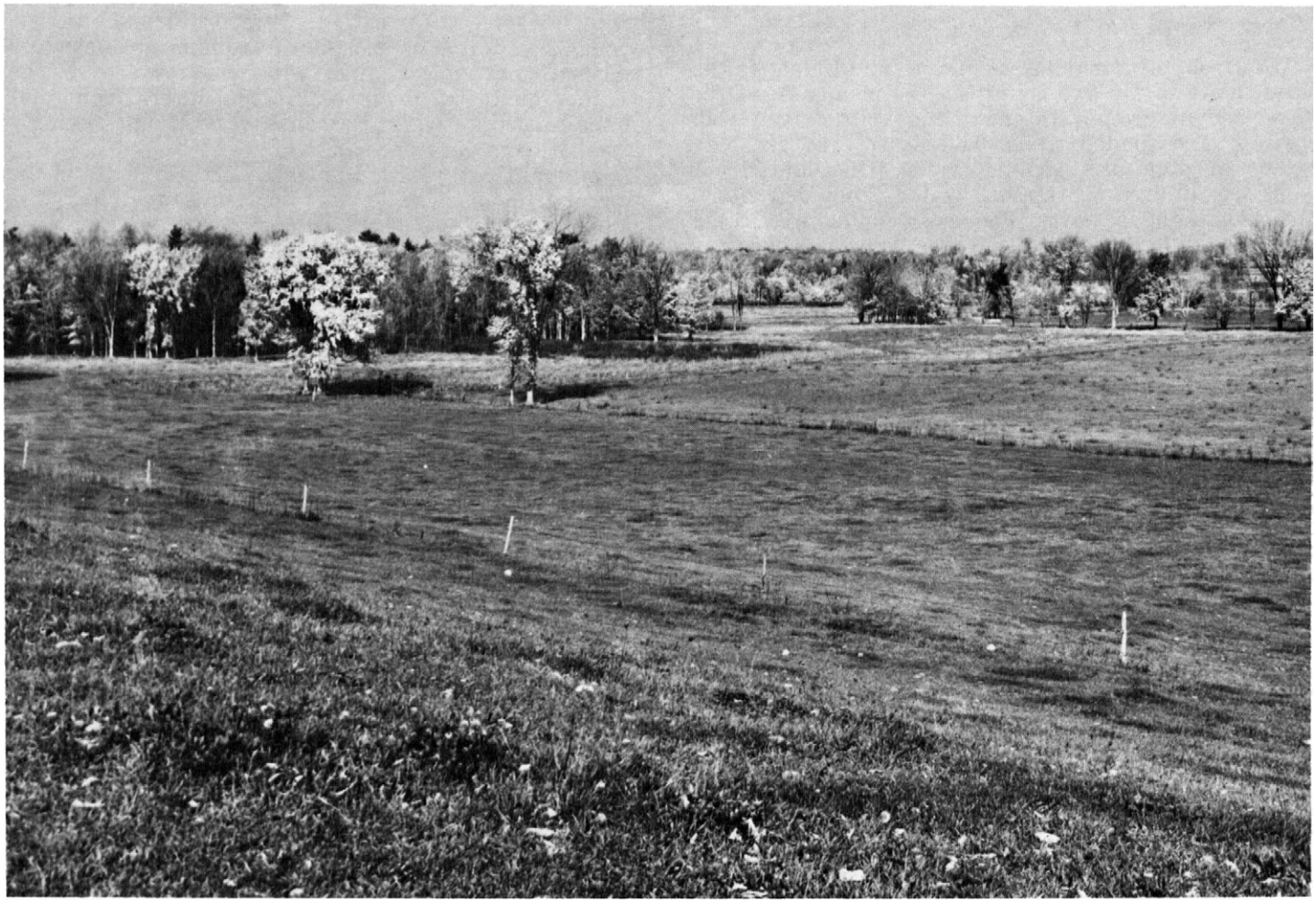

Figure 14.—View of Madalin, Fonda, and Ilion soils that formed in lake deposits of silt and clay.

Rhinebeck soils are examples of soils formed in lacustrine deposits.

The other glacial deposit in this area is outwash. Outwash deposits formed as a result of material washing out of a melting glacier. The main outwash deposit lies in the Mohawk River Valley. During the ice age the ancestral Mohawk River was much larger, and it drained the Great Lakes. Outwash deposits occur chiefly as scattered shoulders overlying till along both banks of the Mohawk River Valley and extending into some of the tributary valleys (*5*). Other scattered and isolated areas of outwash deposits are in areas south of the Mohawk River in Montgomery County. Generally, outwash deposits are stratified sand and gravel. Soils that formed in these deposits are coarse and well drained. Howard soils are examples.

