United States Department of Agriculture

Soil Conservation Service

In cooperation with Massachusetts Agricultural Experiment Station

Soil Survey of Norfolk and Suffolk Counties, Massachusetts

How To Use This Soil Survey

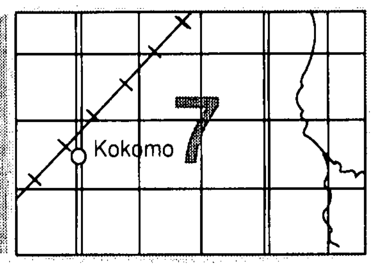
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

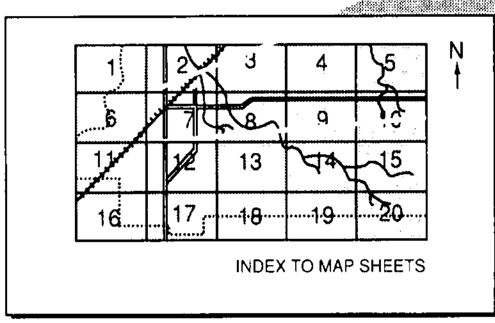
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



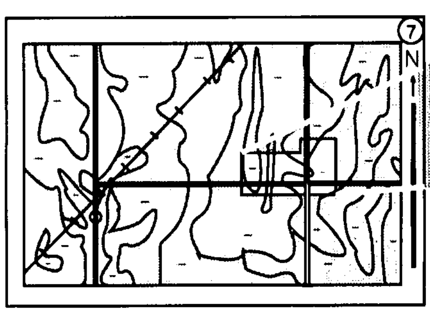
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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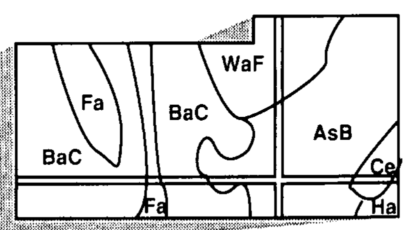

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

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

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the Massachusetts Agricultural Experiment Station.The survey is part of the technical assistance furnished to the Norfolk Conservation District and the Suffolk Conservation District.

This soil survey supersedes the Norfolk County part of the soil survey of Norfolk, Bristol, and Barnstable Counties published in 1920.

Cover: Boston skyline from one of the Harbor Islands. Newport soils are on the island in the middleground, and Merrimac soils are on the island in the foreground.

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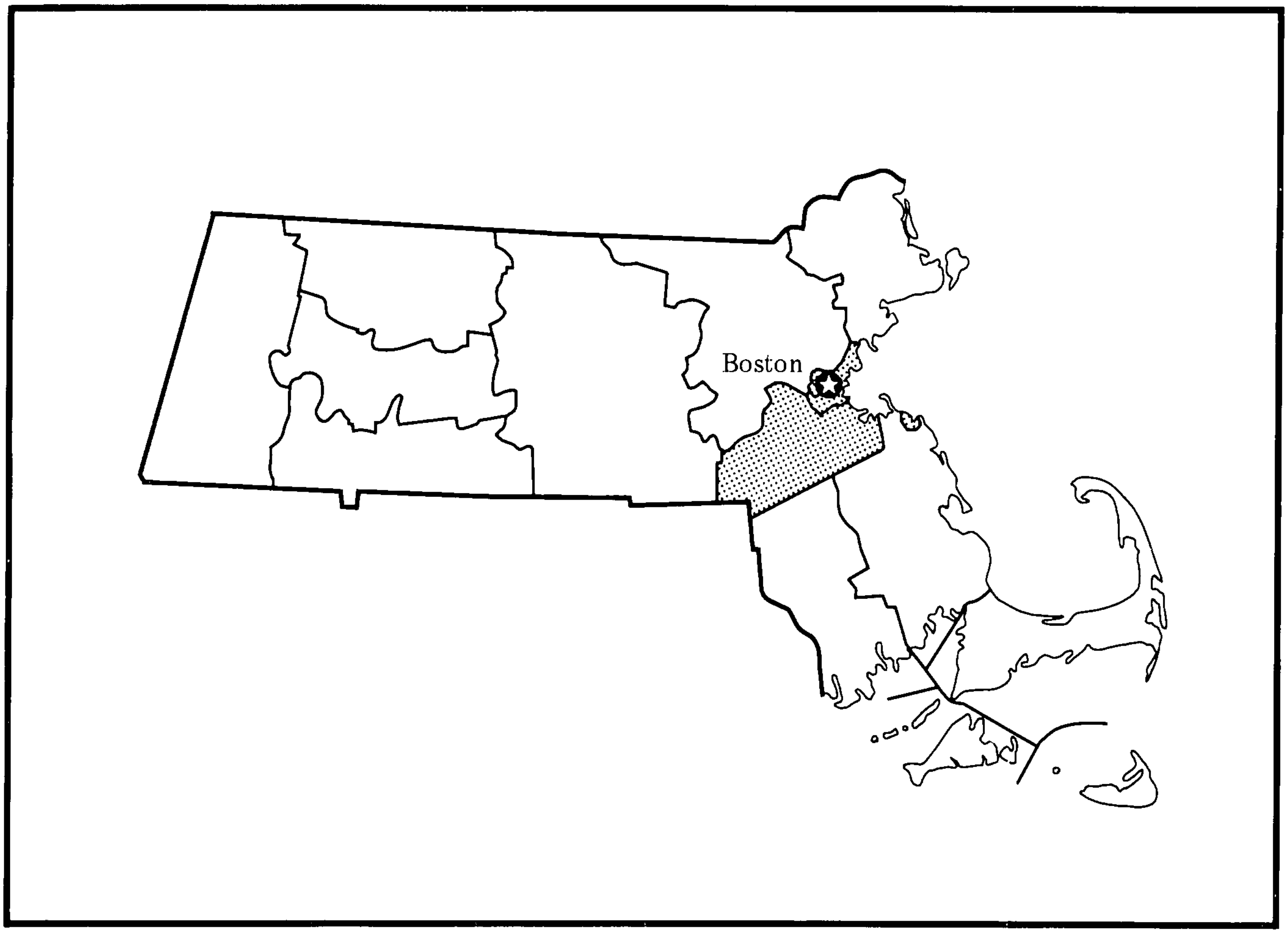
Preface

This soil survey contains information that can be used in land-planning programs in Norfolk and Suffolk Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Location of Norfolk and Suffolk Counties in Massachusetts.

Soil Survey of Norfolk and Suffolk Counties, Massachusetts

By Thomas A. Peragallo, Soil Conservation Service

Fieldwork by Thomas A. Peragallo, Denise M. Frappier, Peter C. Fletcher, and Lisa A. Neffinger, Soil Conservation Service

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

Norfolk and Suffolk Counties are in the east-central part of Massachusetts. They are bordered on the east by Massachusetts Bay, on the north by Essex and Middlesex Counties, on the west by Worcester County, and on the south by Bristol and Plymouth Counties and the State of Rhode Island. The survey area consists of 32 towns covering 289,550 acres, or 452 square miles. The town of Cohasset is separated from the rest of Norfolk County by the town of Hingham, a part of Plymouth County.

The area of this soil survey is, by far, the most densely populated area in the state. In 1980 the total population of the two-county area was 1,256,729. The population per square mile was, on average, about 2,780 (*25*).

The survey area is about 35 percent urban. Its economy is led by high technology industry and commerce. Most farms are in the less urbanized, western part of the survey area, but a few farms are scattered throughout Norfolk County.

In the past 20 years the trend in land use has been the conversion of woodland, cropland, and pastureland to urban and industrial uses. The leading land use throughout the survey area is as construction sites of single family homes for a largely commuting work force. Industrial development extends outward from the major cities and along the major highways. In most towns large tracts of land have been zoned specifically for industrial development.

As this trend in land use is expected to continue, both preservationists and developers will likely place increasing pressure on the land. This soil survey is designed to meet the needs of growing communities by providing much of the necessary land base data for making wise land use decisions.

Soil scientists have determined that there are about 76 different kinds of soils in the survey area. The soils range widely in texture, drainage, depth, and other characteristics. The soils on uplands are generally sloping, well drained, and loamy throughout. Slow permeability and slope are the major limitations to use of these soils. The soils in valleys are generally nearly level or gently sloping, well drained, and sandy or loamy. The seasonal high water table is the major limitation to use of the soils in low-lying valleys and those along the coastal plain.

This soil survey supersedes the soil survey of Norfolk County included in the Soil Survey of Norfolk, Bristol, and Barnstable Counties published in 1920 (*22*). This survey updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

Some of the boundaries on the soil maps of this survey area do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of improvements in the classification of soils, particularly modification or refinements in soil series concepts. Also there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

General Nature of the Survey Area

This section gives general information about the cultural and natural factors that affect the use and characteristics of the soils in the survey area.

History and Development

When Europeans settled the area now known as Norfolk and Suffolk Counties, the native inhabitants were Algonkian Indians. Known as the Massachusetts people, they included the tribes of the Wampanoags and the Pennacooks (*21*). By the time the Pilgrims had arrived in Plymouth, in 1620, epidemics had substantially reduced the Indian population. The early colonists acquired from the Indians many new foods and new methods of hunting, fishing, planting, and cooking.

Some influential Puritans invested in the Massachusetts Bay Company, chartered in 1629. By authority of the King of England, the company established the Massachusetts Bay Colony in 1630. The colony extended 3 miles north of the Merrimack River and 3 miles south of the Charles River. Its governor was John Winthrop, and its center was Boston. By 1640 the colony was a success, and its population of about 20,000 was dispersed throughout Boston and the neighboring towns.

The Puritans achieved an ideal Christian community for about 50 years. In 1684, however, the company's charter was revoked. The colony then merged with other colonies located between present-day areas of New Hampshire and New Jersey. Thus, the Dominion of New England was formed and in 1691 became the unified royal colony, or Province of Massachusetts, which included Maine and Plymouth Colony.

As trade in Norfolk and Suffolk Counties prospered during the 1700's, the British Crown saw an opportunity to raise revenue by levying new taxes and imposing new regulations on the colonies. The levies were the Stamp Act of 1764, the Townshend Act of 1766, and the Tea Act of 1773. These caused the Boston Tea Party in 1773 and the Boston Massacre in 1770. Relations between the colonists in the Province of Massachusetts and the British Crown continued to deteriorate. On April 19, 1775, the American Revolution began. On June 17, 1775, the first major battle of the American Revolution, known as the Battle of Bunker Hill (Breed's Hill), was fought in Charlestown.

By the late 1700's, in the Norfolk and Suffolk Counties area, the economic base had started to slowly change from agriculture to industry. About this time the area's shoreline, especially in Boston, began to be changed by landfilling. The earliest landfilling operations probably began on Boston Neck. There, a causeway built over the tidal marsh connected Boston proper (originally Tremont Island) to Roxbury on the mainland (*10, 30*).

The textile industry began to expand rapidly in the 1830's and shipping climaxed in the 1850's during the age of the clipper ships. As agriculture declined, farmers found jobs in factories or migrated west. Beginning in 1840, waves of Irish and other European immigrants joined the labor markets of major cities.

Landfilling operations expanded as industry developed, and the area's numerous islands, peninsulas, marshes, and beaches became large single land masses. By 1895, extensive filling had created Back Bay, South End, and other areas in Boston.

After the Civil War, shipping declined, but manufacturing increased, fostered by continued immigration and the expansion of the railroad (*14*).

By 1910, Massachusetts, especially the Boston area, had become industrialized. By 1920 immigrants made up 67 percent of the population of the Boston area (*1*). Since then, both the population and industrial technology have continued to grow in Norfolk and Suffolk Counties. The emphasis in industry has changed from textiles to electronics.

Historic Boston can be experienced in a 1½-mile walk called the Freedom Trail. The sites along the way include Boston Common, used as a training ground for Revolutionary Militia; the Old Granary Burying Ground, with the graves of John Hancock, Samuel Adams, and Paul Revere; and the Old State House, site of the Boston Massacre. Other stops on the Freedom Trail include the Old South Meeting House, the site of the Boston Tea Party, the Paul Revere House, Bunker Hill, the U.S.S. Constitution, and more. Nearby in Dedham stands one of the oldest wood-frame buildings in the United States, the Fairbanks House, built in 1636. The Adams National Historic Site, the birthplace of Presidents John Adams and John Quincy Adams, is in nearby Quincy (*20*).

Agriculture in Norfolk County

Carole S. Litchfield, district conservationist, helped to write this section.

Agriculture first became established in Norfolk

County in the 1630's. Early farmers settled in the village of Dedham and gradually ventured out to settle in new towns to the south and west.

During that time, wheat grown in Norfolk County was transported to Maryland and sold to its new settlers. A successful cattle industry produced a great surplus of beef during the 1640's. Most of the land in Norfolk County was explored and used by farmers for new pasture.

From 1675 to 1677, agriculture suffered temporary setbacks during and after King Philip's War. As late as 1687, settlers were concerned about having clear title to land purchased from the Indians (*11*).

During the next 100 years, agriculture prospered in Norfolk County. Most farmers raised sheep and cattle, and rye and corn were the main crops. Many apple orchards were also planted. Sheep were raised for wool and milk cows for milk, cream, butter, and cheese. Dairy products of the county were transported to Boston and sold at Faneuil Hall Market.

By the early 1800's, farmers were planting more oats because of the new demand for oat straw. Factory workers in Foxborough, Franklin, Wrentham, Norfolk, and Plainville used the straw in manufacturing braided straw bonnets.

In the early 1900's, farmers continued to raise hay and corn for their cattle, and the dairy industry was still thriving. Poultry farming had increased.

The changes that occurred at the close of the 19th century were relatively minor compared to those that followed World War II. The rural towns of Norfolk County gradually became bedroom communities for thousands of people who commuted to work in Boston and in Providence. This urbanization is a continuing trend.

Education and Culture

Public education was pioneered in the Boston area. The first public secondary school in the United States, the Boston Latin School (1635), and the first college, Harvard (1636), were established in the area. The first vocational school was opened in 1821, and the first high school for girls was founded in 1826. Some of the leading colleges and universities in the world today are located in Norfolk and Suffolk Counties. They include Harvard University, Massachusetts Institute of Technology, Boston University, Boston College, Wellesley College, and numerous other state and private colleges and universities.

Music has been an important cultural institution in Norfolk and Suffolk Counties. Boston is the home of the Handel and Haydn Society of Boston (established in 1815), the Boston Symphony Orchestra, Boston Pops Orchestra, and New England Conservatory of Music. The Boston Museum of Fine Arts, Boston Children's Museum, and the New England Aquarium are also in Boston. The Arnold Arboretum, near Brookline, has a world famous collection of lilacs and other plants.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Moderate summers, moderately cold winters, and ample, fairly evenly distributed precipitation characterize the climate of Norfolk and Suffolk Counties. At a latitude of 42 degrees, the survey area is in the zone of prevailing west to east atmospheric flow. It is also in the path of north polar wind or south tropical wind. These factors result in varied and changeable weather.

The survey area is also situated on or near several tracks frequently followed by low pressure systems, which bring a dependable supply of precipitation. Coastal storms, or northeasters, bring abundant rain or snow. In coastal areas, temperature extremes in winter and summer are moderated by the Atlantic Ocean. In addition, a refreshing east wind, or sea breeze, is common along the shore.

In the Blue Hills, the elevation is as much as 635 feet. These hills have relatively lower temperatures, more precipitation, higher winds, more frequent occurrences of fog, and longer periods of snow cover than the surrounding terrain.

In highly urban and built-up areas the temperature is noticeably varied. The vast amounts of asphalt and the concrete and masonry structures absorb and store heat. Consequently, in summer nighttime readings are warmer than in the western suburbs and rural areas. Urban temperatures may be warmer by as much as 5 to 10 degrees.

Table 1 gives data on temperature and precipitation for the survey area as recorded at West Medway in the period 1957-81. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 27 degrees F, and the average daily minimum temperature is 15 degrees. The lowest temperature on record, which occurred at West Medway on January 18, 1957, is -25 degrees. In summer the average temperature is 69 degrees, and the average daily maximum temperature is 81 degrees. The highest recorded temperature, which occurred on August 3, 1975, is 104 degrees.

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

The total annual precipitation is more than 45 inches. Of this, 21 inches, or about 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 17 inches. The heaviest 1-day rainfall during the period of record was 4.75 inches at West Medway on September 12, 1960. Thunderstorms occur on about 19 days each year, and most occur in summer.

The average seasonal snowfall is about 46 inches. The greatest snow depth at any one time during the period of record was 36 inches. On the average, 43 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 20 percent. The sun shines 65 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 14 miles per hour, in spring.

Winter storms moving northeastward along the coast frequently bring rain and thawing and then more snow and cold weather. In summer sea breezes frequently moderate the temperature, particularly near the coast.

The high amount of precipitation is the primary climatic factor influencing soil development in the survey area. The water moving through the generally coarse textured soils leaches many soluble minerals, such as calcium, iron, and manganese. This leaching process concentrates the hydrogen ions in the soil and thus lowers the pH (more acid). In leaching, the water also moves the finer soil particles vertically through the soil.

In unvegetated areas heavy prolonged rainfall causes gullying and sheet erosion. Seepage and slippage during the wet season are common on Paxton, Montauk, and Newport soils. In Pittstown, Scituate, and Woodbridge soils, which are normally dry during most parts of the year, the perched seasonal high water table saturates the upper 2 to 3 feet during the wet season.

Physiography, Relief, and Drainage

Norfolk and Suffolk Counties lie within the Lower New England Physiographic Province. Two physiographic subregions characterize the area: the Coastal Hills and the Boston Basin. The Coastal Hills, or the Eastern Plateau, cover most of the survey area. The northeastern part of the survey area is in the Boston Basin.

The Coastal Hills are gently rolling and have low relief with very subtle breaks between major landforms. Most of these hills are less than 400 feet above sea level. The exceptions are the Blue Hills, which reach an elevation of 635 feet on Great Blue Hill, the highest point in the survey area.

The topography of the Coastal Hills is diverse. Where rock outcrops are numerous, the irregular configuration of the bedrock determines the shape of valleys. On drumlins, the deposits themselves determine the shape of landforms.

The Boston Basin ranges in elevation from sea level to about 150 feet. It is characterized by a relatively smooth plain with about 100 round and oval hills, called drumlins, that rise sharply above the plain. It also includes several islands and peninsulas in Boston, Dorchester, and Quincy Bays. Many of the islands have steep cliffs where the ocean has eroded the sides of hills.

The Boston Basin is highly urbanized and has a long history of land reclamation. There, large areas of tidal marshes, bays, and estuaries have been artificially filled. The extent and shape of the original coastline have been greatly obscured (*14, 30*).

Major streams are fed by numerous smaller ones that have an irregular, unsystematic pattern, a common feature of glaciated land. Also, isolated ponds and swamps are numerous.

Two major streams and several minor ones drain the survey area. The Charles River is in the north and western part of the survey area, and the Neponset River is in the central part. The rivers meander slowly through broad valleys and empty directly into Boston Harbor and Dorchester Bay. The extreme eastern edge of Norfolk County is drained by the Weymouth Fore and Back Rivers, which flow into Quincy Bay. A narrow strip along the southern edge of Norfolk County is drained by tributaries to the Taunton River. The southwest corner of Norfolk County is drained by tributaries to the Blackstone River, which flows south to Narragansett Bay. All the principal streams reaching the sea have estuaries into which the tide penetrates for several miles. Generally, drainage is northeasterly.

Geology

Rudy Chlanda, geologist, Soil Conservation Service, helped to write this section.

The maps of both the bedrock geology and the surficial geology of the survey area are at the back of this publication. The maps show a great diversity of bedrock and surficial geology in Norfolk and Suffolk Counties. As in all of New England, the geologic history of the survey area shows repeated advances of thick glacial ice. These advances caused complex deformations of the earth's crust. In addition, glacial erosion and deposition caused the present topography.

The progressing ice scoured the existing bedrock surface, deepening and widening valleys. These were infilled with a veneer of glacial till, glacial outwash, or both, from meltwater streams. In bedrock highlands, different thicknesses of glacial till were deposited. In some places bedrock is exposed and in others deposits of till are as much as 150 feet deep.

The survey area can be divided into two geologic regions, the Boston Basin and the Eastern Plateau. The Boston Basin extends eastward from the Eastern Plateau. Areas 1, 2, and 3 on the Bedrock Geology Map at the back of this publication show that underlying the surficial deposits and fill in the Boston Basin are folded and faulted sedimentary and volcanic rocks (*27*).

The Boston Basin is the result of preferential glacial erosion of softer rocks. It has the characteristics of a glacial outwash plain. Distinct drumlins rise 100 to 200 feet above the plain. The plain drops below sea level as it extends eastward, leaving the drumlins and moraines slightly above sea level to form the Boston Harbor Islands (*15, 16*). In addition, several famous landmarks in the basin are drumlins, many of which have bedrock cores close to the surface (*12*). They include Breed's Hill and Bunker Hill in Charlestown and Powder Horn Hill in Chelsea.

Borings and excavations indicate that the ice successively advanced and retreated and that sea level was 50 feet or more below its present level. When the sea level was lower, the Boston Basin was a broad valley where clay had been deposited by water. The basin provided an outlet at the confluence of two major ice lobes or currents, slowing the ice flow (*14*).

The topography of the Eastern Plateau is characterized by low, rounded hills and open valleys. Glacial erosion of the bedrock surface modified pre-existing valleys. The ice in this area moved, as shown in bedrock striations and drumlin orientations, generally northwest to southeast.

Areas 1, 2, 3, 4, 5, and 10 on the Bedrock Geology Map at the back of this publication show that the bedrock is dominantly granitic. Areas 8 and 9 on this map show that a small, narrow band of sedimentary and partly metamorphosed sedimentary rocks crosses the survey area from southwest to northeast (*27*).

The survey area was deglaciated by typical New England stagnation zone retreat. Glacial lakes with their associated deposits formed in front of the stagnant ice. Some of these are Glacial Lakes Medfield and Charles in the present-day Charles River Valley (*28, 29*). Vegetative successions have since filled in many smaller glacial lakes and ponds, making swamps, bogs, and marshes. Typically, Freetown and Swansea soils are in these locations.

Area Qsg on the Surficial Geology Map at the back of this publication shows that stratified glacial deposits are typically at lower elevations (*26*). The soils most commonly associated with these deposits are Hinckley, Merrimac, and Windsor soils. Area Qt on the Surficial Geology Map shows that the hills have a veneer of glacial till. The soils most commonly associated with these deposits are Charlton, Paxton, and Montauk soils.

As the glacier retreated further to the north, glacial lakes drained, and river systems began to develop on the new land surface. Before the surface was vegetated, a layer of windblown material derived from the underlying glacial drift was deposited over parts of the area.

As postglacial drainage developed further, alluvium was deposited along the rivers and streams. Most alluvium consists of organic material, fine sand, and silt but in some areas includes fine gravel. Rippowam and Saco soils formed in these alluvial deposits.

Survey Procedures

The general procedures followed in making this survey are described in the National Soils Handbook of the Soil Conservation Service. In addition, several U.S. Geological Survey surficial geologic maps and topographic maps were used to help soil scientists in the analysis of land formation (*5, 6, 7, 8, 9, 13, 15, 16, 19, 28, 29*).

Before field mapping began, preliminary boundaries of major landforms were plotted stereoscopically on field atlas sheets after the study of geology, previous soil maps (where available), and photo and topographic interpretation. Atlas sheets consisted of quad-centered aerial photographs made in 1977 at a scale of 1:80,000 and enlarged to a scale of 1:24,000.

Soil scientists took these prepared atlas sheets into the field and traversed the landscape on foot. They ran traverses across the major landforms, and they observed the soil at key locations, which typified areas of soil associated with a particular landscape. They observed road cuts, backhoe pits, and any other deep excavations that exposed the soil horizons. In addition, they dug holes generally to a depth of 4 to 6 feet using a tile spade (long, narrow-bladed shovel) or soil auger (drill-like sampling device).

Depending on the complexity of the soil pattern, the distance between traverses ranged from 100 to 300 yards and the distance between holes ranged from 50 to 600 feet. In the highly urbanized areas, the land was traversed in a similar fashion but while following existing roads in a pickup truck at more widely spaced intervals.

Soil scientists observed the soils in urban areas in open excavations, in road cuts, and in holes where they could dig them. In addition to these field observations, they used geologic studies and historical documentation of land alterations.

The soil was examined for profile development, texture, pH, the characteristics of underlying material, the degree of wetness, and other related soil features.

In many areas, additional transects were made on representative areas of complex map units to obtain more detailed information on map unit composition and on kinds and extent of inclusions. In most areas the point intercept method of transecting was used. The soil was examined at 100- to 150-foot intervals, and the soils data were recorded. Several randomly selected areas of a particular kind of map unit were transected, and then the soils data were compiled and summarized for the survey area (*5, 6, 13*).

While the soil survey was in progress, samples for chemical and physical analyses were made of typical pedons of major soils. The analyses were made by the University of Massachusetts Soil Laboratory, in Amherst, and the Massachusetts Department of Public Works, in Wellesley. The results of these analyses, along with field observations, research data, production records, and field experience of specialists, were used in making interpretations and predictions of soil behavior.

After completion of soil mapping on field atlas sheets, map unit delineations were transferred by hand to orthophotographs (a more versatile base than aerial photography) at a scale of 1:25,000. Most drainage and cultural features were transferred from U.S. Geological Survey 7½ minute topographic maps or were recorded after visual observation.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, soil texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called similar inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Freetown-Swansea-Saco

Very deep, nearly level, very poorly drained soils formed in highly decomposed organic material and silty alluvium; on flood plains of and at outlets of the Charles and Neponset Rivers

This map unit makes up about 5 percent of the survey area. It is about 35 percent Freetown soils, 30 percent Swansea soils, 15 percent Saco soils, and 20 percent soils of minor extent (fig. 1).

Freetown soils are in depressions and in low, flat areas along streams. Typically, the soils are black and dark brown muck to a depth of 60 inches or more.

Swansea soils are adjacent to Freetown soils and are in similar landscape positions. Typically, the surface layer is black and dark yellowish brown muck. The substratum is olive gray gravelly sand.

Saco soils are on the lowest lying parts of flood plains adjacent to the Charles and Neponset Rivers. Typically, the surface layer is very dark grayish brown loam in the upper part and black silt loam in the lower part. The substratum is very dark grayish brown silt loam in the upper part and grayish brown loamy fine sand in the lower part.

Minor soils in this map unit are very poorly drained Ipswich, Scarboro, and Birdsall soils, poorly drained Rippowam soils, Udorthents, wet substratum, and Beaches. Ipswich soils and Udorthents, wet substratum, make up about 90 percent of this map unit where it is at outlets of the Neponset River in Quincy and Boston and of the Pines River in Revere. Ipswich soils are in tidal marshes and estuaries, and are subject to daily tidal flooding. Udorthents, wet substratum, are in low inland areas and coastal wet areas that have been filled, adjoining existing swamps, marshes, and estuaries. Scarboro and Birdsall soils are along the edges of the map unit. Rippowam soils are at slightly higher elevations next to Saco soils. Beaches are in narrow bands along Massachusetts Bay.

Most areas of the soils in this map unit are woodland or support wetland grasses and shrubs. Some areas are tidal marshes of salt-tolerant grasses. Most areas of this map unit are protected wetland, wildlife habitat, and flood control areas.

These soils are very poorly suited to most uses because of the seasonal high water table, flooding, and low strength. In addition, those soils in areas of tidal marshes are high in content of salt and sulfide.

2. Hinckley-Merrimac-Urban land

Very deep, nearly level to steep, excessively drained and somewhat excessively drained soils formed in sandy and loamy glacial outwash overlying stratified sand and gravel, and areas of urban land; in major stream valleys and on coastal plains

This map unit makes up about 38 percent of the survey area. It is about 22 percent Hinckley soils, 22 percent Merrimac soils, 15 percent Urban land, and 41 percent soils of minor extent (fig. 2).

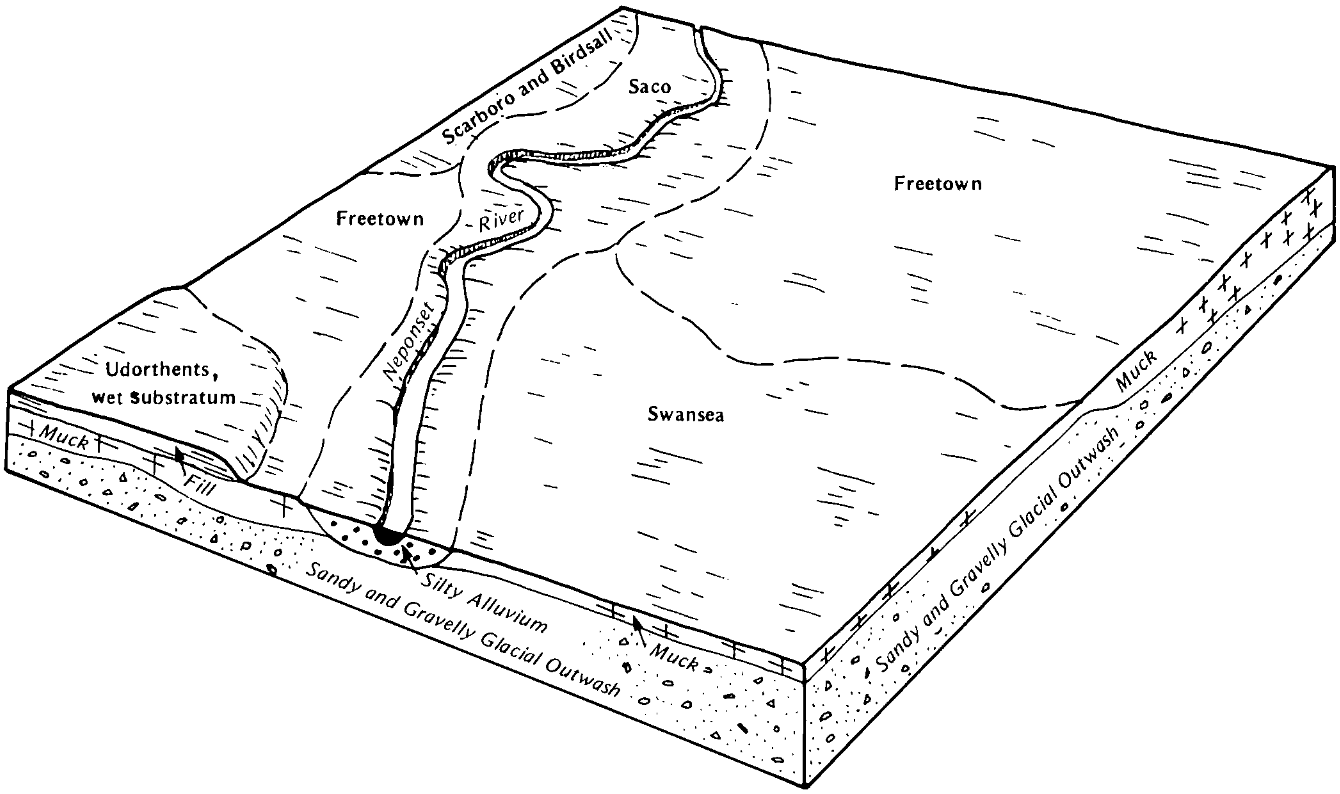


Figure 1.—Typical landscape pattern of soils and underlying material in the Freetown-Swansea-Saco general soil map unit.

Hinckley soils are on kames, eskers, and knolls of glacial outwash stream terraces and plains. Typically, the surface layer is dark brown sandy loam. The subsoil is dark yellowish brown. It is gravelly sandy loam in the upper part and gravelly loamy sand in the lower part. The substratum is light olive brown gravelly and very gravelly coarse sand.

Merrimac soils are on glacial outwash stream terraces and plains. Typically, the surface layer is dark brown fine sandy loam. The subsoil is yellowish brown. It is fine sandy loam in the upper part and loamy sand in the lower part. The substratum is light yellowish brown stratified sand and gravel.

Urban land is in an intricate pattern with Merrimac soils. It consists of areas where the original soil has been covered with impervious surfaces, such as asphalt, concrete, and buildings.

Minor soils in this map unit are well drained Canton soils, moderately well drained Sudbury soils, poorly drained Walpole soils, and very poorly drained Scarboro and Birdsall soils. Canton soils are on small hills on undulating uplands. Sudbury soils are in depressions on glacial outwash plains. Walpole soils are in low, flat, wet areas. Scarboro and Birdsall soils are in depressions and along drainageways.

Most areas of the soils in this map unit are used as individual homesites and for commercial and industrial development. Some areas are woodland, cropland, or pastureland.

These soils generally are well suited to building site development and local roads and streets. If these soils are used as sites for septic tank absorption fields, ground water pollution is a hazard; the soils readily absorb but do not adequately filter the effluent.

3. Canton-Charlton-Hollis

Very deep and shallow, gently sloping to steep, somewhat excessively drained and well drained, loamy soils formed in glacial till and in ice-contact, stratified drift; on upland, low hills

This map unit makes up about 35 percent of the

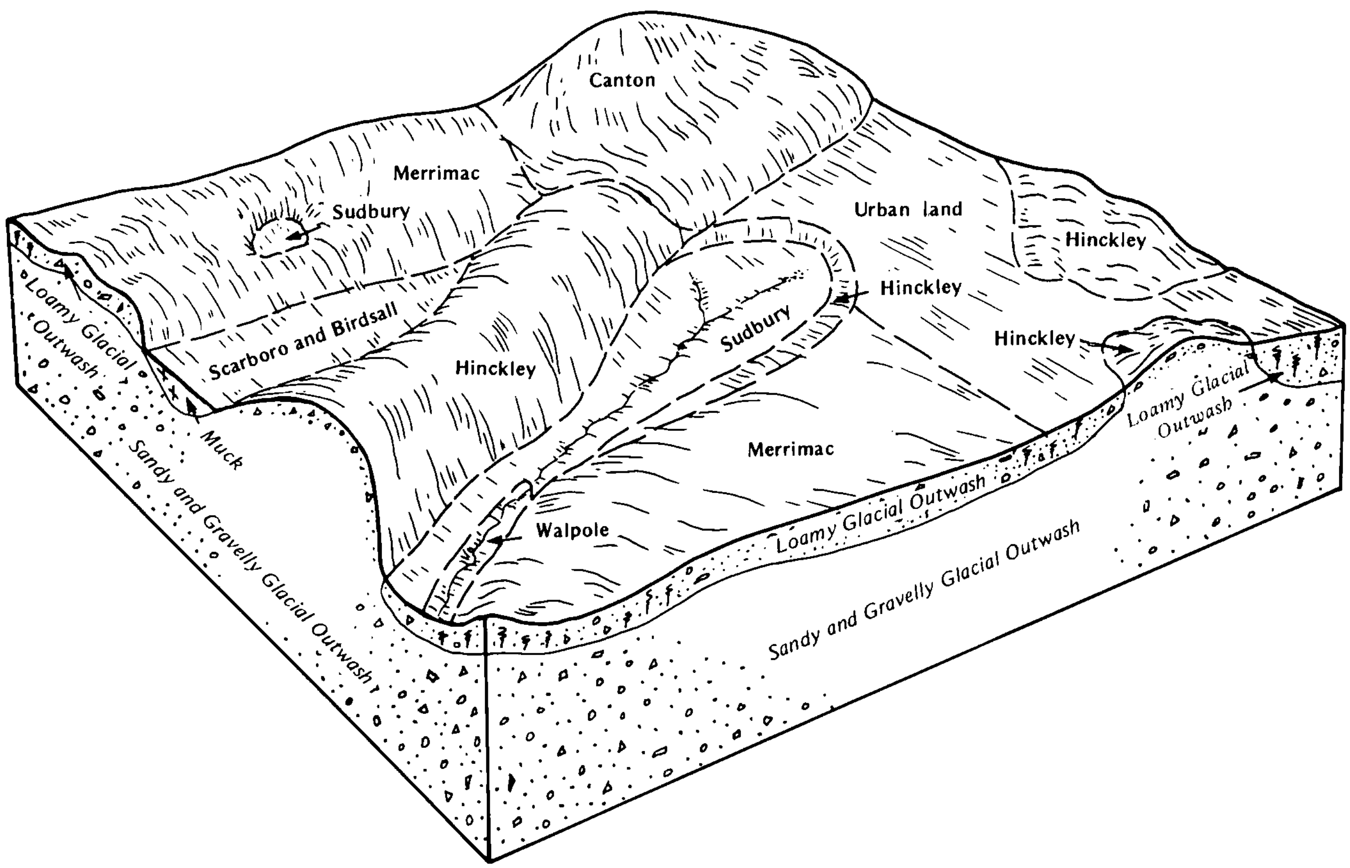


Figure 2.—Typical pattern of soils and underlying material in the Hinckley-Merrimac-Urban land general soil map unit.

survey area. It is about 27 percent Canton soils, 15 percent Charlton soils, 11 percent Hollis soils, and 47 percent soils of minor extent (fig. 3).

Canton soils are on small, undulating hills adjacent to valleys. Typically, the surface layer is black fine sandy loam. The subsoil is yellowish brown and light yellowish brown fine sandy loam. The substratum is light olive gray and olive gray gravelly loamy sand.

Charlton soils are in low pockets and saddles between irregular ridges at higher elevations. Typically, the surface layer is black fine sandy loam. The subsoil is yellowish brown fine sandy loam. The substratum is light brownish gray sandy loam.

Hollis soils are at the tops of ridges and near rock outcrops. They are shallow to bedrock. Typically, the surface layer is black and the subsoil is dark yellowish brown. The soils are fine sandy loam throughout.

Minor soils in this map unit are well drained Montauk soils, moderately well drained Scituate soils, and poorly drained Ridgebury soils. Montauk soils are on a smooth, sloping terrain. Scituate and Ridgebury soils are in depressions. Also included are areas of rock outcrop. In Montauk, Scituate, and Ridgebury soils the firm substratum restricts the movement of water. Scituate and Ridgebury soils have a perched seasonal high water table.

Most of the soils in this map unit are woodland. Many areas are used as individual homesites. A few areas are used as cropland and pasture.

These soils are well suited to woodland productivity, building site development, and crop production. If Canton soils are used as sites for septic tank absorption fields, ground water pollution is a hazard; these soils readily absorb but do not adequately filter the effluent. Hollis soils are too shallow for use as sites for standard septic tank absorption fields. In many areas of this map unit, stones and boulders on the surface and rock outcrops impede the use of conventional farming equipment.

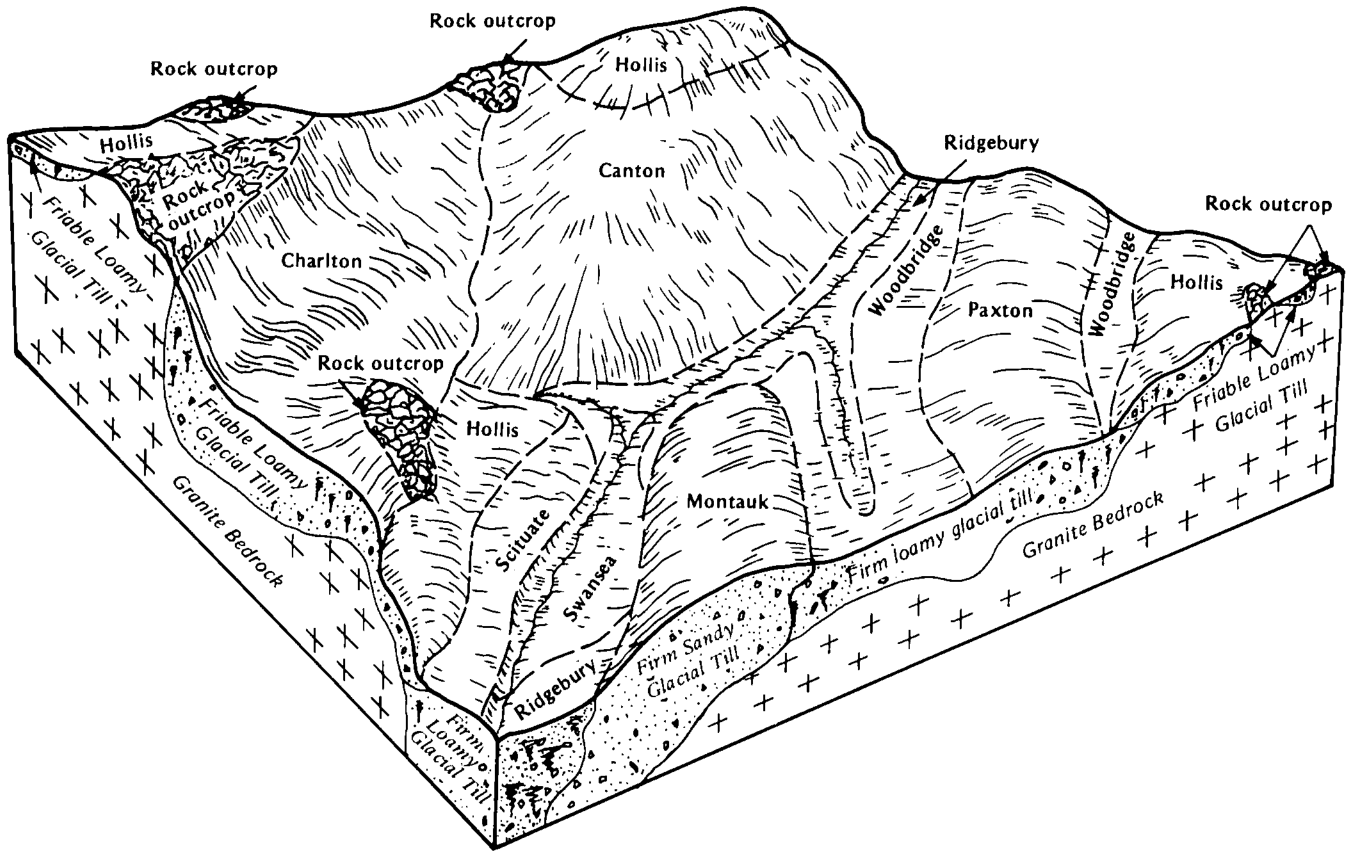


Figure 3.—Typical pattern of soils and underlying material in the Canton-Charlton-Hollis general soil map unit.