Since the Wisconsin Glaciation, some recent deposits have formed. These deposits are on the flood plains of major streams and rivers, and they occur as fan deposits at the base of some hillsides. They are called alluvial deposits and were transported by water. Flood plain deposits are basically silt. This fine-grained material is deposited by overbank flow, away from the main channel, during periods of flooding. Coarser deposits are near the channel or in abandoned channels and in fan deposits where velocities are high. The source of this material is the underlying glacial deposits or is exposed bedrock. Hamlin soils are examples of soils formed in recent alluvial deposits.

Drainage

All of Montgomery County and most of Schenectady County are drained by the Mohawk River. Only a small area in eastern Schenectady County drains directly into the Hudson River. The Mohawk River joins the Hudson River at Cohoes. The main tributary to the Mohawk in this area is Schoharie Creek. It drains southern Montgomery County and flows north to its confluence with the Mohawk between Fonda and Amsterdam. Two types of stream patterns are prevalent in the two counties. The common pattern is dendritic, but in parts of Montgomery County some streams approach a trellis pattern. The shape of most of the stream valleys is broad, but some are young enough to be deeply incised.

Water Supply

Water supply for domestic, farm, and industrial use is adequate in the two counties. The means or sources of recovering ground water are dug wells, driven wells, springs, and drilled wells. The first three are older means of obtaining ground water. Dug and driven wells are limited to tapping water from deposits of unconsolidated material. The most common source of water today is drilled wells. These wells can penetrate into bedrock reservoirs, as well as into unconsolidated deposits.

Water quality in the two counties is generally suitable for domestic, farm, and industrial use. Two characteristics common in measuring water quality are the concentration of dissolved solids and hardness. The measurement is expressed as parts per million (ppm).

In Montgomery County, most of the bedrock reservoirs have a concentration of dissolved solids that is less than 1,000 ppm (the objectionable limit). Sand and gravel have less than 750 ppm. In Schenectady County the concentrations of dissolved solids are less than 1,000 ppm for bedrock and less than 500 ppm for sand and gravel deposits.

The objectionable limit for water hardness is any amount greater than 220 ppm. Beyond this limit water generally needs to be treated for domestic and industrial use. The overall degree of water hardness in Montgomery County is considered to be very high; in Schenectady County it is considerably lower. Water hardness in Montgomery County is attributed to large deposits of limestone and dolomite bedrock.

The greatest quantities of ground water are found in Pleistocene outwash deposits and in extensively jointed and bedded rock. Outwash deposits are limited to locations in the Mohawk Valley and to some isolated areas. Fine-grained till, lacustrine, and recent alluvial deposits yield low quantities of ground water, and they are generally avoided. The sandy deltaic deposits near Schenectady, however, yield appreciable quantities of water.

In Montgomery County the greatest yield of ground water comes from Pleistocene outwash deposits. The most extensive source is the Schenectady Formation.

Climate [10]

The climate of Schenectady and Montgomery Counties is humid continental. Air masses of moderate maritime characteristics occasionally flow into southeastern New York State and affect the eastern Mohawk Valley. Currents in the upper atmosphere transport considerable moisture, resulting in much cloudiness and humidity.

The counties are affected by most weather systems in their normal movement toward the northeastern United States. The favored tracks of storms are (1) through the St. Lawrence Valley, (2) across the middle latitudes of the country, and (3) parallel to the east coast. Each track is close enough to the region to bring a variety of weather. Temperature, humidity, winds, and other atmospheric conditions normally undergo noticeable change within a few days. The weather during a given week often differs from that of the preceding week. Seasonal weather is commonly variable from year to year.

The main geographic influence on the climate is the long, north-south valley of the Hudson River. The modifying influence of the Atlantic Ocean on the lower atmosphere is felt well into the northern and eastern reaches of the Mohawk Valley. The Adirondack Plateau to the north tends to shield the counties from strong, chilling, northwest winds in winter. Because of distance, the Great Lakes, Erie and Ontario, have little influence on the weather and climate. Topography and elevation result in some variations of climate within the two counties, but their effects are less pronounced than in other regions of New York State.

Winters are generally long and cold with an occasional season that is severe in terms of low temperatures, heavy snowfall, or both. Below-zero temperatures occur on about 10 to 20 days in winter over the two-county area. Extreme minimum temperatures of −25° to −28° F have been recorded. In most seasons the coldest temperature ranges from −5° to −15° in the Schenectady area. A somewhat colder range is likely in western Montgomery County. Temperature and precipitation data are shown in table 10.