4. Woodbridge-Paxton-Montauk

Very deep, nearly level to steep, moderately well drained and well drained soils formed in friable, loamy glacial till overlying a firm substratum; on upland, oval hills

This map unit makes up about 9 percent of the survey area. It is about 40 percent Woodbridge soils, 25 percent Paxton soils, 20 percent Montauk soils, and 15 percent soils of minor extent (fig. 4).

Woodbridge soils are on hilltops, gentle side slopes, and foot slopes of hills. Typically, the surface layer is very dark gray fine sandy loam. The subsoil is light olive brown fine sandy loam in the upper part and mottled, light yellowish brown fine sandy loam in the lower part. The substratum is very firm, mottled grayish brown loam. The perched seasonal high water table is at a depth of 1.5 to 3 feet below the surface.

Paxton soils are on side slopes of hills. Typically, the surface layer is very dark brown fine sandy loam. The subsoil is yellowish brown and brownish yellow gravelly fine sandy loam. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam.

Montauk soils are on tops and side slopes of hills. Typically, the surface layer is very dark grayish brown fine sandy loam. The subsoil is dark yellowish brown fine sandy loam in the upper part and yellowish brown and light olive brown fine sandy loam and sandy loam in the lower part. The substratum is firm, olive loamy sand.

Minor soils in this map unit are well drained Charlton soils, poorly drained Ridgebury soils, and very poorly drained Whitman soils in depressions and along drainageways. Charlton soils do not have a firm or extremely firm, slowly permeable substratum. In Ridgebury and Whitman soils the perched water table is at or near the surface most of the year.

Most areas of the soils in this map unit are woodland or are used as individual homesites. A few areas are

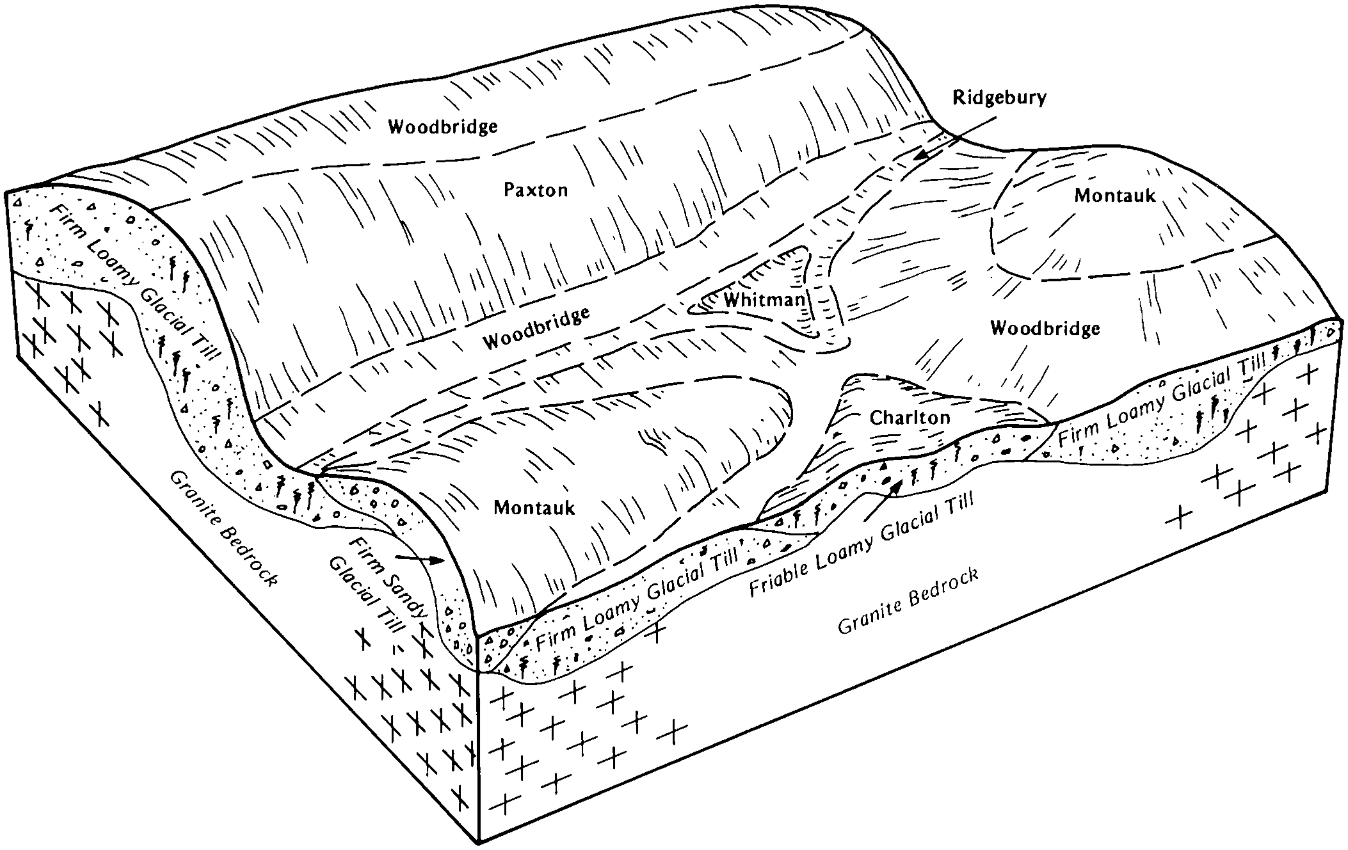


Figure 4.—Typical pattern of soils and underlying material in the Woodbridge-Paxton-Montauk general soil map unit.

used for crop production and pasture.

These soils are poorly suited to use as sites for septic tank absorption fields because the firm substratum does not readily absorb the effluent. The soils are well suited to cultivated crops and pasture and to use as woodland because of smooth slopes and high productivity.

5. Newport-Urban land

Very deep, gently sloping to moderately steep, well drained soils formed in friable, loamy glacial till overlying a firm substratum, and areas of Urban land; on steep hillsides in the Boston Basin

This map unit makes up about 6 percent of the survey area and about 30 percent of Suffolk County. It is about 28 percent Newport soils, 26 percent Urban land, and 46 percent soils of minor extent.

Newport soils are on top slopes and side slopes. Typically, the surface layer is dark brown silt loam. The subsoil is light olive brown silt loam. The substratum is light yellowish brown silt loam that is firm and slowly permeable. In many areas 50 to 75 percent of the coarse fragments are flat, dark gray shale and slate fragments.

Urban land is in an intricate pattern with Newport and Pittstown soils. It consists of areas where the original soil has been covered with impervious surfaces, such as asphalt, concrete, and buildings. In most areas the underlying soil has been cut away or covered with Newport soils from surrounding areas.

Minor soils in this map unit are well drained Charlton soils, somewhat excessively drained Hollis soils, and Udorthents. Charlton soils do not have a firm, slowly permeable substratum. Hollis soils are less than 20 inches deep to bedrock. Udorthents are in areas where the natural soil has been disturbed by man.

Most areas of the soils in this map unit are used as individual homesites and for commercial development. A few areas are used for parks and recreation areas.

Newport soils are poorly suited to use as sites for dwellings with basements because of excess wetness caused by the perched seasonal high water table. Because of slow permeability, these soils do not readily absorb the effluent from septic tank absorption fields. Constructing local roads on well compacted, coarse textured base material helps to prevent damage to pavement by frost action. If not protected, Newport and Pittstown soils are subject to severe erosion. The erosion hazard is increased in areas exposed to wave action.

6. Udorthents-Urban land

Very deep, nearly level to moderately steep, loamy and sandy soils that have been altered, and areas of Urban land; in and around the city of Boston

Most areas of this map unit were previously tidal marshes, flood plains, bays, harbors, and swamps.

This map unit makes up about 7 percent of the survey area. It is about 50 percent Udorthents, 45 percent Urban land, and 5 percent soils of minor extent.

Udorthents consist of areas where soil material has been removed and areas that have been filled with soil material. In areas where the soil has been removed, the surface layer is loamy or sandy. The fill consists of various types of soil material, rubble, refuse, or channel dredgings. It ranges from 2 to 20 feet in depth. The seasonal high water table is in the lower part of the substratum, commonly at a depth of 3 to 5 feet.

Urban land consists of areas where 85 percent or more of the land is covered with impervious surfaces, such as buildings and pavement.

Minor soils in this map unit are well drained Newport soils and somewhat excessively drained Merrimac soils. Most areas of this map unit are used for commercial development. Some areas are used as individual homesites. The variability of this map unit requires onsite investigations to determine the suitability for a particular land use.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Paxton fine sandy loam, 3 to 8 percent slopes, is one of several phases in the Paxton series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Rock outcrop-Hollis complex, 3 to 25 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Scarboro and Birdsall soils is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

Be—Beaches. This map unit consists of areas of sand and gravel along the shoreline of Massachusetts Bay. The areas are subject to wave action and, in some places, tidal flooding. They are long and narrow in shape, and follow the contour of the coastline, inlets, and bays. They range from 5 to 50 acres. Slopes are short and range from 0 to 8 percent.

Typically, Beaches consist of deep marine deposits of sand derived from granite. Some areas have a gravelly or cobbly surface. Many beaches in the Boston Basin are covered with fragments of dark, flat shale and slate.

Included with this unit in mapping are areas of Udorthents, smooth, and areas of Urban land. Also included are areas of old sand dunes that have been leveled for development. Some areas have rock outcrops. Included areas make up about 5 percent of the map unit.

Soil properties:

Permeability: Rapid or very rapid.
Available water capacity: Very low.
Tidal flooding: Low areas are subject to daily wave action. High areas are subject to storm tides.

Most areas of Beaches do not have vegetation and are in intensive use for summer bathing and related kinds of recreation. The few areas that are sparsely covered with beach grass and beach shrubs are suited to use as sites for shore bird nesting. Beaches are generally not suitable for most other uses.

This map unit has not been assigned to a capability subclass.

CaB—Canton fine sandy loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on the sides of hills and ridges and on uplands near outwash plains and terraces. Areas of the soil are irregular in shape and range from 6 to 150 acres.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel in the subsoil, and some areas have less gravel in the substratum.

Included with this soil in mapping are small areas of Charlton, Merrimac, and Montauk soils in smooth areas of the landscape. Also included are Scituate soils in low areas and depressions. Also included are small areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are farmed.

This soil is very well suited to cultivated crops and pasture and to use as orchards. If the soil is farmed, conservation tillage and cover crops help to control erosion.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland. If conifers are grown, plant competition at regeneration is moderate. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

There are no major limitations to use of this soil for building site development and for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluvent.

This soil is in capability subclass IIe.

CaC—Canton fine sandy loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained soil on the sides of hills and ridges and on uplands near outwash plains and terraces. Areas of the soil are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel in the subsoil. Some areas have less gravel in the substratum.

Included with this soil in mapping are many small areas of Charlton, Merrimac, and Montauk soils in smooth, convex areas. Also included are Scituate soils along drainageways. Also included are areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites.

This soil is suited to orchards, hay, and pasture. If the soil is farmed, stripcropping, conservation tillage, and cover crops help to reduce runoff and to control erosion.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland. If conifers are grown, plant competition at regeneration is moderate. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Designing buildings to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Land shaping is needed in some areas. Constructing roads on the contour, where possible, and planting roadbanks to well adapted grasses help to control erosion. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

This soil is in capability subclass IIIe.

CaD—Canton fine sandy loam, 15 to 35 percent slopes. This is a very deep, moderately steep and steep, well drained soil on side slopes of upland hills. Areas of the soil are long and narrow or irregular in shape and range from 6 to 50 acres.

Typically, the surface layer is dark brown fine sandy loam about 2 inches thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel in the subsoil. Some areas have less gravel in the substratum.

Included with this soil in mapping are many small areas of Charlton, Merrimac, and Montauk soils in landscape positions similar to those of the Canton soil. Also included are areas of soils that have slopes of less than 25 percent. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as homesites.

Potential productivity for eastern white pine on this soil is high. Management concerns are slope and the hazard of erosion. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth of preferred trees. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Slope is the main limitation of this soil for building sites. Extensive land shaping is generally needed. Designing buildings and lots to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Large amounts of cut and fill are generally needed when constructing roads on this soil. Constructing roads on the contour and planting roadbanks to well adapted grasses help to control erosion. Slope and rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Installing distribution lines across the slope helps to prevent the effluent from breaking out on the surface. In some areas precautionary measures are needed to reduce the pollution hazard.

This soil is in capability subclass IVe.

CbB—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony. This is a very deep, gently sloping, well drained soil on the sides of upland hills and ridges near plains and terraces. Areas are irregular in shape and range from 6 to 150 acres in size. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. In some map units the stones are in clusters and the rest of these map units do not have stones.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel throughout.

Included with this soil in mapping are small areas of Charlton, Merrimac, and extremely stony Montauk soils in positions on the landscape similar to those of the Canton soil. Also included, in low areas and depressions, are areas of extremely stony Scituate soils. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used for pasture.

This soil is poorly suited to cultivated crops unless the surface is cleared of stones. The soil is fairly well suited to use as pastureland and as orchards. Stones and boulders, however, limit the use of conventional farm equipment.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland. If conifers are grown, plant competition at regeneration is moderate. Thinning crowded stands to accepted stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine. Large stones on the surface generally limit the use of harvesting and planting equipment.

There are no major limitations to use of this soil for building site development and for local roads and streets. However, if the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. The large stones in this soil generally hinder excavation operations and the installation of distribution lines for septic tank absorption fields.

This soil is in capability subclass VIs.

CbC—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony. This is a very deep, strongly sloping, well drained soil on the sides of upland hills and ridges near outwash plains and terraces. Areas are irregular in shape and range from 6 to 150 acres in size. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the land surface. In some map units the stones are in clusters and the rest of these map units do not have stones.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part.

Included with this soil in mapping are small areas of Charlton and extremely stony Montauk soils in positions on the landscape similar to those of the Canton soil. Also included are areas of extremely stony Chatfield soils on knobs and extremely stony Scituate soils along drainageways. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few small areas are used for pasture.

This soil is very poorly suited to cultivated crops unless the stones on the surface are removed. It is suited to use as pastureland, and as orchards. Stones and boulders, however, limit the use of conventional farm equipment.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland use. If conifers are grown, plant competition at regeneration is moderate. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine. Large stones on the surface generally hinder the use of harvesting and planting equipment.

Designing buildings to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. In some areas land shaping is needed. Large stones generally limit excavations. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. The large stones in the soil generally limit the installation of distribution lines.

This soil is in capability subclass VIs.

CbD—Canton fine sandy loam, 15 to 25 percent slopes, extremely stony. This is a very deep, moderately steep, well drained soil on side slopes of upland hills. Areas are long and narrow or irregular in shape and range from 6 to 50 acres in size. Stones 10 to 20 inches in diameter cover 1 to 15 percent of the surface. In some map units the stones are in clusters and the rest of these map units do not have stones.

Typically, the surface layer is dark brown fine sandy loam about 2 inches thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel in the subsoil.

Included with this soil in mapping are small areas of Charlton soils and extremely stony Montauk soils in similar positions on the landscape. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites.

This soil is poorly suited to crop production because stones and slope limit the use of conventional farm equipment.

Potential productivity for eastern white pine on this soil is high. Management concerns are slope and the hazard of erosion. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and to control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth of preferred trees. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Slope and large stones on the surface are the main limitations of this soil for building sites. Extensive land shaping is generally needed. The large stones generally limit excavation operations. Designing buildings and lots to conform to the natural slope of the land help to overcome the slope limitation and to control erosion in disturbed areas. Large amounts of cut and fill are generally needed during road construction. The large stones generally limit excavation operations.

Slope and rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Installing distribution lines across the slope helps to prevent the effluent from breaking out on the surface. Additional precautionary measures are needed in some areas to reduce the pollution hazard. The large stones in this soil generally limit the installation of distribution lines.

This soil is in capability subclass VIs.

CcB—Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery. This is a very deep, gently sloping, well drained soil on lower side slopes on uplands near outwash plains and terraces. Areas are irregular in shape and range from 6 to 50 acres. Boulders more than 2 feet in diameter cover 1 to 25 percent of the surface. In many map units the boulders are in clusters and the rest of these map units do not have boulders.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. In some areas the subsoil has more gravel.

Included with this soil in mapping are small areas of Charlton and extremely stony Montauk soils in similar positions on the landscape. Also included are extremely stony Chatfield soils on knobs and extremely stony Scituate soils in low areas and depressions. Also included are small isolated areas that do not have boulders on the surface. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsurface layer, and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. A few areas are used as individual homesites.

This soil is very poorly suited to cultivated crops and pasture and to use as orchards. The boulders on the surface limit the use of farm equipment.

Potential productivity for eastern white pine on this soil is high. Management concerns are large stones and boulders on the surface and plant competition. The large surface stones and boulders generally limit the use of harvesting and planting equipment. In some areas hand-planting is needed. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth of preferred trees. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

The boulders in this soil limit excavation operations for building sites and generally limit road construction. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. The boulders in this soil generally limit the installation of distribution lines. The soil is fairly well suited to lawns, landscaping, and gardens, but boulders restrict the use of machinery.

This soil is in capability subclass VIIs.

CcC—Canton fine sandy loam, 8 to 15 percent slopes, extremely bouldery. This is a very deep, strongly sloping, well drained soil on the sides of upland hills and ridges near outwash plains and terraces (fig. 5). Areas are irregular in shape and range from 6 to 50 acres. Boulders more than 2 feet in diameter cover 1 to 25 percent of the surface. In many map units the boulders are in clusters and the rest of these map units do not have boulders.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in

Figure 5.—An area of Canton fine sandy loam, 8 to 15 percent slopes, extremely bouldery, in the Blue Hills Reservation.

the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. In some areas the subsoil has more gravel.

Included with this soil in mapping are small areas of Charlton soils and extremely stony Montauk soils in similar positions on the landscape. Also included are extremely stony Chatfield soils on knobs and extremely stony Scituate soils in low areas and depressions. Also included are small isolated areas that do not have boulders on the surface. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this soil are woodland. A few areas are used as individual homesites.

This soil is very poorly suited to cultivated crops and pasture and to use as orchards. Stones and boulders on the surface limit the use of farm equipment.

Potential productivity for eastern white pine on this soil is high. Management concerns are large stones and boulders on the surface and plant competition. The large surface stones and boulders limit the use of harvesting and planting equipment. In some areas hand-planting of trees is needed. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth of preferred trees. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best regrowth of newly established seedlings.

The boulders in this soil limit excavation operations for building sites and generally limit road construction. Designing buildings to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. In some areas land shaping is needed. Constructing roads on the contour, where possible, and planting roadbanks to well adapted grasses help to control erosion. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Boulders in this soil generally limit the installation of distribution lines.

This soil is in capability subclass VIIs.

CcD—Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery. This is a very deep, moderately steep, well drained soil on the side slopes of upland hills. Areas are long and narrow or irregular in shape and range from 6 to 50 acres. Boulders more than 2 feet in diameter cover 1 to 25 percent of the land surface. In some map units the boulders are in clusters and the rest of these map units do not have boulders.

Typically, the surface layer is dark brown fine sandy loam about 2 inches thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. In some areas the subsoil has more gravel.

Included with this soil in mapping are small areas of Charlton soils and extremely stony Montauk soils in similar positions on the landscape. Also included are small isolated areas that do not have boulders on the surface. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Most areas of this map unit are wooded. Some areas are used as individual homesites.

This soil is generally not suited to cultivated crops and very poorly suited to pasture and to use as orchards because of slope and stones and boulders on the surface.

Potential productivity for eastern white pine on this soil is high. Management concerns are slope, the erosion hazard, and boulders on the surface. Boulders generally limit the use of harvesting and planting equipment. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and to control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth of preferred trees. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Slope and the boulders on the surface are the main limitations to use of this soil as building sites. Extensive land shaping is generally needed. The large stones and boulders generally limit excavation operations. Designing buildings and lots to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Slope and the boulders on the surface are the main limitations to road construction. Large amounts of cut and fill are generally needed, and the boulders generally limit excavation operations.

Slope and rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Installing distribution lines across the slope helps to prevent the effluent from breaking out on the surface. In some areas additional precautionary measures are needed to prevent ground water pollution. The boulders in the soil generally limit the installation of distribution lines.

This soil is in capability subclass VIIs.

CdC—Canton-Urban land complex, 3 to 15 percent slopes. This map unit consists of very deep, well drained Canton soil and areas of Urban land on the sides of hills and ridges on uplands. In a typical area it is about 50 percent Canton soil, 35 percent Urban land, and 15 percent other soils. The Canton soil and Urban land are together in such an intricate pattern on the landscape that it was not practical to map them separately at the scale used for mapping. Areas of this soil and Urban land are irregular in shape and range from 10 to 150 acres.

Typically, the surface layer of the Canton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part.

Urban land consists of areas where the original soil surface has been covered with impervious surfaces, such as asphalt, concrete, or buildings. In most areas the underlying soil material has been cut away or covered with fill from adjacent areas.

Included in this complex in mapping are small areas of Charlton and Montauk soils in similar landscape positions and Scituate soils in low, wet areas. Also included are areas of Udorthents, loamy, where the Canton soil has been cut away or filled with more than 20 inches of loamy soil material. Also included are a few small areas where stones and boulders are on the surface. Included areas make up about 15 percent of the complex.

Soil properties of the Canton soil:

Permeability: Moderate in the surface layer and the subsoil and moderately rapid or rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

The mapped areas of this complex are in both residential and commercial uses. On the Canton soil there are no major limitations to building site development or for local roads and streets. If the Canton soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

The Canton soil is well suited to lawn establishment and landscaping and to use as vegetable gardens. For these uses, the soil needs periodic watering during the dry season when it is somewhat droughty.

The Canton soil has not been assigned to a capability subclass.

ChB—Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes. This map unit consists of gently sloping soils on uplands where the relief is affected by the underlying bedrock. The very deep, well drained Charlton soil is in low pockets. The shallow, excessively drained Hollis soil is on the tops of hills and ridges or near rock outcrops. In many areas stones and boulders 10 inches to 10 feet in diameter cover 0 to 10 percent of the surface. A typical map unit is about 47 percent Charlton soil, 18 percent Hollis soil, 10 percent Rock outcrop, and 25 percent other soils. These soils and areas of exposed bedrock are intermingled so closely that it was not practical to separate them at the scale used for mapping. Areas of the map unit are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more. In some areas the surface layer is very fine sandy loam. In some areas the subsoil is redder.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches. In some areas the substratum is pale yellow fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Included with this complex in mapping are small areas of Canton and Chatfield soils on the same landscape as the Charlton and Hollis soils. Also included are areas of Scituate soils and small, wet areas in depressions. Also included are areas of Montauk soils on smoother parts of the landscape. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Charlton and Hollis soils.

Available water capacity: Charlton soil—moderate; Hollis soil—low.
Soil reaction: Very strongly acid to moderately acid in both Charlton and Hollis soils.
Depth to bedrock: Charlton soil—more than 60 inches; Hollis soils—10 to 20 inches.
Depth to the seasonal high water table: More than 6 feet in both the Charlton and Hollis soils.
Hydrologic group: Charlton—B; Hollis—C/D.

Many areas of the Charlton and Hollis soils in this complex are woodland. Some areas are used as individual homesites.

These soils are poorly suited to cultivated crops and to pastureland because of the exposed bedrock and stones on the surface.

Potential productivity for northern red oak on this soil is moderate. Management concerns are shallow depth to bedrock and low available water capacity. In some areas rock outcroppings restrict the use of equipment. Proper thinning of the stands helps to minimize the hazard of windthrow. Some areas are suitable for hand-planting of trees.

The Charlton soil is well suited to use as sites for dwellings with basements and for septic tank absorption fields. The Hollis soil is poorly suited to use as sites for both dwellings with basements and septic tank absorption fields because it is less than 20 inches deep to bedrock. Some suitable homesites are on these soils, but a lot size larger than customary is generally needed. The Charlton soil is well suited to and the Hollis soil is poorly suited to lawns, landscaping, and gardens.

The Charlton and Hollis soils are in capability subclass VIIs.

ChC—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes. This map unit consists of strongly sloping soils on uplands where the underlying bedrock is near the surface. The very deep, well drained Charlton soil is in low pockets. The shallow, somewhat excessively drained Hollis soil is on the tops of hills and ridges near rock outcrops. Stones and boulders 10 inches to 10 feet in diameter cover 0 to 10 percent of the surface. A typical map unit is about 47 percent Charlton soil, 18 percent Hollis soil, 10 percent Rock outcrop, and 25 percent other soils. These soils and areas of exposed bedrock are intermingled so closely that it was not practical to separate them at the scale used for mapping. Areas of this map unit are irregular in shape and range from 6 to 200 acres.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more. In some areas the surface layer is very fine sandy loam. In some areas the subsoil is redder.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches. In areas the substratum is pale yellow fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Included with this complex in mapping are small areas of Canton and Chatfield soils on the same landscape as the Charlton and Hollis soils. Also included are areas of Scituate soils and small, wet areas in depressions and along drainageways. Also included are areas of Montauk soils on smoother parts of the landscape. Also included are small areas of soils that have slopes of 15 to 25 percent. Included areas make up about 25 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Charlton and Hollis soils.
Available water capacity: Charlton—moderate; Hollis—low.
Soil reaction: Very strongly acid to moderately acid in both Charlton and Hollis soils.
Depth to bedrock: Charlton—more than 60 inches; Hollis—10 to 20 inches.
Depth to the seasonal high water table: More than 6 feet in both Charlton and Hollis soils.
Hydrologic group: Charlton—B; Hollis—C/D.

Most areas of the Charlton and Hollis soils in this complex are woodland. Some areas are used as individual homesites.

These soils are poorly suited to cultivated crops and to pastureland because of the exposed bedrock, slope, and stones on the surface.

Potential productivity for northern red oak on this soil is moderate. Management concerns are shallow depth to bedrock, low available water capacity, and slope. Rock outcrops and slope limit the use of equipment. Proper thinning of the stands will help to minimize the hazard of windthrow. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to absorb precipitation, to reduce runoff, and to control erosion. Some areas are suitable for hand-planting of trees.

The Charlton soil is suited to use as sites for dwellings with basements. The Hollis soil is poorly suited to use as sites for both dwellings with basements and septic tank absorption fields because it is less than 20 inches deep to bedrock. Some suitable homesites are on these soils, but a lot size larger than customary is generally needed. When homesites are under construction, such conservation measures as diversions and temporary or permanent plant cover commonly will control erosion. Because of slope, installing cross-slope distribution lines for septic tank absorption fields is generally needed for proper operation.

The Charlton and Hollis soils are in capability subclass VIIs.

ChD—Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes. This map unit consists of moderately steep soils on upland hills where the underlying bedrock is near the surface. The very deep, well drained Charlton soil is on side slopes. The shallow, somewhat excessively drained Hollis soil is on the tops of hills and ridges or near rock outcrops. Stones and boulders 10 inches to 10 feet in diameter cover 0 to 10 percent of the surface. A typical map unit is about 47 percent Charlton soil, 18 percent Hollis soil, 10 percent Rock outcrop, and 25 percent other soils. These soils and areas of exposed bedrock are intermingled so closely that it was not practical to separate them at the scale used for mapping.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more. In some areas the surface layer is very fine sandy loam. In some areas the subsoil is redder.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 2 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches. In some areas the substratum is pale yellow fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Included with this complex in mapping are small areas of Canton and Chatfield soils in positions on the landscape similar to those of the Charlton and Hollis soils. Also included are areas of Montauk soils on side slopes. Also included are small areas of soils that have slopes of 3 to 15 percent. Included areas make up about 20 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Charlton and Hollis soils.
Available water capacity: Charlton soil—moderate; Hollis soil—low.
Soil reaction: Very strongly acid to moderately acid in both Charlton and Hollis soils.
Depth to bedrock: Charlton soil—more than 60 inches; Hollis soil—10 to 20 inches.
Depth to the seasonal high water table: More than 6 feet in both Charlton and Hollis soils.
Hydrologic group: Charlton—B; Hollis—C/D.

Most areas of the Charlton and Hollis soils in this complex are woodland. A few small areas are used as homesites.

These soils are generally not suitable for cultivated crops or pastureland because of slope and shallow depth to bedrock.

Potential productivity for northern red oak on this soil is moderate. Management concerns are shallow depth to bedrock and low available water capacity on the Hollis soil. Rock outcrops generally restrict the use of equipment. Some areas are suitable for hand-planting of trees.

Shallowness to bedrock in the Hollis soil, exposed bedrock, slope, and stones and boulders on the surface are limitations to use of the soils as sites for both building development and septic tank absorption fields. Other soils that are better suited to these uses are generally in nearby areas.

The Charlton and Hollis soils are in capability subclass VIIs.

CuC—Charlton-Hollis-Urban land complex, 3 to 15 percent slopes. This map unit consists of undulating and rolling soils and areas of Urban land on uplands. The Charlton soil is very deep and well drained. The Hollis soil is shallow and somewhat excessively drained. Individual areas of the soils in this map unit are irregular in shape and range from 10 to 300 acres in size. In a typical area it is 40 percent Charlton soil, 20 percent Hollis soil, 20 percent Urban land, and 20 percent other soils and areas of rock outcrops. The Charlton and Hollis soils and areas of Urban land are in such an intricate pattern on the landscape that it was not practical to separate them at the scale used for mapping.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches.

Urban land consists of areas where the original soil surface has been covered by impervious surfaces, such as asphalt, concrete, and buildings. In most areas the underlying soil has been cut away or covered by fill from surrounding areas of Charlton soil.

Included with this complex in mapping are small areas of Canton and Montauk soils in convex positions and Scituate soils in low, wet areas. Also included are areas of Udorthents, loamy, where the original soil has been removed, replaced, or covered with more than 20 inches of loamy fill material. Rock outcrops cover less than 10 percent of the surface. Included areas make up 20 percent of the complex.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Charlton and Hollis soils.
Available water capacity: Charlton—moderate; Hollis—low.
Soil reaction: Very strongly acid to moderately acid in both Charlton and Hollis soils.
Depth to bedrock: Charlton soil—more than 60 inches; Hollis soil—10 to 20 inches.
Depth to the seasonal high water table: More than 6 feet in both Charlton and Hollis soils.
Hydrologic group: Charlton soil—B; Hollis soil—C/D.

Most mapped areas of this complex are in residential or commercial use.

The Charlton soil is well suited to use as sites for dwellings with basements and small commercial buildings. In areas of the Hollis soil filling or blasting is needed for installation of deep foundations. The Hollis soil is generally not suitable for use as sites for septic tank absorption fields because of shallow depth to bedrock. Adjacent areas of the Charlton soil are well suited to use as sites for septic tank absorption fields.

The Charlton and Hollis soils have not been assigned to a capability subclass.

DeA—Deerfield loamy sand, 0 to 3 percent slopes. This is a nearly level, moderately well drained soil on deltas and in depressions on terraces. Areas of the soil are irregular in shape and range from 6 to 60 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 11 inches thick. The subsoil is mottled and about 24 inches thick. It is dark yellowish brown loamy sand in the upper part and olive yellow loamy sand in the lower part. The substratum is mottled, yellowish brown sand to a depth of 60 inches or more. In many areas the surface layer is thinner and sandier.

Included with this soil in mapping are some small areas of Sudbury, Walpole, and Windsor soils in positions on the landscape similar to those of the Deerfield soil. These soils make up about 10 percent of the map unit.

Soil properties:

Permeability: Rapid or very rapid throughout.
Available water capacity: Low.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 3.0 feet below the surface.
Hydrologic group: B.

Most areas of this soil are woodland. A few small areas are used for commercial and industrial development.

This soil is suited to cultivated crops. The seasonal high water table delays farming in spring and limits root growth. Irrigating the soil during dry periods is needed for best crop growth. The soil is limited in its use for hay and pasture. The restricted root system and droughtiness in summer lower crop yields. The main management concern is preventing overgrazing, particularly during droughty periods, which reduces the hardiness and density of desirable plants. Proper stocking rates, timely grazing, and restricted grazing during droughty periods help to maintain plant densities.

Potential productivity for eastern white pine on this soil is high. Seedling mortality is moderate because of moisture stress caused by droughtiness. Minimizing disturbance of the soil, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface runoff away from buildings also helps to protect the interior from damage by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect pavement from damage by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Placing distribution lines in a mound of more suitable fill material helps to overcome the limitation of the seasonal high water table.

This soil is in capability subclass IIIw.

DeB—Deerfield loamy sand, 3 to 8 percent slopes. This is a gently sloping, moderately well drained soil on deltas and in depressions on terraces. Areas of the soil are irregular in shape and range from 6 to 60 acres.

Typically, the surface layer is very dark grayish brown sandy loam about 11 inches thick. The subsoil is dark yellowish brown loamy sand in the upper part and olive yellow loamy sand in the lower part. It is mottled and about 24 inches thick. The substratum is mottled, yellowish brown sand to a depth of 60 inches or more. In many areas the surface layer is thinner and sandier.

Included with this soil in mapping are some small areas of Sudbury, Walpole, and Windsor soils in similar positions on the landscape. These soils make up about 10 percent of the map unit.

Soil properties:

Permeability: Rapid or very rapid throughout.
Available water capacity: Low.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 3.0 feet below the surface.
Hydrologic group: B.

Most areas of this soil are woodland. A few small areas are used for commercial and industrial development.

This soil is suited to cultivated crops. The seasonal high water table delays farming in spring and limits root growth. Irrigating the soil during dry periods is needed for best crop growth. In the gently sloping areas, conservation practices, such as cover crops, stripcropping, and farming across the slope or on the contour, help to control erosion.

This soil is limited in its use for hay and pasture. The restricted root system and droughtiness in summer lower crop yields. The main management concern is preventing overgrazing, particularly during droughty periods, which reduces the hardiness and density of desirable plants. Proper stocking rates, timely grazing, and restricted grazing during droughty periods help to maintain plant densities.

Potential productivity for eastern white pine on this soil is high. Seedling mortality is moderate because of moisture stress caused by droughtiness. Minimizing disturbance of the soil, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface runoff away from buildings also helps to protect the interior from damage by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the pavement from damage by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability the soil readily absorbs but does not adequately filter the effluent. Placing distribution lines in a mound of more suitable fill material helps to overcome the limitation of the seasonal high water table.

This soil is in capability subclass IIIw.

Fm—Freetown muck. This is a very deep, nearly level, very poorly drained, organic soil in depressions and along streams and rivers. Areas are irregular in shape and range from 6 to 500 acres.

Typically, the surface layer is black muck about 13 inches thick. The subsurface layer is dark brown and black muck about 16 inches thick. The bottom layer is black muck to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of Scarboro and Swansea soils near the edges of the unit. Also included are a few ponded areas. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid.
Available water capacity: Very high.
Soil reaction: Extremely acid.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1 foot below the surface.
Hydrologic group: D.

Most areas of this soil are woodland or wetland shrubs and grasses and provide excellent habitat for wetland wildlife. In the southeastern part of the county a few areas are used for cranberry production.

This soil is poorly suited to conventional farming because of the seasonal high water table. If a suitable outlet is available, the soil can be drained and used for cranberry production.

Potential productivity for red maple on this soil is moderate. Management concerns are excess soil moisture, high seedling mortality, and the hazard of windthrow (fig. 6). Low soil strength limits the use of equipment to periods when the soil is very dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less. Some areas are suitable for hand-planting trees.

This soil is generally not suitable for use as sites for both buildings and septic tank absorption fields because of the seasonal high water table and low strength. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured fill material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table, potential frost action, and low strength.

This soil is in capability subclass Vw.

Fp—Freetown muck, ponded. This is a very deep, nearly level, very poorly drained and ponded organic soil in depressions and along streams and rivers. Areas are round and elongated in shape and range from 6 to 30 acres.

Typically, the surface layer is black muck about 13 inches thick. The subsurface layer is dark brown and black muck about 16 inches thick. The bottom layer is black muck to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of ponded Scarboro and Swansea soils near the edge of the map unit, and a few areas of unponded Freetown soils. Also included, in the southwest part of the survey area, are some small areas that have 6 to 12 inches of coarse sand on the surface. The included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid.
Available water capacity: Very high.
Soil reaction: Extremely acid.
Depth to bedrock: More than 60 inches.
Seasonal high water table: 0 to 3 feet above the surface.
Hydrologic group: D.

Most areas of this soil are completely covered with water and have emergent wetland vegetation typical of freshwater marshes. A few small areas have controlled drainage and are used for cranberry production. Areas of these soils provide excellent habitat for wetland wildlife.

This soil generally is not suitable to most uses because of the ponded surface and low soil strength. Drainage of the soil is difficult because of its position on the landscape and because adequate outlets are not available.

This soil is in capability subclass VIIw.

HaA—Haven silt loam, 0 to 3 percent slopes. This is a very deep, nearly level, well drained soil in broad areas on plains and terraces along the Charles and Neponset Rivers. Areas of the soil are irregular in shape and range from 6 to 50 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is yellowish brown very fine sandy loam in the upper part and light olive brown gravelly very fine sandy loam in the lower part. It is about 15 inches thick. The substratum is light olive brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In some areas the substratum is very fine sandy loam or silt loam and permeability is slow.

Included with this soil in mapping are small areas of Merrimac soils in positions on the landscape similar to those of the Haven soil. Also included, in depressional areas, are small areas of Scio soils that have a

Figure 6.—Windthrow is common in areas of Freetown muck.

seasonal high water table. The included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Strongly acid to slightly acid throughout.
Depth to bedrock: More than 60 inches.
Depth to high water table: More than 6 feet.
Hydrologic group: B.

Many areas of this soil are cultivated. Some areas are wooded, and some areas are used as individual homesites.

This soil is very well suited to cultivated crops, lawns, landscaping, gardens, and pasture. Irrigation may not be necessary in years when rainfall is evenly distributed throughout the growing season. Motorized equipment is easily operated on these nearly level slopes.

Potential productivity for eastern white pine on this soil is very high. The soil is easily managed for woodland use. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

This soil has no major limitations for building site development. Constructing roads on well compacted, coarse textured, base material helps to prevent the damage to pavement by potential frost action. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of very rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

This soil is in capability class I.

HaB—Haven silt loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil in broad areas on plains and terraces along the Charles and Neponset Rivers. Areas of the soil are irregular in shape and range from 6 to 50 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is yellowish brown very fine sandy loam in the upper part and light olive brown gravelly very fine sandy loam in the lower part. It is about 15 inches thick. The substratum is light olive brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In some areas the substratum is very fine sandy loam or silt loam and permeability is slow.

Included with this soil in mapping are small areas of Merrimac soils in positions on the landscape similar to those of the Haven soil. Also included, in depressional areas, are small areas of Scio soils that have a seasonal high water table. The included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Strongly acid to slightly acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: B.

Many areas of this soil are cultivated. Some areas are wooded, and some areas are used as individual homesites.

This soil is very well suited to cultivated crops, lawns, landscaping, gardens, and pasture. Irrigation may not be necessary in years when rainfall is evenly distributed throughout the growing season. Tillage operations that run on the contour or across the slope, crop rotations, and cover crops help to control erosion.

Potential productivity for eastern white pine on this soil is very high. The soil is easily managed for woodland use. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

This soil has no major limitations to building site development. Constructing roads on well compacted, coarse textured, base material helps to protect the pavement from damage by potential frost action. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Extensive grading is needed in preparing sites for small commercial buildings on this gently sloping soil.

This soil is in capability subclass IIe.

HfB—Hinckley sandy loam, 3 to 8 percent slopes. This is a very deep, undulating, excessively drained soil in broad areas on glacial outwash plains, terraces, and kames. Areas are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is dark brown sandy loam about 4 inches thick. The subsoil is dark yellowish brown and about 10 inches thick. In the upper part it is gravelly sandy loam and in the lower part it is gravelly loamy sand. The substratum is light olive brown, stratified gravelly and very gravelly coarse sand to a depth of 60 inches or more. In many areas the surface layer and the subsoil are loamy sand. In areas of this soil in the Boston Basin and in Weymouth, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are small areas of Merrimac and Windsor soils in positions on the landscape similar to those of the Hinckley soil. Also included are small areas of Sudbury soils in depressions. Also included are very small areas where the soil is less than 60 inches to bedrock. In some areas slopes are less than 3 percent. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Rapid in the surface layer and the subsoil and very rapid in the substratum.
Available water capacity: Low.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.

Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are used as individual homesites. Some areas are used as cropland, pastureland, and woodland.

This soil is fairly suited to cultivated crops, pasture, lawns, and landscaping. Because of droughtiness the soil requires irrigation for best plant growth. Minimum tillage, cover crops, and contour farming help to control erosion. In pastureland, the main concern is preventing overgrazing, which reduces the hardiness and density of plants.

Potential productivity for eastern white pine on this soil is high. A management concern is moisture stress caused by the limited available water capacity. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to absorb precipitation. Designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture.

This soil has no major limitations to building site development or for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Low density housing development reduces the volume of effluent, thus lessening the pollution hazard.

This soil is in capability subclass IIIs.

HfC—Hinckley sandy loam, 8 to 15 percent slopes. This is a very deep, rolling, excessively drained soil on side slopes on glacial stream terraces and kames. Areas of the soil are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is dark brown sandy loam about 4 inches thick. The subsoil is dark yellowish brown and about 10 inches thick. In the upper part it is gravelly sandy loam and in the lower part it is gravelly loamy sand. The substratum is light olive brown, stratified gravelly and very gravelly coarse sand to a depth of 60 inches or more. In many areas the surface layer and the subsoil are loamy sand. In areas of this soil in the Boston Basin and in Weymouth, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are small areas of Canton, Merrimac, and Windsor soils in similar landscape positions and Sudbury soils in depressions. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Rapid in the surface layer and the subsoil and very rapid in the substratum.
Available water capacity: Low.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are woodland. A few areas are used as individual homesites.