Summers are warm. Occasional periods of as much as a week of rather hot, humid weather are generally terminated by refreshing outbreaks of cool, much drier air from the west or northwest. Temperatures of 90° F or higher occur on an average of 8 to 12 days per year, mostly between early June and late August. Maximum daytime temperatures in summer range mostly from the upper 70's to the mid 80's.

The freeze-free season averages about 140 days in parts of western Montgomery County and is approximately 165 days in the Schenectady County. The last freezing temperature in spring generally occurs between May 10 and 15 over most of the two counties, and the first occurrence in fall generally varies from about October 1 in the west to about October 10 in the east.

Annual precipitation averages 35 to 38 inches throughout most of the two-county area, but the western and northern fringe of Montgomery County may have as much as nearly 40 inches. During a period of a half century, annual precipitation has ranged from extremes of 25 to more than 50 inches. Rainfall during May to September growing season varies from about 17 to 19 inches in the two counties; the distribution of this rainfall is generally adequate for agriculture and maintenance of water resources. Serious droughts are rare, but in most growing seasons crop moisture is deficient for temporary periods.

Total seasonal snowfall averages 60 to 65 inches over much of Schenectady and Montgomery Counties. However, the average total ranges from about 55 inches in the Canajoharie-Fonda area to more than 70 inches in the extreme western part of Montgomery County. In rare winters the snow accumulation may be as light as 40 inches or in excess of 100 inches.

[10] By A. Boyd Pack, senior research associate, Division of Atmospheric Sciences, Department of Agronomy, Cornell University, Ithaca, New York.

TABLE 10.—*Temperature and precipitation*

[Data recorded at Schenectady, Schenectady County, New York]

Month	Temperature				Precipitation				
			7 years in 10 will have:			3 years in 10 will have:		Snow	
	Average daily maximum	Average daily minimum	Maximum equal to or higher than—	Minimum equal to or lower than—	Average total	More than—	Less than—	Average monthly total	7 years in 10 will have more than—
	°F	°F	°F	°F	In	In	In	In	In
January	31	15	44	−2	2.5	3.1	2.0	15	10
February	32	16	47	−2	2.3	2.8	1.8	16	11
March	41	26	60	15	2.8	3.0	2.2	11	4
April	55	37	75	28	3.0	3.3	2.4	2	[1] 3
May	69	49	84	36	3.3	3.9	2.5	0	--
June	78	58	90	46	3.8	4.6	3.4	0	--
July	84	64	92	53	3.5	4.2	2.5	0	--
August	80	61	89	50	3.4	3.9	2.5	0	--
September	71	53	86	39	3.3	4.3	2.2	0	--
October	59	42	76	30	2.7	3.1	1.9	([2])	--
November	45	32	61	22	2.9	3.9	1.8	5	[3] 2
December	33	21	49	4	2.7	3.0	2.0	14	7
Year	57	39	94	−7	36.2	37.7	34.7	63	54

[1] One year in ten.
[2] Trace.
[3] Five years in ten.

Monthly amounts of 10 to 20 inches are common in December, January, and February. Snow cover is typical from about mid-December to early in March. Maximum depth is generally noted in February.

The amount of sunshine possible ranges from an average of 35 to 40 percent in November and December to 60 to 65 percent in summer.

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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 a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

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

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. Mineral or rock particles more than 2 millimeters in diameter.

Coarse textured soils. Sand and 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 a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

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

Cemented.—Hard 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 of close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cut and fill land. An area in which the original soil is stripped anud removed or is covered with 3 feet or more of soil material. In this survey area, cut and fill land occurs where flooding is a problem.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation 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 available water 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 and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

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 material deposited by glaciers and by streams and lakes associated with them.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fine textured soils. Sandy clay, silty clay, and 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 content 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. 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.

Low strength. Inadequate strength for supporting loads.

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

Moderately coarse textured soils. Sandy loam and fine sandy loam.

Moderately fine textured soils. Clay loam, sandy clay loam, and silty clay loam.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil and carbon, hydrogen, and oxygen, obtained largely from the air and water, are plant nutrients.

Permeability. The quality that enables the soil 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.*

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. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strong acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

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

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

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 milli-

meter); *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).

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 wind 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 either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

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

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

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.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Variant, soil. A soil having properties sufficiently different from those of 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.

Varves. Distinctly marked annual deposits of sediment, regardless of their origin.

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.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

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