This soil is fairly suited to cultivated crops, pasture, lawns, and landscaping. Droughtiness and slope are limitations. Irrigation is needed for best plant growth, but it is difficult to apply because of slope. Crop rotations of mostly hay, and stripcropping help to reduce runoff and to control erosion.

Potential productivity for eastern white pine on this soil is high. A management concern is moisture stress caused by the limited available water capacity of the soil. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to absorb precipitation. Designing regeneration cuts to optimize shade and reduce evapotranspiration helps to retain the limited soil moisture.

Buildings designed to conform to the natural slope of the land help to overcome the slope limitation and to control erosion in disturbed areas. Land shaping is needed in some areas. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. The soil readily absorbs but does not adequately filter the effluent. Low density housing development reduces the volume of effluent, thus lessening the pollution hazard.

This soil is in capability subclass IVs.

HfD—Hinckley loamy sand, 15 to 35 percent slopes. This is a very deep, hilly and steep, excessively drained soil on side slopes on terraces, escarpments, kames, and eskers. Areas of the soil are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is dark brown loamy sand about 4 inches thick. The subsoil is dark yellowish brown gravelly loamy sand about 10 inches thick. The substratum is light olive brown, stratified gravelly and very gravelly coarse sand to a depth of 60 inches or more. In areas of this soil in the Boston Basin and in Weymouth, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are small areas of Merrimac and Windsor soils in positions on the landscape similar to those of the Hinckley soil. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Rapid in the surface layer and the subsoil and very rapid in the substratum.
Available water capacity: Low.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are woodland. A few areas are used as individual homesites.

This soil is poorly suited to cultivated crops and pasture because of droughtiness and steep slopes.

Potential productivity for eastern white pine on this soil is high. Management concerns are droughtiness and the hazard of erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion.

Slope is the main limitation for building sites. Extensive land shaping is generally needed. Designing buildings and lots to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Large amounts of cut and fill are generally needed when constructing roads on this soil. Constructing roads on the contour and planting roadbanks to well adapted grasses help to control erosion.

Steepness of slope and very rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Installing distribution lines across the slope helps to overcome the slope limitation, but in some areas additional precautionary measures are needed to reduce the pollution hazard.

This soil is in capability subclass VIIs.

HrC—Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes. This map unit consists of gently sloping and strongly sloping soils and areas of exposed bedrock on hills and ridges where the relief is affected by the underlying bedrock (fig. 7). The shallow, somewhat excessively drained Hollis soil is on the tops of ridges or is near rock outcrops. The very deep, well drained Charlton soil is in low pockets and saddles. Stones and boulders 10 inches to 10 feet in diameter cover 0 to 15 percent of the surface. A typical map unit is about 30 percent Hollis soil, 30 percent Rock outcrop, 25 percent Charlton soil, and 15 percent other soils. These soils and areas of exposed bedrock are intermingled so closely that it was not practical to separate them at the scale used for mapping. Areas of the map unit are irregular in shape and range from 6 to 250 acres.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches. In some areas the substratum is pale yellow fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5

Figure 7.—An area of Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes, on Great Blue Hill.

inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more. In some areas the surface layer is very fine sandy loam. In some areas the subsoil is redder.

Included with this complex in mapping are small areas of moderately deep soils and Canton soils in saddles and on side slopes. Also included are small areas of Scituate soils in depressions. Also included are small areas of seeps or wet pockets. In some areas stones and boulders cover 1 to 15 percent of the surface. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Hollis and Charlton soils.

Available water capacity: Hollis soil—low; Charlton soil—moderate.

Soil reaction: Very strongly acid to moderately acid in both Hollis and Charlton soils.

Depth to bedrock: Hollis soil—10 to 20 inches; Charlton soil—more than 60 inches.

Depth to the seasonal high water table: More than 6 feet in both the Hollis and Charlton soils.

Hydrologic group: Hollis—C/D; Charlton—B.

Most of the soils in this complex are woodland. A few areas are used as individual homesites.

These soils are fairly suited to pasture, but exposed bedrock, stones, and boulders on the surface nearly prohibit pasture maintenance and renovation with conventional farm equipment. These soils are poorly suited to cultivated crops.

Potential productivity for northern red oak on this soil is moderate. The shallow depth to bedrock and low available water capacity on the Hollis soil are management concerns. Rock outcrops generally limit the use of equipment. Some areas are suitable for hand-planting of trees.

Slope is the main limitation to use of these soils as building sites. On the Hollis soil, shallow depth to bedrock is also a limitation. Extensive land shaping and blasting of bedrock are generally needed. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. In some areas the underlying bedrock limits road construction. The underlying bedrock and slope are the main limitations to use of the soils as sites for septic tank absorption fields. Installing the distribution lines across the slope is generally needed for proper operation. In many areas the bedrock limits installation operations. It is difficult to find suitable sites for septic tank absorption fields unless building lots on these soils are more than 2 acres in size.

The very deep Charlton soil in this map unit is well suited to lawns, landscaping, and gardens.

The Hollis and Charlton soils are in capability subclass VIIs.

HrD—Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes. This map unit consists of moderately steep soils and areas of exposed bedrock on hills and ridges where relief is controlled by the underlying bedrock. In a typical area it is about 30 percent Hollis soil, 30 percent Rock outcrop, 25 percent Charlton soil, and 15 percent other soils. The soils and areas of exposed bedrock in this complex are intermingled so closely that it was not practical to separate them in mapping at the scale used for mapping. The shallow, somewhat excessively drained Hollis soil is on the tops of ridges or is near rock outcrops. The very deep, well drained Charlton soil is on side slopes and foot slopes. Stones and boulders 10 inches to 10 feet in diameter cover 0 to 15 percent of the surface. Areas are irregular in shape and range from 6 to 150 acres.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 2 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of 14 inches. In some areas the substratum is pale yellow fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Typically, the surface layer of the Charlton soil is black fine sandy loam about 1 inch thick. The subsurface layer is dark brown fine sandy loam about 5 inches thick. The subsoil is yellowish brown fine sandy loam about 30 inches thick. The substratum is light brownish gray sandy loam to a depth of 60 inches or more. In some areas the surface layer is very fine sandy loam. In some areas the subsoil is redder.

Included with this complex in mapping are small areas of moderately deep soils and areas of Canton soils on side slopes. Also included are small areas of seeps or wet pockets. Stones and boulders cover 1 to 15 percent of the surface. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid throughout in both Hollis and Charlton soils.
Available water capacity: Hollis soil—low; Charlton soil—moderate.
Soil reaction: Hollis soil—very strongly acid or strongly acid; Charlton soil—very strongly acid to moderately acid.
Depth to bedrock: Hollis soil—10 to 20 inches; Charlton soil—more than 60 inches.
Depth to the seasonal high water table: More than 6 feet in both Hollis and Charlton soils.
Hydrologic group: Hollis—C/D; Charlton—B.

Most of the soils in this complex are woodland. A few small areas are used as individual homesites.

This map unit is generally not suited to cultivated crops and pasture because of slope and, on the Hollis soil, shallow depth to bedrock.

Potential productivity for northern red oak on these soils is moderate. Management concerns are slope and, on the Hollis soil, shallow depth to bedrock and low available water capacity. Rock outcrops restrict the use of equipment. Some areas are suitable for hand-planting of trees.

Slope is the main limitation to use of these soils as building sites. In addition, on the Hollis soil, shallow depth to bedrock is also a limitation. Extensive land shaping and blasting of bedrock are generally necessary. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. In some areas the underlying bedrock limits road construction. The underlying bedrock and slope are the main limitations to use of these soils as sites for septic tank absorption fields. Installing the distribution lines across the slope is generally needed for proper operation. In many areas bedrock limits installation operations.

The Hollis and Charlton soils are in capability subclass VIIs.

Ip—Ipswich mucky peat. This is a very poorly drained, nearly level soil in tidal marshes and estuaries on Massachusetts Bay (fig. 8). The soil is subject to tidal flooding twice daily. Areas are irregular in shape and range from 5 to 150 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown mucky peat about 14 inches thick. The subsurface layer is very dark grayish brown mucky peat about 21 inches thick. The bottom layer is very dark grayish brown mucky peat to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of Udorthents, wet substratum, and areas of organic deposits that are less than 51 inches deep. Included areas make up about 5 percent of this map unit.

Soil properties:

Permeability: Moderate to rapid.
Available water capacity: Very high.
Soil reaction: Strongly acid to neutral.
Depth to bedrock: More than 60 inches.
Tidal flooding: Twice daily.
Hydrologic group: D.
Salt content: More than 10,000 parts per million.

Most areas of this soil are in salt-tolerant grasses. They are in the natural condition except for a system of open ditches for freer drainage of tidal inundations.

This soil is very poorly suited to most uses because of sulfides, flooding, wetness, low strength, and salt content. It is well suited to habitat for wetland wildlife, such as fish, shellfish, and waterfowl. In the past some of these areas have been filled and used for commercial, industrial, and residential developments. The filled areas extend through Suffolk County and Quincy, except they are smaller in Quincy. Some of the filled areas are subject to subsidence and to flooding by storm tides.

This soil is in capability subclass VIIIw.

MmA—Merrimac fine sandy loam, 0 to 3 percent slopes. This is a very deep, nearly level, somewhat excessively drained soil in broad areas on plains and terraces that commonly follow major stream valleys. Areas are irregular or rounded in shape and range from 6 to 60 acres.

Typically, the surface layer is dark brown fine sandy loam about 9 inches thick. The subsoil is about 14 inches thick. It is yellowish brown fine sandy loam in the upper part and yellowish brown loamy sand in the lower part. The substratum is light yellowish brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In places the texture changes abruptly from fine sandy loam or loamy sand in the subsoil to very gravelly coarse sand in the substratum. In areas of this soil in the Boston Basin and in Weymouth, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are a few small areas of Hinckley soils on knolls and Sudbury soils in low areas. Also included are areas where the surface layer has been removed or disturbed. Included areas make up about 10 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are used as individual homesites, as sites for commercial and industrial buildings, and as parking lots. Some areas are farmed, and some are woodland.

This soil is very well suited to farming, lawns, landscaping, and gardens. Because of droughtiness, however, irrigation is needed for best plant growth. Mixing crop residue and manure into the surface layer increases the water-holding capacity.

Potential productivity for northern red oak on this soil is moderate. Seedling mortality is moderate because of moisture stress caused by droughtiness. Minimizing soil disturbance, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling

Figure 8.—An area of Ipswich mucky peat. Udorthents, wet substratum, are in the far background.

competing vegetation allows best growth of newly established seedlings. Softwood trees generally grow faster on this soil than hardwood trees.

This soil has no major limitations for building site development and for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Low density housing development reduces the volume of effluent, thus lessening the pollution hazard.

This soil is in capability subclass IIs.

MmB—Merrimac fine sandy loam, 3 to 8 percent slopes. This is a very deep, gently sloping, somewhat excessively drained soil in broad areas on plains and on terraces that commonly follow major stream valleys. Areas are irregular or rounded in shape and range from 6 to 100 acres.

Typically, the surface layer is dark brown fine sandy loam about 9 inches thick. The subsoil is about 14 inches thick. It is yellowish brown fine sandy loam in the upper part and yellowish brown loamy sand in the lower part. The substratum is light yellowish brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In many places the texture changes more abruptly from the subsoil to the substratum. In areas of this soil in the Boston Basin, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are a few small areas of Hinckley soils on knolls and Sudbury soils in low areas and depressions. Also included are areas where the surface layer has been removed or disturbed. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are used as individual homesites, as sites for commercial and industrial buildings, and as parking lots. Some areas are used as cropland, pastureland, and woodland.

This soil is well suited to cultivated crops, lawns, landscaping, and gardens. Because of droughtiness, however, irrigation is needed for best plant growth. Tillage operations on the contour or across the slope, crop rotations, and cover crops help to control erosion.

Potential productivity for northern red oak on this soil is moderate. Seedling mortality is moderate because of moisture stress caused by droughtiness. Minimizing soil disturbance, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations, it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Softwood trees generally grow faster on this soil than hardwood trees.

This soil has no major limitations for building site development and for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Low density housing development reduces the volume of effluent, thus lessening the pollution hazard.

This soil is in capability subclass IIs.

MmC—Merrimac fine sandy loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, somewhat excessively drained soil on side slopes of terraces that commonly follow major stream valleys. Areas of the soil are irregular or elongated in shape and range from 6 to 60 acres.

Typically, the surface layer is dark brown fine sandy loam about 6 inches thick. The subsoil is about 14 inches thick. It is yellowish brown fine sandy loam in the upper part and yellowish brown loamy sand in the lower part. The substratum is light yellowish brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In places the texture changes more abruptly from the subsoil to the substratum. In areas of this soil in the Boston Basin, the subsoil and the substratum are mostly olive colored and are 50 to 75 percent, by volume, coarse fragments of dark, flat shale and slate.

Included with this soil in mapping are a few small areas of Hinckley soils on knolls. Included areas make up about 10 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are used as individual homesites. Some areas are used as cropland, pastureland, and woodland.

This soil is fairly suited to cultivated crops, lawns, landscaping, and gardens. It is well suited to pasture. Slope and droughtiness are the main limitations. Tillage operations on the contour or across the slope, diversions, stripcropping, and cover crops help to control erosion. Irrigation is needed for best plant growth, but application is difficult because of slope. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants.

Potential productivity for northern red oak on this soil is moderate. Seedling mortality is moderate because of moisture stress caused by droughtiness. Minimizing soil disturbance, retaining the sponge-like mulch of leaves, and designing regeneration cuts to optimize shade and reduce evapotranspiration help to retain the limited soil moisture. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Softwood trees grow faster than hardwood trees on this soil.

Designing buildings to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Land shaping is needed in some areas. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Low density housing development reduces the volume of effluent, thus lessening the pollution hazard.

This soil is in capability subclass IIIe.

MnB—Merrimac-Urban land complex, 0 to 8 percent slopes. This map unit consists of nearly level and undulating Merrimac soil and similar soils and areas of Urban land on broad plains. The Merrimac soil is very deep and somewhat excessively drained. A typical map unit is 45 percent Merrimac soil, 40 percent Urban land, and 15 percent other soils. The Merrimac soil and areas of Urban land are in such an intricate pattern on the landscape that it was not practical to separate them at the scale used for mapping. Areas of this map unit are rectangular or irregular in shape and range from 10 to 1,000 acres.

Typically, the surface layer of the Merrimac soil is dark brown fine sandy loam about 9 inches thick. The subsurface layer is about 14 inches thick. It is yellowish brown fine sandy loam in the upper part and yellowish brown loamy sand in the lower part. The substratum is light yellowish brown, stratified very gravelly coarse sand to a depth of 60 inches or more. In areas of this soil in the Boston Basin, the subsoil and the substratum are mostly olive colored and, by volume, 50 to 75 percent of the coarse fragments are dark, flat shale and slate.

Urban land consists of areas where the original soil has been covered with impervious surfaces, such as asphalt, concrete, and buildings. In many places the underlying soil has been cut away or covered by fill from adjacent areas.

Included with this unit in mapping are small areas of Hinckley and Windsor soils in landscape positions similar to those of the Merrimac soil. Also included are areas of Sudbury soils that are in low areas and depressions and that have a seasonal high water table. Included areas make up about 20 percent of the map unit.

Soil properties of the Merrimac soil:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

The mapped areas of this complex are in residential and commercial uses. The Merrimac soil has no major limitations for building site development or for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

The Merrimac soil is well suited to lawns, landscaping, and vegetable gardens. Moderate irrigation is needed during dry periods because the soil is droughty.

The Merrimac soil has not been assigned to a capability subclass.

MoB—Montauk fine sandy loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on lower side slopes on uplands. Areas of the soil are oval or irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown fine sandy loam in the upper part and yellowish brown and light olive brown fine sandy loam and sandy loam in the lower part. The substratum is firm, olive loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Canton and Paxton soils in positions on the landscape similar to those of the Montauk soil. Also included, in low areas, are small areas of Scituate soils. Also included are areas of soils where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and moderately slow or slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 2 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as cropland and pastureland. Some areas are used as individual homesites.

This soil is very well suited to cultivated crops and pasture and to use as orchards. Farming on the contour or across the slope, stripcropping, cover crops, and crop rotations help to reduce runoff and to control erosion. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants and helps to control erosion. The soil is generally on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderately high. The soil is easily managed for woodland. The high productivity of the soil allows intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

The seasonal high water table during winter and spring is a limitation to use of this soil as sites for dwellings with basements and for small commercial buildings. Tile drains around foundations help to remove excess subsurface water. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to protect them from damage by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, slow permeability restricts the soil from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Some areas of this map unit have included soils that have suitable permeability.

This soil is in capability subclass IIe.

MoC—Montauk fine sandy loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained soil on the sides of upland hills. Areas of this soil are oval or irregular in shape and range from 6 to 40 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown fine sandy loam in the upper part and yellowish brown and light olive brown fine sandy loam and sandy loam in the lower part. The substratum is firm, olive loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Canton and Paxton soils in positions on the landscape similar to those of the Montauk soil. Also included are areas of Scituate soils along drainageways and on benches on the sides of hills. Also included are areas of soils where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and moderately slow or slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 2 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as cropland and pastureland. Some areas are used as individual homesites.

This soil is suited to cultivated crops and pasture and to use as orchards. Farming on the contour or across the slope, stripcropping, diversions, cover crops, and crop rotations help to reduce runoff and to control erosion. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants and helps to control erosion. The soil is generally on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderately high. The erosion hazard is a management concern, especially in disturbed areas, such as skid trails, landings, and access roads. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars will help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to absorb precipitation, to reduce runoff, and to control erosion. Plant competition at the time of regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

The seasonal high water table in winter and spring is a limitation to use of the soil as sites for dwellings with basements and small commercial buildings. Tile drains around foundations help to lower the seasonal high water table. Land shaping is needed in some areas. Designing lots to drain surface water away from buildings also helps to protect the interior from damage by the seasonal high water table.

Slope, the seasonal high water table, and potential frost action are the main limitations for road construction. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, the slow permeability restricts the soil from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Some areas of this map unit have included soils that have suitable permeability.

This soil is in capability subclass IIIe.

MsB—Montauk fine sandy loam, 3 to 8 percent slopes, extremely stony. This is a very deep, gently sloping, well drained soil on the tops of hills on uplands. Areas of the soil are oval or irregular in shape and range from 6 to 80 acres. Stones and boulders 10 to 36 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown fine sandy loam in the upper part and yellowish brown and light olive brown fine sandy loam and sandy loam in the lower part. The substratum is firm, olive loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of extremely stony Canton soils and extremely stony Paxton soils in positions on the landscape similar to those of the Montauk soil. Also included, in low areas, are extremely stony Scituate soils. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and moderately slow or slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 2 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are cropland or pasture. Some areas are used as individual homesites.

Unless the stones on the surface are removed, this soil is poorly suited to cultivated crops. The soil is suited to pasture and to use as orchards, but stones on the surface make it difficult to operate conventional farming equipment.

Potential productivity for northern red oak on this soil is moderately high. Management concerns are large stones and boulders on the surface and plant competition. The large surface stones and boulders generally limit the use of harvesting and planting equipment. In some areas hand-planting of trees is needed. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

The seasonal high water table in winter and spring is a limitation to use of these soils as sites for dwellings with basements and small commercial buildings. Tile drains around foundations help to lower the seasonal high water table. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table and potential frost action. If the soil is used as sites for septic tank absorption fields, slow permeability restricts it from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Some map units have included soils that have suitable permeability.

This soil is in capability subclass VIs.

MsC—Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony. This is a very deep, strongly sloping, well drained soil on the sides of upland hills. Areas of the soil are oval or irregular in shape and range from 6 to 60 acres. Stones and boulders 10 to 36 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown fine sandy loam about 4 inches thick. The subsoil is about 25 inches thick. It is dark yellowish brown fine sandy loam in the upper part and yellowish brown and light olive brown fine sandy loam and sandy loam in the lower part. The substratum is firm, olive loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of extremely stony Canton soils and extremely stony Paxton soils in positions on the landscape similar to those of the Montauk soil. Also included are small areas of extremely stony Scituate soils along drainageways and on benches on the sides of hills. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and moderately slow or slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Extremely acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 2 to 2.5 feet.
Hydrologic group: C.

This soil is very poorly suited to cultivated crops because of slope and stones on the surface. It is fairly suited to pasture, but stones on the surface limit pasture maintenance.

Potential productivity for northern red oak on this soil is moderately high. Management concerns are the large stones and boulders on the surface and plant competition. The large surface stones and boulders generally limit the use of harvesting and planting equipment. In some areas hand-planting of trees is needed. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

The seasonal high water table in winter and spring is a limitation to use of this soil as sites for dwellings with basements and small commercial buildings. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also helps to prevent damage to the interior by the seasonal high water table. The large stones in the soil generally hinder excavation operations. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. The large stones in the soil generally hinder road construction. If the soil is used as sites for absorption fields, slow permeability restricts it from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Some map units have included soils that have suitable permeability. Large stones in the soil generally limit installation of the drain fields.

This soil is in capability subclass VIs.

NpB—Newport silt loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on top of hills in the Boston Basin and along the Plymouth County line. Areas are oval and range from 6 to 30 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is light olive brown silt loam about 17 inches thick. The substratum is firm, light yellowish brown silt loam to a depth of 60 inches or more. In many areas the coarse fragments in the soil are 50 to 75 percent, by volume, flat, dark gray shale and slate and are 1 to 15 inches long.

Included with this soil in mapping are small areas of Paxton soils in positions on the landscape similar to those of the Newport soil. Also included are small areas of Pittstown soils in low, flat areas or depressions. Also included are small areas of Udorthents, loamy, where the Newport soil has been cut away or covered with more than 20 inches of loamy fill material. Also included are a few small areas of Urban land. Included soils and areas of Urban land make up about 10 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are used for parks and playgrounds. Some areas are used as sites for buildings.

This soil is very well suited to cultivated crops, hay, and pasture, and to use as orchards. Erosion is a hazard and is the main management concern. Contour tillage, stripcropping, cover crops, and grasses and legumes in the cropping system help to reduce runoff and to control erosion.

Potential productivity for northern red oak on this soil is moderately high. The soil is easily managed for woodland. The high productivity of the soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings with the lower or basement level above the seasonal high water table helps to prevent the damage to the interior by the seasonal high water table. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to the pavement by the seasonal high water table and frost action. If the soil is used as sites for septic tank absorption fields, slow permeability restricts it from readily absorbing the effluent. Installing a drain field larger than average helps to overcome this limitation. Where suitable outlets are available, curtain drains around the absorption field help to lower the seasonal high water table.

This soil is in capability subclass IIe.

NpC—Newport silt loam, 8 to 15 percent slopes. This is a deep, strongly sloping, well drained soil on side slopes of upland hills in the Boston Basin and along the Plymouth County line. Areas are oval and range from 6 to 30 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is light olive brown silt loam about 17 inches thick. The substratum is firm, light yellowish brown silt loam to a depth of 60 inches or more. In many areas the coarse fragments in the soil are commonly 50 to 75 percent, by volume, flat, dark gray shale and slate and are 1 to 15 inches long.

Included with this soil in mapping are small areas of Paxton soils in positions on the landscape similar to those of the Newport soil. Also included are small areas of Pittstown soils in depressions. Also included are small areas of Udorthents, loamy, where Newport soils have been cut away or covered with more than 20 inches of loamy fill material. Also included are a few small areas of Urban land where the soil is covered with impervious surfaces, such as pavement or buildings. Included soils and areas of Urban land make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are used for parks and playgrounds.

This soil is well suited to lawns, landscaping, cultivated crops, hay, and pasture and to use as orchards. Erosion is a hazard and is the main management concern. Contour tillage, stripcropping, diversions, cover crops, and grasses and legumes in the cropping system help to reduce runoff and to control erosion.

Potential productivity for northern red oak on this soil is moderately high. The soil is easily managed for woodland use. The high productivity of this soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted, standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Tile drains around foundations help to lower the seasonal high water table. Land shaping is needed in some areas. Designing lots to drain surface water away from buildings also helps protect the interior from damage by the seasonal high water table. Slope, the seasonal high water table, and potential frost action are the main limitations for road construction. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to the pavement by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, slow permeability of the soil restricts it from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Where a vegetative cover cannot be maintained during construction, sediment and erosion control structures help to control erosion.

This soil is in capability subclass IIIe.

NpD—Newport silt loam, 15 to 25 percent slopes. This is a deep, moderately steep, well drained soil on side slopes of hills in the Boston Basin and along the Plymouth County line. Areas are long and narrow and range from 6 to 50 acres in size. Some of the areas are on eroded slopes that have been revegetated.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil is light olive brown silt loam about 17 inches thick. The substratum is firm, light yellowish brown silt loam to a depth of 60 inches or more. In many areas the coarse fragments in the soil are 50 to 75 percent, by volume, flat, dark gray shale and slate and are 1 to 15 inches long.

Included with this soil in mapping are small areas of Paxton soils in positions on the landscape similar to those of the Newport soil. Also included are a few small areas of Urban land where the soil is covered with impervious surfaces, such as pavement or buildings. Included soils and areas of Urban land make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are used as individual homesites. Other areas are used for parks and playgrounds.

This soil is poorly suited to cultivated crops, hay, or pasture because of slope and the erosion hazard. A permanent vegetative cover is needed to control erosion, especially on the Boston Harbor Islands, where the soil is exposed to wave action.

Potential productivity for northern red oak on this soil is moderately high. Management concerns are slope and the hazard of erosion. Plant competition is moderate if conifers are grown. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and to control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Tile drains around building foundations help to lower the seasonal high water table. In some areas extensive land shaping is needed because of slope. Landscaping designed to drain surface water away from buildings also prevents damage to the interior by the seasonal high water table. Slope, the seasonal high water table, and potential frost action are the main limitations for road construction. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table and potential frost action.

Slope and permeability are limitations to use of the soil as sites for septic tank absorption fields. Unless the absorption fields have expensive and elaborate design, the effluent will rise to the surface. Soils that are better suited to use as sites for septic tank absorption fields are generally nearby.

This soil is in capability subclass IVe.

NuC—Newport-Urban land complex, 3 to 15 percent slopes. This map unit consists of very deep, gently sloping and strongly sloping, well drained soil and areas of Urban land on hills in the Boston Basin. In a typical area it is about 50 percent Newport soil, 40 percent Urban land, and 10 percent other soils. The Newport soil and areas of Urban land are in such an intricate pattern that it was not practical to separate them at the scale used for mapping. Areas are oval in shape and range from 10 to 500 acres.

Typically, the surface layer of the Newport soil is dark brown silt loam about 9 inches thick. The subsoil is light olive brown silt loam about 17 inches thick. The substratum is firm, light yellowish brown silt loam to a depth of 60 inches or more. In many areas the coarse fragments in the soil are 50 to 75 percent, by volume, flat, dark gray shale and slate and are 1 to 15 inches long.

Urban land consists of areas where the original soil has been covered with impervious surfaces, such as asphalt, concrete, and buildings. In most cases the underlying soil has been cut away or covered by fill from surrounding areas of the Newport soil.

Included with this unit in mapping are small areas of Paxton soils in positions on the landscape similar to those of the Newport soil. Also included are Pittstown soils in low, flat areas or depressions. Also included are small areas of Udorthents, loamy, where the Newport soil has been cut away or covered with 20 inches or more of loamy fill material. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

The mapped areas of this complex are in residential and commercial uses.

If the Newport soil is used as sites for septic tank absorption fields, the slow permeability of the substratum restricts it from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Tile drains around building foundations help to lower the seasonal high water table. Designing lots to drain surface water away from buildings helps to prevent damage to the structural interior by the seasonal high water table. During construction, minimizing the exposed soil area helps to control erosion. Hay bale barriers, sediment basins, and other erosion control measures also help to control erosion. Lawns, landscape planting, and gardens are easily established and maintained on the Newport soil.

This soil has not been assigned to a capability subclass.

PaB—Paxton fine sandy loam, 3 to 8 percent slopes. This is a deep, gently sloping, well drained soil on the top of upland hills. The soil is in oval-shaped areas that range from 6 to 100 acres. Slopes are smooth and slightly convex.

Typically, the surface layer is very dark brown fine sandy loam about 5 inches thick. The subsoil is about 24 inches thick. It is yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with this soil in mapping are small areas of Montauk soils where slopes are irregular. Also included are small areas of Charlton soils in positions on the landscape similar to those of the Paxton soils. Also included are small areas of Woodbridge and Ridgebury soils in lower areas and in depressions. Also included are areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included soils make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Some areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used as cropland and pastureland.

This soil is very well suited to cultivated crops, hay, and pasture and to use as orchards. Farming on the contour, stripcropping, cover crops, and grasses and legumes in the cropping system help to reduce runoff and to control erosion. Crop production is generally the best use of the soil. The soil is on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland use. The high productivity of the soil justifies intensive management for either hardwoods or conifers. Plant competition at the time of regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings with the lower or basement level above the seasonal high water table helps to prevent the damage to the interior by the seasonal high water table. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent damage to the pavement by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, slow or very slow permeability restricts it from readily absorbing the effluent. Installing a drain field larger than average helps to overcome this limitation. Where suitable outlets are available, curtain drains around the absorption field help to lower the seasonal high water table.

This soil is in capability subclass IIe.

PaC—Paxton fine sandy loam, 8 to 15 percent slopes. This is a very deep, sloping, well drained soil on the sides of upland hills. The soil is in oval and irregularly shaped areas that range from 6 to 30 acres. Slopes are smooth and slightly convex.

Typically, the surface layer is very dark brown fine sandy loam about 5 inches thick. The subsoil is about 24 inches thick. It is yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with this soil in mapping are areas of Charlton and Montauk soils in positions on the landscape similar to those of the Paxton soil. Also included are areas of Woodbridge soils along drainageways and on benches on the sides of hills. Also included are areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included soils make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table. 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used as cropland or pastureland.

This soil is well suited to cultivated crops, hay, and pasture and to use as orchards. Farming on the contour, stripcropping, diversions, cover crops, and grasses and legumes in the cropping system help to reduce runoff and to control erosion. This soil is on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland use. The high productivity of this soil allows intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

The seasonal high water table in winter and spring is a limitation to use of this soil as sites for dwellings with basements and small commercial buildings. Tile drains around foundations help to lower the seasonal high water table. Land shaping is needed in some areas. Designing lots to drain surface water away from buildings also helps to prevent the damage to the interior by the seasonal high water table. Slope, the seasonal high water table, and potential frost action are the main limitations for road construction. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, slow or very slow permeability restricts it from readily absorbing the effluent. Installing a drain field that is larger than average helps to overcome this limitation. Installing the distribution lines across the slope is generally needed for proper operation.

This soil is in capability subclass IIIe.

PaD—Paxton fine sandy loam, 15 to 25 percent slopes. This is a very deep, moderately steep, well drained soil on the sides of upland hills. Areas of the soil are long and narrow or irregular in shape and range from 6 to 20 acres. Slopes are smooth and convex.

Typically, the surface layer is very dark brown fine sandy loam about 3 inches thick. The subsoil is about 24 inches thick. It is dark yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with this soil in mapping are small areas of Charlton and Montauk soils in positions on the landscape similar to those of the Paxton soil. Also included are areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included areas make up about 10 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as individual homesites.

This soil is poorly suited to cultivated crops because of moderately steep slopes. It is fairly suited to pasture. Erosion is a hazard, and preventing overgrazing is a management concern. Restricting grazing during wet periods helps to maintain plant densities, to reduce surface compaction, and to control erosion.

Potential productivity for northern red oak on this soil is moderate. Slope and the erosion hazard are the main management concerns. Plant competition is moderate if conifers are grown. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and to control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting can be used to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Tile drains around building foundations help to lower the seasonal high water table. Extensive land shaping is needed in some areas because of slope. Landscaping designed to drain surface water away from buildings also helps to prevent the structural damage by the seasonal high water table. Slope, the seasonal high water table, and potential frost action are the main limitations for road construction. Constructing roads on the contour, if possible, and planting roadbanks to well adapted grasses help to control erosion. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent damage to the pavement by the seasonal high water table and potential frost action.

Slope and slow or very slow permeability are limitations to use of the soil as sites for septic tank absorption fields. Unless the absorption field has an expensive and elaborate design, the effluent will surface.

This soil is in capability subclass IVe.

PbB—Paxton fine sandy loam, 3 to 8 percent slopes, extremely stony. This is a very deep, gently sloping, well drained soil on top of upland hills. The soil is in oval and in irregularly shaped areas that range from 6 to 100 acres. Slopes are smooth and slightly convex. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark brown fine sandy loam about 5 inches thick. The subsoil is about 24 inches thick. It is yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with these soils in mapping are a few small areas of extremely stony Montauk soils and Charlton soils in positions on the landscape similar to those of the Paxton soil. Also included are a few small areas of extremely stony Woodbridge and Ridgebury soils in lower areas and in depressions. Also included are areas where stones cover less than 1 percent of the surface. Included areas make up about 15 percent of this map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.

Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used as pastureland or orchards.

This soil is poorly suited to cultivated crops unless the stones are removed. The soil is fairly suited to pasture and to use as orchards, but stones on the surface limit the use of conventional farm equipment. The soil is on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland use. The high productivity of this soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings with the lower or basement level above the seasonal high water table helps to prevent damage to the interior by the seasonal high water table. Large stones and boulders generally limit excavation of foundations and roads. Constructing roads on well compacted, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to pavement by the seasonal high water table and potential frost action.

If the soil is used as sites for septic tank absorption fields, slow or very slow permeability restricts it from readily absorbing the effluent. Installing a drain field larger than average helps to overcome this limitation. If suitable outlets are available, curtain drains around the absorption field help to lower the seasonal high water table. Large stones in the soil generally limit installation of distribution lines.

This soil is in capability subclass VIIs.

PbC—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony. This is a very deep, strongly sloping, well drained soil on tops and sides of upland hills. The soil is in oval or irregularly shaped areas that range from 6 to 100 acres. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark brown fine sandy loam about 4 inches thick. The subsoil is about 24 inches thick. It is yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with these soils in mapping are a few small areas of extremely stony Montauk soils and Charlton soils in positions on the landscape similar to those of the Paxton soil. Also included are a few small areas of extremely stony Woodbridge soils along drainageways and on benches on sides of hills. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table. 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used as pastureland or orchards.

This soil is very poorly suited to cultivated crops because of slope and stones on the surface. It is suited to pasture and orchards, but stones on the surface limit the use of conventional farm equipment. It is on hills where air drainage is good and where fruit crops are protected from frost.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland. The high productivity of the soil allows intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Slope and large stones and boulders are the main limitations to use of the soil as building sites. Land shaping is needed and the large stones and boulders hinder excavation operations. Buildings and lots designed to conform to the natural slope of the land help to overcome the slope limitation and control erosion in disturbed areas. Slope and large stones and boulders are the main limitations for road construction. Large amounts of cut and fill are generally needed, and the large stones and boulders generally limit excavation operations.

Slope and slow or very slow permeability are the main limitations to use of the soil as sites for septic tank absorption fields. The permeability restricts the soil from readily absorbing the effluent. Installing a distribution system that is larger than average across the slope helps to overcome these limitations. The large stones in the soil generally limit the installation of distribution lines.

This soil is in capability unit VIIs.

PbD—Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony. This is a very deep, moderately steep, well drained soil on tops and sides of upland hills. The soil is in oval or irregularly shaped areas that range from 6 to 100 acres. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark brown fine sandy loam about 3 inches thick. The subsoil is about 24 inches thick. It is yellowish brown fine sandy loam in the upper part and brownish yellow gravelly fine sandy loam in the lower part. The substratum is extremely firm and brittle, grayish brown gravelly sandy loam to a depth of 60 inches or more. In some areas the soil has a redder hue throughout.

Included with these soils in mapping are small areas of Charlton soils and extremely stony Montauk soils in positions on the landscape similar to those of the Paxton soil. Also included are areas of soils that have a firm, loamy sand substratum. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland.

This soil is poorly suited to cultivated crops because of slope and stones on the surface. It is fairly suited to pasture. The main management concern is preventing overgrazing. Restricted grazing during wet periods helps to maintain plant densities and to reduce surface compaction. Large stones on the surface restrict the use of conventional farm equipment.

Potential productivity for northern red oak on this soil is moderate. Management concerns are slope and the hazard of erosion. Plant competition is moderate if conifers are grown. Constructing access roads and trails with grades between 2 and 10 percent and installing water bars help to control erosion. Minimizing soil disturbance and retaining the sponge-like mulch of leaves help to reduce runoff and to control erosion. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings.

Slope and large stones and boulders are the main limitations to use of the soil as building sites. Extensive land shaping is needed, and large stones and boulders generally limit excavation operations. Designing buildings and lots to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Slope and the presence of large stones and boulders are the main limitations for road construction. Large amounts of cut and fill are generally needed. The large stones and boulders generally limit excavation operations.

Slope and slow or very slow permeability are limitations to use of the soil as sites for septic tank absorption fields. Permeability restricts the soil from readily absorbing effluent. Unless expensive and elaborate design is used, the effluent will surface. The large stones in the soil generally limit the installation of distribution lines. Soils that are better suited to use as septic tank absorption fields are generally nearby.

This soil is in capability subclass VIIs.

Pr—Pits, quarry. This map unit consists of areas that have been excavated for rock products mostly of granite, diorite, and slate. The quarries are on upland hills and typically have vertical rock walls along the perimeter of the map units, on the working face. Map units are round or rectangular in shape and range from 4 to 60 acres.

Pools of water are at the bottom of some quarries. Piles of quarried and broken rock and piles of rock fragments and rock dust are at the bottom of others.

Most areas of Pits, quarry, are used in a quarrying operation. A few small areas have been abandoned and unreclaimed and are void of vegetation. Included in mapping are small areas of Urban land and Udorthents.

Areas of Pits, quarry, are very poorly suited to most uses. They require extensive site preparation and fill before they can be used as individual homesites.

The lack of soil material and the difficulty of excavation limit reclamation of these areas, and very few have been reclaimed. The areas are poorly suited to most uses because of exposed bedrock, a high percentage of small stone fragments, and very low available water capacity. Onsite investigation is needed to determine the suitability of the unit for any proposed use.

This map unit has not been assigned to a capability subclass.

Ps—Pits, sand and gravel. This map unit consists of excavations mainly in areas of gravelly and sandy material. The pits were created when sand and gravel were removed for construction purposes. The pits are 3 to 50 feet deep. The sides are typically steep. The floor is level to rolling and varies with the underlying material and the bedrock. Piles of stones and boulders are commonly scattered over the pit floor. Included in mapping are small pools of water or small areas of rock outcrops. The excavations are commonly irregular in shape, and vary with the deposits and the ownership boundaries. The pits range from 2 to 100 acres.

These pits generally are not vegetated, although some older ones have scattered shrubs, grasses, and weeds. Most pits are droughty because of very low available water capacity. Some pits have been excavated to depths below the seasonal high water table.

Areas of Pits, sand and gravel, are poorly suited to farming and woodland use because of very low available water capacity. They are also poorly suited to use as habitat for wildlife, although some birds prefer to nest in these areas.

Some areas of Pits, sand and gravel, are suitable for residential and recreation development. Onsite investigation is needed for any proposed use. If these areas are used as sites for septic tank absorption fields, ground water pollution is a hazard.

This map unit has not been assigned to a capability subclass.

PtB—Pittstown silt loam, 2 to 8 percent slopes. This is a very deep, gently sloping, moderately well drained soil in flat areas or depressions of upland hills in the Boston Basin. Areas of the soil are rounded or oval in shape and range from 6 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil is light olive brown silt loam about 20 inches thick. In the lower part it has distinct mottles. The substratum is firm, mottled, grayish brown silt loam to a depth of 60 inches or more. In a few places the subsoil and the substratum have more clay and are sticky when wet. Fragments of flat, dark gray shale and slate 1 to 15 inches long make up 50 to 75 percent, by volume, of the coarse fragments in the soil.

Included with this soil in mapping are small, more sloping areas of Newport soils. Also included are small areas of Udorthents, loamy, where the Pittstown soil has been cut away or covered with more than 20 inches of loamy fill material. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Strongly acid or moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are used as sites for parks or public institutions. Some areas are used as individual homesites. A few areas are used as community vegetable gardens.

This soil is well suited to cultivated crops and pasture. In some years the perched seasonal high water table delays planting in spring or harvesting in fall. Drainage is needed for best crop growth and the most efficient use of machinery. The firm, compact substratum limits the installation of effective drainage systems. Cover crops and crop rotations help to reduce runoff and to control erosion. Proper stocking rates, timely grazing, and restricted use during wet periods help to maintain desirable pasture plant species.

Potential productivity for northern red oak on this soil is moderately high. The soil is easily managed for woodland use. The high productivity of this soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting can be used to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to prevent the damage to the interior by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings and use of sump pumps in basements also help to prevent the damage to the interior by the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from potential frost action.

The seasonal high water table and permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations. Erosion is a severe hazard; consequently, a vegetative cover is needed. Hay bale dams and sediment basins also help to reduce runoff and to control erosion if the soil is exposed during construction.

This soil is well suited to lawns, landscaping, and gardens. The seasonal high water table generally limits cultivation and restricts the use of machinery to late spring and early fall.

This soil is in capability subclass IIe.

Ra—Raynham silt loam. This is a very deep, nearly level, poorly drained soil in low areas of glacial lakebeds and outwash plains. Areas of the soil are oval and irregular in shape and range from 6 to 30 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is black silt loam about 8 inches thick. In the upper part the subsoil is grayish brown silt loam about 5 inches thick. In the lower part it is mottled, light olive gray silt loam about 19 inches thick. The substratum is mottled, light olive gray very fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Birdsall soils in depressions. Also included are small areas of Walpole soils in positions on the landscape similar to those of the Raynham soil. Also included are a few small areas of soils that have a dense, very slowly permeable substratum. Included areas make up about 25 percent of the map unit.

Soil properties:

Permeability: Moderately slow.
Available water capacity: High.
Soil reaction: Strongly acid or moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal water table: 0.5 foot to 2.0 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are open and idle. A few small areas are cropland.

This soil is fairly suited to cultivated crops if drainage systems remove excess water. In undrained areas it is better suited to midsummer and late summer pasture. Mixing crop residue and manure into the plow layer improves the tilth and increases the organic matter content.

Potential productivity for red maple on this soil is moderate. The main management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less.

Constructing buildings without basements, above the seasonal high water table, helps to prevent damage to the interior by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also helps to prevent damage to the interior by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the roads from damage by the seasonal high water table and potential frost action. The seasonal high water table and permeability are the main limitations of the soil to use as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IVw.

RdA—Ridgebury fine sandy loam, 0 to 5 percent slopes. This is a very deep, nearly level and gently sloping, poorly drained soil in depressions and along drainageways, on uplands. Areas of the soil are irregular or long and narrow in shape and range from 6 to 20 acres.

Typically, the surface layer is very dark brown fine sandy loam about 10 inches thick. The subsoil is about 9 inches thick. It is dark brown fine sandy loam in the upper part and mottled, grayish brown fine sandy loam in the lower part. The substratum is very firm, mottled, light brownish gray fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Whitman soils in depressions and Scituate and Woodbridge soils on low knolls. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. A few areas are pastureland.

This soil is suited to cultivated crops and pasture. The seasonal high water table is the main limitation. The dense, compact substratum limits installation of effective drainage systems.

Potential productivity for northern red oak on this soil is moderate. Management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less.

Constructing buildings without basements, above the seasonal high water table, helps to prevent the damage to the interior by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also helps to prevent the damage to the interior by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to roads by the seasonal high water table and potential frost action. The seasonal high water table and slow or very slow permeability are the main limitations of the soil to use as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IIIw.

RgB—Ridgebury fine sandy loam, 2 to 8 percent slopes, extremely stony. This is a very deep, gently sloping, poorly drained soil in depressions and along drainageways on uplands. Areas of the soil are irregular or long and narrow in shape and range from 6 to 40 acres. Stones and boulders 10 inches to 10 feet in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark brown fine sandy loam about 10 inches thick. The subsoil is about 9 inches thick. It is dark brown fine sandy loam in the upper part and mottled, grayish brown fine sandy loam in the lower part. The substratum is very firm, mottled, light brownish gray fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of extremely stony Whitman soils in depressions and extremely stony Scituate soils and extremely stony Woodbridge soils, on low knolls. Also included are some areas of extremely stony Ridgebury soils with slopes of more than 8 percent. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate to moderately rapid in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. A few areas are pastureland.

This soil is poorly suited to cultivated crops and pasture because of the seasonal high water table and stones and boulders on the surface.

Potential productivity for northern red oak on this soil is moderate. Management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less.

Constructing buildings without basements, above the seasonal high water table, helps to prevent the damage to the interior by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also helps to prevent the damage to the interior by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to the pavement by the seasonal high water table and potential frost action. The seasonal high water table and slow or very slow permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations. Stones and boulders on the surface hinder all excavation operations.

This soil is in capability subclass VIIs.

Rm—Rippowam silt loam. This is a very deep, nearly level, poorly drained soil on flood plains adjacent to streams and rivers. Areas of the soil are irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The substratum is mottled and extends to a depth of 60 inches or more. It is brown fine sandy loam in the upper part and grayish brown, stratified medium and coarse sand in the lower part. In many areas the surface layer has less silt and more sand.

Included with this soil in mapping are small areas of Saco soils along the edges of streams. Also included are areas of soils that have more silt throughout than the Rippowam soil. Also included are areas of better drained soils in narrow bands in slightly higher, convex positions. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Strongly acid to slightly acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1.5 feet.
Hydrologic group: C.
Flooding: Frequent for brief periods.

Most areas of this soil are woodland or in marsh grasses and sedges.

This soil is suited to cultivated crops and pasture if it is drained. In undrained areas the soil is saturated by the seasonal high water table through late spring and is poorly suited to farming. The main conservation practices needed include installing field drains where feasible, proper timing of farming operations, planting water-tolerant plant species, and planting after spring flooding.

Potential productivity for red maple on this soil is moderate. Management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less.

This soil is generally not suitable to use as sites for buildings and septic tank absorption fields because of flooding and the seasonal high water table. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured fill material and providing adequate side ditches and culverts help to prevent the damage to pavement by flooding.

This soil is in capability subclass IVw.

RoD—Rock outcrop-Hollis complex, 3 to 25 percent slopes. This map unit consists of areas of exposed bedrock and nearly level to steep, shallow, somewhat excessively drained Hollis soil (fig. 9). It is on tops and along ridge lines of steep upland hills and in coastal areas along Boston Bay. In a typical area it is about 55 percent Rock outcrop, 40 percent Hollis soil, and 5 percent other soils. The areas of exposed bedrock and the Hollis soil in this map unit are intermingled so closely that it was not practical to separate them at the scale used for mapping. Areas of the map unit are long and narrow or irregular in shape and range from 5 to 200 acres.

Typically, the surface layer of the Hollis soil is black fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown fine sandy loam about 11 inches thick. Bedrock is at a depth of about 14 inches. In some areas the substratum is yellowish brown fine sandy loam. The bedrock is granite, basalt, diorite, or conglomerate.

Included with this unit in mapping are small areas of moderately deep, well drained soils on foot slopes and very poorly drained Whitman and Swansea soils in depressions. In some areas slopes range to as much as 45 percent. Included areas make up about 10 percent of the map unit.

Soil properties of the Hollis soil:

Permeability: Moderate or moderately rapid throughout.
Available water capacity: Low.

Figure 9.—An area of Rock outcrop-Hollis complex, 3 to 25 percent slopes, is in the foreground. In the background is an area of Newport-Urban land complex, 3 to 15 percent slopes.

Soil reaction: Strongly acid or moderately acid.
Depth to bedrock: 10 to 20 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: C/D.

Most areas of the Hollis soil are woodland. Many areas are used as parks and reservations. A few areas are used for radio, TV, or microwave transmission towers.

Extensive exposures of bedrock and the shallow Hollis soil of this map unit are generally not suitable to most uses. It is best suited to use as habitat for woodland wildlife and to recreational use such as hiking.

Potential productivity for northern red oak on this soil is moderate. Management concerns are shallow depth to bedrock and low available water capacity. Bedrock outcrops restrict the use of equipment. Some areas are suitable for hand-planting of trees.

The Hollis soil is generally not suitable for building site development and for use as sites for septic tank absorption fields. Areas that are better suited to these uses are generally nearby.

This Hollis soil is in capability subclass VIIs.

Sa—Saco silt loam. This is a very deep, nearly level, very poorly drained soil on the lowest lying parts of flood plains adjacent to streams and rivers. Areas of the soil are irregular in shape and range from 6 to 250 acres.

Typically, the surface layer is 26 inches thick. It is very dark grayish brown silt loam in the upper part and black silt loam in the lower part. The substratum extends to a depth of 60 inches or more. It is very dark gray and grayish brown silt loam in the upper part and grayish brown loamy fine sand in the lower part.

Included with this soil in mapping are small areas of Freetown soils, ponded, and Rippowam, Scarboro, and Swansea soils in similar positions on the landscape. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: High.
Soil reaction: Strongly acid or moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 0.5 foot.
Hydrologic group: D.
Flooding: Frequent for long periods.

Most areas of this soil are used as habitat for wetland wildlife and support a growth of sedges, wetland shrubs, and grasses.

This soil is very poorly suited to crop production or pasture because of flooding and the seasonal high water table.

Potential productivity for eastern white pine on this soil is moderately high. Management concerns are flooding, the seasonal high water table, high seedling mortality, and the hazard of windthrow. Some areas are suitable for hand-planting of trees.

This soil is generally not suited to use as sites for buildings and septic tank absorption fields because of flooding and the seasonal high water table. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured fill material and providing adequate side ditches and culverts help to prevent damage to the pavement by flooding.

This soil is best suited to use as habitat for wetland wildlife. Extensive areas along the Charles and Neponset Rivers are publicly owned and controlled and are used for hunting and other outdoor recreation.

This soil is in capability subclass VIw.

Sb—Scarboro and Birdsall soils. These are deep, nearly level, very poorly drained soils in low, flat areas and in depressions on glacial outwash plains and terraces. Some areas are mostly Scarboro soils, some are mostly Birdsall soils, and some areas consist of both soils. Areas of these soils are irregular in shape and range from 6 to 50 acres. The Scarboro and Birdsall soils were mapped together because they are similar in use and management. The total acreage of this map unit is about 65 percent Scarboro soils, 15 percent Birdsall soils, and 20 percent other soils. Slopes range from 0 to 3 percent.

Typically, the surface layer of the Scarboro soils is black muck about 9 inches thick. The substratum is gray coarse sand to a depth of 60 inches or more. In some areas the substratum has more gravel or more silt.

Typically, the surface layer of the Birdsall soils is very dark gray very fine sandy loam about 8 inches thick. The subsoil is very fine sandy loam about 8 inches thick. It is light olive gray in the upper part and is gray and has faint mottles in the lower part. The substratum is gray, stratified very fine sand and silt to a depth of 60 inches or more. In some areas the substratum is greenish gray.

Included with this unit in mapping are small areas of Swansea soils in landscape positions similar to those of the Scarboro and Birdsall soils. Also included are small areas of Raynham and Walpole soils in slightly higher, convex positions. Included areas make up about 10 percent of the map unit.

Soil properties:

Permeability: Scarboro soils—Rapid or very rapid; Birdsall soils—Moderately slow.
Available water capacity: Scarboro soils—Low; Birdsall soils—High.
Soil reaction: Scarboro soils—Very strongly acid to moderately acid throughout; Birdsall soils—Very strongly acid to moderately acid throughout.
Depth to bedrock: Scarboro soils—More than 60 inches; Birdsall soils—More than 60 inches.
Depth to the seasonal high water table: Scarboro soils—1 foot above to 1 foot below the surface; Birdsall soils—0 to 1.0 foot.
Hydrologic group: Both Scarboro and Birdsall soils—D.

Most areas of the soils in this unit are woodland. A few areas have been drained and are used for pasture.

A few other areas have been filled in and are used as building sites.

These soils are poorly suited to cultivated crops and pasture because of the seasonal high water table and ponding.

Potential productivity for red maple on this soil is moderate. Management concerns are excess soil moisture, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soils are very dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less. Some areas are suitable for hand-planting of trees.

These soils are generally not suitable for use as sites for buildings and for septic tank absorption fields because of the seasonal high water table and ponding. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to prevent the damage to the pavement by the seasonal high water table and potential frost action.

The Scarboro and Birdsall soils are in capability subclass Vw.

ScB—Scio very fine sandy loam, 2 to 5 percent slopes. This is a nearly level or gently sloping, moderately well drained soil in slight depressions on plains and on tops of low terraces along the Charles and Neponset Rivers. Individual areas of this soil are irregular in shape and range from about 5 to 20 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 14 inches thick. It is light olive brown silt loam in the upper part and mottled, olive silt loam in the lower part. The substratum is mottled, olive silt loam to a depth of 60 inches or more. In some areas slopes are less than 2 percent. In a few areas the surface layer and the subsoil have more sand.

Included with this soil in mapping are small areas of Haven soils on subtle rises in the topography and Sudbury soils in similar positions on the landscape. Included soils make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderate.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.0 feet.
Hydrologic group: B.
Flooding: Occasional after periods of intense rainfall.

Most areas of this soil are abandoned cropland. A few areas are woodland.

This soil is well suited to cultivated crops and pasture. In some years the seasonal high water table delays planting or harvesting. Drainage is needed for maximum crop yields and efficient use of machinery. Most forage grasses are suited to the undrained soil.

Potential productivity for northern red oak on this soil is moderately high. The soil is easily managed for woodland use. The high productivity of this soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings and use of sump pumps in basements also protect the interior from damage by the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect pavement from damage by potential frost action. The seasonal high water table is the main limitation to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome this limitation.

This soil is in capability subclass IIe.

SeB—Scituate fine sandy loam, 3 to 8 percent slopes. This is a very deep, gently sloping, moderately well drained soil in low areas on tops, the lower slopes, and depressions of uplands. Areas of the soil are irregular in shape and range from 6 to 20 acres.

Typically, the surface layer is black fine sandy loam about 5 inches thick. The subsoil is about 27 inches thick. It is dark brown to dark yellowish brown sandy loam in the upper part and mottled, light olive brown gravelly loamy sand in the lower part. The substratum is firm, mottled, grayish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Woodbridge soils in positions on the landscape similar to those of the Scituate soils. Also included are small areas of Ridgebury soils in depressions and Montauk soils on knolls. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are used as cropland and pastureland. Some areas are used as individual homesites.

This soil is very well suited to cultivated crops and pasture. In some years the perched seasonal high water table delays planting in spring or harvesting in fall. Drainage is needed for best crop growth and the most efficient use of machinery. The firm, compact substratum limits installing effective drainage systems. Farming on the contour or across the slope, crop rotations, and cover crops help to reduce runoff and to control erosion. Proper stocking rates, timely grazing, and restricted grazing during wet periods help to maintain desirable pasture plant species.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland use. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation is generally needed for best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also protects the interior from damage by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the roads from damage by the seasonal high water table and potential frost action.

The seasonal high water table and permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IIw.

StB—Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony. This is a very deep, gently sloping, moderately well drained soil in low areas on tops, the lower slopes, and depressions of uplands. Areas of the soil are irregular in shape and range from 6 to 80 acres. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is black fine sandy loam about 5 inches thick. The subsoil is about 27 inches thick. It is dark brown to dark yellowish brown sandy loam in the upper part and mottled, light olive brown gravelly loamy sand in the lower part. The substratum is firm, mottled, grayish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of extremely stony Woodbridge soils in positions on the landscape similar to those of the Scituate soil. Also included are small areas of extremely stony Ridgebury soils in depressions and extremely stony Montauk soils on knolls. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas are pastureland, and some are used as individual homesites.

Unless the stones on the surface are removed, the soil is poorly suited to cultivated crops. The soil is fairly suited to pasture, but stones on the surface limit the use of conventional farming equipment.

Potential productivity for northern red oak on this soil is moderate. The soil is easily managed for woodland use. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface runoff away from buildings also helps to protect the interior from damage by the seasonal high water table. The large stones in the soil generally hinder excavation operations. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the pavement from damage by the seasonal high water table and potential frost action. The large stones generally limit road construction.

The seasonal high water table and permeability are the main limitations to use of this soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations. The large stones generally limit the installation of distribution lines.

This soil is in capability subclass VIs.

SuB—Sudbury fine sandy loam, 2 to 8 percent slopes. This is a very deep, nearly level and gently sloping, moderately well drained soil in low areas and slight depressions on glacial outwash plains and terraces. Areas of the soil are irregular in shape and range from 6 to 30 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 8 inches thick. The subsoil is about 22 inches thick. It is dark brown and dark yellowish brown sandy loam in the upper part and mottled, yellowish brown loamy sand in the lower part. The substratum is mottled, light yellowish brown stratified sand and fine sand to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of Merrimac and Walpole soils. Merrimac soils are typically in higher convex areas, and Walpole soils are in swales. Also included are areas where more sand is in the surface layer and the subsoil than in the Sudbury soil. Also included are areas that have a finer textured or firm substratum. Also included are areas where some soil horizons have accumulations of iron. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 3.0 feet.
Hydrologic group: B.

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are cropland or pastureland.

This soil is well suited to cultivated crops and pasture. The seasonal high water table is the major management concern, and subsurface drains are needed for best production of row crops. Farming on the contour, cover crops, and grasses and legumes in the cropping system help to reduce runoff and to control erosion. Restricted grazing is needed during wet conditions.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings provides added assurance against damage caused by the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the pavement from damage by the seasonal high water table and potential frost action.

The seasonal high water table and rapid permeability are the main limitations of the soil to use as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IIe.

Sw—Swansea muck. This is a very deep, nearly level, very poorly drained soil in depressions or in low-lying level areas. Areas of the soil are circular or irregular in shape and range from 5 to 20 acres.

Typically, the surface layer is black and dark yellowish brown muck about 34 inches thick. The substratum is loose, olive gray gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of Birdsall, Freetown, and Scarboro soils in positions on the landscape similar to those of the Swansea soil. Also included are a few small areas of Saco soils along streams. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the organic material and very rapid in the substratum.
Available water capacity: High.
Soil reaction: Extremely acid in the organic material and extremely acid to strongly acid in the underlying mineral material.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1.0 foot.
Hydrologic group: D.

Most areas of this soil are used as habitat for wetland wildlife. The natural vegetation consists of reeds, sedges, and water-tolerant grasses.

This soil is very poorly suited to cultivated crops and pasture because of the seasonal high water table. Areas of the soil are difficult to drain because suitable outlets are not available.

Potential productivity for red maple on this soil is moderate. Management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is very dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less. Some areas are suitable for hand-planting of trees.

This soil is generally not suitable for building sites and septic tank absorption fields because of the seasonal high water table and low strength. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured fill material and providing adequate side ditches and culverts help to protect the pavement from damage by the seasonal high water table, potential frost action, and low soil strength.

This soil is in capability subclass Vw.

Ua—Udorthents, sandy. This map unit consists of nearly level to steep areas where the original soils have been removed for use as roadfill, concrete aggregate, or landfill. The original soils were typically excessively drained to well drained and on glacial outwash plains, terraces, kames, and eskers. Areas of Udorthents, sandy, are irregular in shape and range from 6 to 150 acres. Slopes are complex but are dominantly 0 to 5 percent at the base of cutout areas and have side slopes of 8 to 35 percent following the perimeter of the unit map.

Typically, Udorthents, sandy, are the remaining substratum material from Canton, Hinckley, Merrimac, and Windsor soils, after the upper 4 to 40 feet of the soil material was removed. Most areas are stratified sand and gravel to a depth of 60 inches or more. In many areas stones and boulders 10 inches to 10 feet in diameter are scattered randomly on the surface or are in piles. Where heavy machinery has made continual passes over the same area, the surface is firm and compact. In a few areas the surface layer is thin and is brown or dark brown sandy loam or loamy sand.

Included with this map unit are small areas of Udorthents, loamy, and Urban land. Also included are some low areas and depressions that have a seasonal high water table. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate to very rapid throughout.
Available water capacity: Very low or low.

Most areas of Udorthents, sandy, are idle and commonly have scrubby vegetation of poverty grass, sweet fern, gray birch, poplar, and eastern redcedar.

Udorthents, sandy, differ greatly in soil characteristics from place to place but are generally well suited to use as building sites. Because of rapid or very rapid permeability, the soils readily absorb but do not adequately filter the effluent. If the soils are used as septic tank absorption fields, ground water pollution is a hazard. These soils are very droughty and are poorly suited to use as sites for lawns, landscaping, and vegetable gardens. Irrigation, fertilization, and the addition of at least 4 inches of topsoil are needed to establish a protective cover of grasses.

Onsite investigation is needed to determine the suitability of this map unit for any use.

These soils have not been assigned to a capability subclass.

Ud—Udorthents, loamy. This map unit consists of nearly level and gently sloping areas where the original soils have been cut away or covered with a loamy fill material. Most areas have been graded to a smooth surface. Areas are dominantly on uplands but are in almost every landscape position. Areas range in size from 6 to 200 acres. Slopes are smooth or irregular, and range from 0 to 25 percent but are dominantly 0 to 5 percent.

Where the original soil has been cut away, Udorthents, loamy, typically consist of the exposed substrata of Boxford, Charlton, Newport, Paxton, Pittstown, or Woodridge soils. In areas that have been filled they consist of several soils or of one soil removed from an adjacent cut. Areas have a loamy texture, dominantly fine sandy loam. The soils in these areas are slightly darker in the uppermost 6 to 10 inches than in the underlying material, and they resemble topsoil. In many areas the fill is compact and firm when dry. Most of these areas have grass vegetation. Some areas on slopes of 15 to 25 percent do not have a vegetative cover because of erosion.

Included with this map unit are areas of Udorthents, sandy, near abandoned gravel pits and Udorthents, wet substratum, on wetlands. Also included are small areas of Urban land. These included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderate to slow to a depth of 10 inches and rapid to very slow below that depth.
Available water capacity: Low or moderate.

In most areas Udorthents, loamy, are used for parks, recreation fields, and buildings. The properties of these soils vary greatly with depth; however, they are generally well suited to use as building sites. Restrictive layers and buried objects generally obstruct deep excavations. These soils are fairly suited to lawns, landscaping, and vegetable gardens. In urban areas vegetable gardens generally can be planted if soil tests are made to identify possibly contaminated soil, as with heavy metals. These soils differ greatly from place to place; consequently, onsite investigation is needed to assess the suitability of the soils for specific land uses.

These soils have not been assigned to a capability subclass.

Ue—Udorthents, wet substratum. This map unit consists of filled areas that were previously tidal marshes, river flood plains, bays, harbors, and swamps (fig. 10). The fill consists of rubble, refuse, and mixed soil material, typically, sand, gravel, and channel dredgings. Depth of the fill ranges from 2 to 20 feet or more. Areas of these soils are most extensive along Boston, Dorchester, and Quincy Bays and adjacent to the Charles and Neponset Rivers. Smaller areas are scattered throughout the survey area. Areas of these soils are irregular in shape and range from 6 to 600 acres.

Typically, the surface layer is very dark gray fine sandy loam about 14 inches thick. The substratum in the upper part is dark grayish brown fine sandy loam and in the lower part is very dark gray silt mixed with oyster shells and other debris. It extends to a depth of 82 inches. Below that, it is underlain by a preexisting tidal mud flat. A distinct sulfide odor emanates from the lower part of the substratum. In some areas the original surface layer has been removed.

Included with this map unit are small areas of Urban land and Ipswich soils. These areas are typically less than 2 acres in size, and make up about 5 percent of the map unit.

Soil properties:

Permeability: Moderate or slow.
Available water capacity: Low or moderate.

Runoff is slow, and water tends to pond on the surface after intensive rain. The seasonal high water table is in the lower part of the substratum, commonly within 3 to 5 feet of the surface.

If these areas are used as building sites, extensive onsite investigation is needed and pilings are typically used in preparing foundations. Vegetable gardens generally can be planted if individual areas are tested for reaction, nutrients, and metal content.

Onsite investigation is needed to determine the suitability of these soils for any use.

These soils have not been assigned to a capability subclass.

Uf—Udorthents, refuse substratum. This map unit consists of areas that have been used for refuse disposal. Most of these areas have been constructed of alternating layers, several inches to several feet thick,

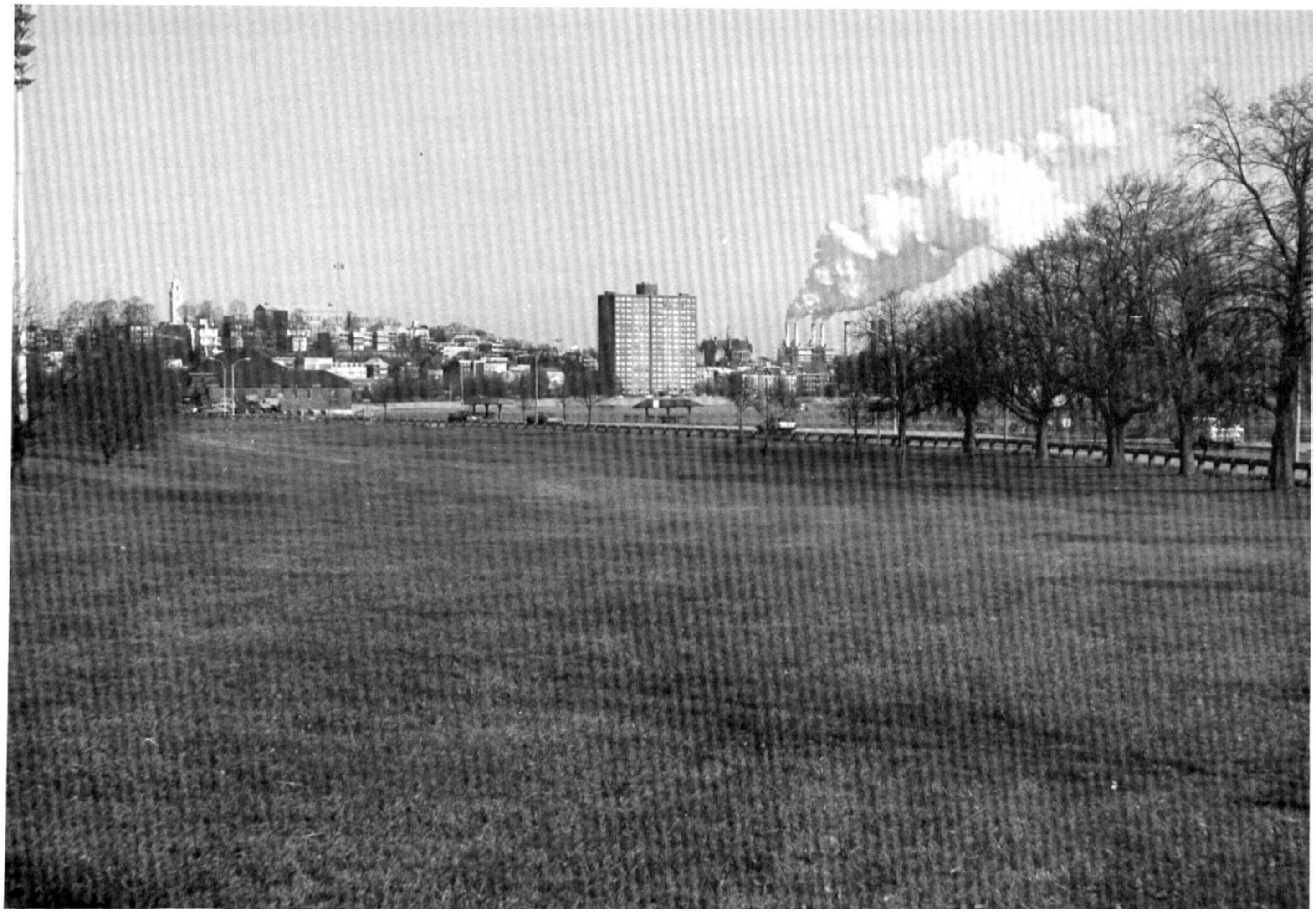


Figure 10.—An area of Udorthents, wet substratum, is in the foreground. In the background is an area of Newport-Urban land complex, 3 to 15 percent slopes.

of refuse and soil material. The areas are mainly in the low-lying parts of the landscape. The largest areas of this map unit are on the Boston and Quincy landfills. This map unit ranges from 5 to 110 acres in size. Slopes are dominantly 2 to 8 percent but increase to 15 to 35 percent on side slopes at the edges of the map unit.

The areas of these soils constructed prior to 1971 consist almost entirely of refuse many feet deep and a cover of 12 inches or more of loamy soil material planted to grasses. The refuse consists of partly decomposed or burned paper, plastic, metal, glass, rubble, cinders, and organic debris. The areas constructed after 1971 consist of alternating layers of loamy and sandy soil material, unburned refuse, sewage sludge, and incinerated refuse. Where these areas have been abandoned, a final cover of 24 to 48 inches of loamy soil material has been placed on the surface, sometimes mixed with sewage sludge, graded to 2 percent slopes, and planted to grasses. In areas in active use, about 6 inches of sandy or loamy soil material daily is placed over the refuse and compacted. In a few places refuse protrudes through the surface.

Included with this map unit are areas of Udorthents, loamy, where no refuse is in the underlying material. Also included are areas of Udorthents, sandy, in adjacent pits used as a source of daily cover material. Also included are areas of Udorthents, wet substratum, where swamps, marshes, and flood plains have been filled. The included areas make up about 20 percent of the map unit.

Permeability of Udorthents, refuse substratum, is moderate to very slow in the upper 24 to 48 inches and rapid to very slow in underlying material. Available water capacity is low. In nearly level areas water tends to pond on the surface of the compacted cover material. The odor of sulfide gas can be detected when excavations are made in this map unit. Occasionally, an orange-colored leachate seeps out of the base of slopes.

Areas of these soils that are not in use for refuse disposal are idle or are used as playing fields. Some areas have been reclaimed and are used as building sites.

These soils are generally not suitable as sites for buildings and septic tank absorption fields because they subside. In addition, dangerous, emitted gases can accumulate inside buildings on these areas.

These soils are poorly suited to use as vegetable gardens because crops can absorb toxic substances from refuse and sewage sludge. They are fairly suited to recreation uses, such as ballfields. Areas of these soils differ greatly from area to area; consequently, onsite investigation is needed to assess the suitability of the soils for specific land uses.

These soils have not been assigned to a capability subclass.

Ur—Urban land, 0 to 15 percent slopes. This map unit consists of areas where 75 percent or more of the land is covered with impervious surfaces, such as buildings, pavement, industrial parks, and railroad yards. These areas are mapped throughout the survey area, typically in central business districts and along major roads and highways. They are in almost every landscape position. Areas are irregular in shape and have angular boundaries. They range from 6 to 1,000 acres.

Most of this map unit is covered with impervious surfaces; consequently, nearly all rainfall runs off. A storm drainage system is needed to control this excessive runoff.

Included with this unit in mapping are areas of Udorthents, loamy, and Udorthents, wet substratum. These inclusions commonly vary with the underlying soil material of the adjoining Urban land. Some units have areas of rock outcrops. Included areas make up about 15 percent of the map unit.

It was impractical to identify in all areas the underlying soil because of the extent of impervious surfaces. Onsite investigation is needed to determine the suitability for specific land uses.

This map unit has not been assigned to a capability subclass.

Uw—Urban land, wet substratum, 0 to 3 percent slopes. This map unit consists of Urban land developed in areas of Udorthents, wet substratum. Buildings, industrial areas, pavement, and railroad beds cover more than 75 percent of the land surface. The largest areas of this map unit are in downtown Boston and in land surrounding Boston Harbor. Prior to the mid-1700's these areas were a series of small islands surrounded by the bay and estuaries. They are now one large landmass surrounded by the Charles River and Boston Harbor. Smaller areas of this map unit are scattered throughout the cities and towns that border Massachusetts Bay. Areas are irregular in shape and range from 10 to 10,000 acres.

Included with this map unit are small areas of Udorthents, wet substratum, and Udorthents, loamy, where the surface has been exposed. Also included are small, narrow Beaches where the landmass borders Boston Harbor. Included areas make up about 15 percent of the map unit.

Most of this map unit is covered with impervious surfaces; consequently, almost all rainfall runs off. A storm drainage system is needed to control this excessive runoff. The seasonal high water table is in the lower part of the substratum.

Most of these areas are in commercial and industrial uses. If they are used as building sites, extensive onsite investigation is needed and pilings are typically used in preparing foundations (fig. 11).

In a few areas of these soils vegetable gardens can be planted. Soil tests of individual areas are needed for depth, reaction, nutrients, and metal content.

This map unit has not been assigned to a capability subclass.

UxA—Urban land-Boxford complex, 0 to 3 percent slopes. This map unit consists of areas of Urban land and very deep, nearly level and gently sloping soils in coastal plain regions. In a typical area it is about 60 percent Urban land, 30 percent Boxford soil, and 10 percent other soils. The Urban land and the Boxford soil are in such an intricate pattern that it was not practical to separate them at the scale selected for mapping. Areas are irregular in shape and range from 6 to 200 acres in size.

Urban land consists of areas where the original soil has been covered with impervious surfaces, such as

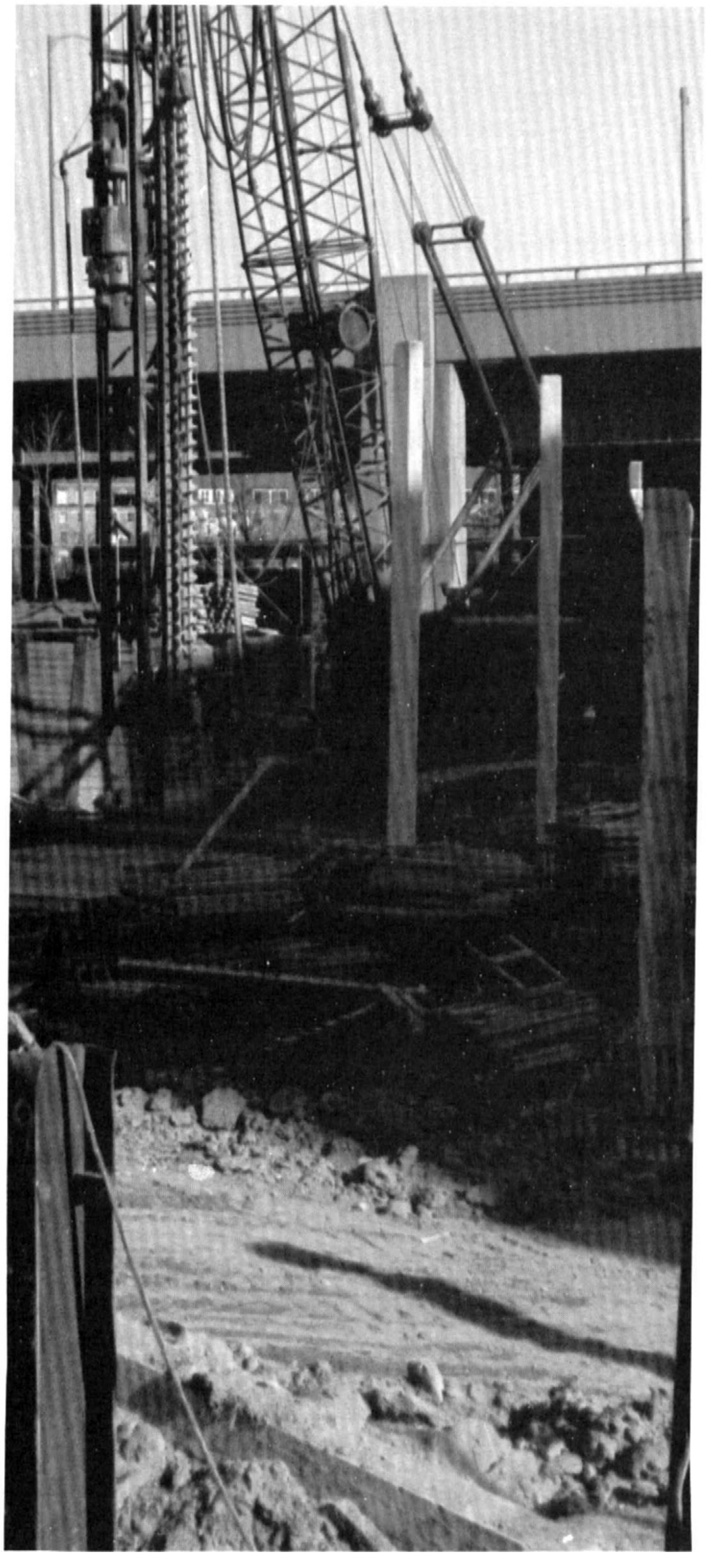


Figure 11.—An area of Urban land, wet substratum, 0 to 3 percent slopes. Pilings typically are used in the construction of foundations.

asphalt, concrete, and buildings. In most cases the underlying soil has been cut away or covered with fill from adjacent areas.

Typically, the surface layer of the Boxford soil is a very dark grayish brown silt loam about 8 inches thick. The subsoil is mottled, light olive brown silty clay loam about 14 inches thick. The substratum is mottled, olive silty clay loam to a depth of 60 inches or more.

Included with this unit in mapping are areas of Newport and Pittstown soils adjacent to hills and areas of Scio soils in positions on the landscape similar to those of the Urban land and the Boxford soil. Also included are a few areas of Udorthents, loamy, where the Boxford soil has been cut away or covered with 20 inches or more of loamy fill material, and Udorthents, wet substratum, where areas of tidal marsh have been filled with more than 24 inches of soil material. Included areas make up about 10 percent of the map unit.

Soil properties of the Boxford soil:

Permeability: Moderate in the surface layer and the subsoil and slow in the substratum.
Available water capacity: High.
Soil reaction: Strongly acid to slightly acid in the surface layer and the upper part of the subsoil and slightly acid to neutral in the substratum.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.0 to 3.0 feet.
Hydrologic group: C.

The mapped areas of this complex are in both residential and commercial uses. Constructing buildings without basements, above the seasonal high water table, and designing landscaping to drain surface water away from buildings help to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps help to lower the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from damage by potential frost action. The seasonal high water table and slow permeability are the main limitations to use of the Boxford soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

The Boxford soil is fairly suited to establishing and maintaining lawns, landscaping, and gardens. The seasonal high water table is the main limitation. The seasonal high water table generally delays planting and tillage. The Boxford soil holds enough water to enable plants to tolerate short periods of drought.

This Boxford soil has not been assigned to a capability subclass.

WaA—Walpole sandy loam, 0 to 5 percent slopes. This is a very deep, nearly level, poorly drained soil in depressions and along drainageways of glacial outwash plains and terraces. Areas of the soil are narrow and irregular in shape and range from 6 to 40 acres.

Typically, the surface layer is very dark brown sandy loam about 9 inches thick. The subsoil is grayish brown sandy loam about 9 inches thick. The substratum is yellowish brown and pale olive gravelly loamy sand to a depth of 60 inches or more. In many areas the surface layer and the subsoil are fine sandy loam, and in other areas the surface layer is less than 9 inches thick.

Included with this soil in mapping are small areas of Sudbury, Raynham, and Scarboro soils. Raynham soils are in positions on the landscape similar to those of the Walpole soil. Sudbury soils typically are in convex positions, and Scarboro soils are in lower positions on the landscape. A few areas have a hard, cemented layer 2 to 6 inches thick that restricts water movement and root penetration in the lower part of the subsoil. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Moderately rapid in the surface layer and the subsoil and rapid or very rapid in the substratum.
Available water capacity: Low or moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 0 to 1.0 foot.
Hydrologic group: C.

Most areas of this soil are woodland or are abandoned, idle fields. A few areas are used for pasture.

This soil is fairly suited to cultivated crops and pasture. The seasonal high water table restricts the root zone and keeps the soil saturated through late spring. The main management concern is overgrazing. Restricted grazing during wet periods helps to maintain a good growth of forage plants. Drainage systems help to lower the seasonal high water table and increase the choice of crops.

Potential productivity for red maple on this soil is moderate. Management concerns are the seasonal high water table, high seedling mortality, and the hazard of windthrow. Low soil strength limits the use of equipment to periods when the soil is dry or frozen. Thinning the stands helps to minimize windthrow if residual stand density is at or slightly above standard stocking levels and if changes in stand density are limited to 30 percent or less.

Constructing buildings without basements, above the seasonal high water table, and designing landscaping to drain surface water away from buildings help to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps in basements help to lower the seasonal high water table. Constructing roads on raised, coarse textured base material and providing adequate side ditches and culverts help to protect the pavement from damage by the seasonal high water table and potential frost action.

The seasonal high water table and rapid or very rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Because of rapid or very rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Consequently, ground water pollution is a hazard. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IVw.

WhA—Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony. This is a very deep, nearly level and gently sloping, very poorly drained soil along drainageways, in depressions, and in low areas on uplands. Areas of the soil are long and narrow or irregular in shape and range from 5 to 40 acres. Slopes range from 0 to 5 percent. Stones and boulders that are 10 inches to 10 feet in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is black fine sandy loam about 9 inches thick. The subsoil is mottled, grayish brown gravelly fine sandy loam about 13 inches thick. The substratum extends to a depth of 60 inches or more. It is firm, grayish brown gravelly sandy loam.

Included with this soil in mapping are small areas of extremely stony Ridgebury soils and extremely stony Woodbridge soils on low knolls and Birdsall soils along drainageways that extend onto glacial outwash plains and terraces. Also included are areas that have slopes of 5 to 8 percent and areas where stones cover less than 1 percent of the surface. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate or moderately rapid in the

surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Strongly acid or moderately acid throughout.
Depth to bedrock: More than 60 inches.
Seasonal high water table: 1.0 foot above to 0.5 foot below the surface.
Hydrologic group: D.

Most areas of this soil are woodland.

This soil is poorly suited to cultivated crops and pasture because of ponding, the seasonal high water table, and stones on the surface.

Potential productivity for eastern white pine on this soil is high. Management concerns are ponding, high seedling mortality, the hazard of windthrow, large stones and boulders on the surface, and plant competition. The large stones and boulders on the surface generally limit the use of harvesting and planting equipment. Hand-planting of trees is needed in some areas. Thinning crowded stands to accepted, standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting can be used to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation is needed for best growth of newly established seedlings.

This soil is generally not suitable for building site development because of ponding. It is also not suitable for septic tank absorption fields because of ponding and because permeability of the soil restricts it from readily absorbing the effluent. Soils that are better suited to these uses are generally nearby. Constructing roads on raised, coarse textured fill material and providing adequate side ditches and culverts help to protect the pavement from damage by ponding and potential frost action. The large stones generally limit road construction.

This soil is in capability subclass VIIs.

WnA—Windsor loamy sand, 0 to 3 percent slopes. This is a very deep, nearly level, excessively drained soil on tops of glacial outwash plains, terraces, and deltas. Areas of the soil are rounded and irregular in shape and range from 6 to 50 acres.

Typically, the surface layer is dark brown loamy sand about 8 inches thick. The subsoil is about 16 inches thick. It is yellowish brown loamy sand in the upper part and yellowish brown sand in the lower part. The substratum is very pale brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Deerfield soils in low-lying areas and depressions. Merrimac and Hinckley soils are on low knolls and hummocks. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Rapid.
Available water capacity: Low.
Soil reaction: Very strongly acid to moderately acid in the surface layer and the subsoil and strongly acid to slightly acid in the substratum.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are woodland. Some areas are cropland or pastureland, and some are used as individual homesites. This soil is a probable source of sand. In a few areas it is used as a source of sand.

This soil is well suited to cultivated crops. It is droughty, and irrigation is needed for best plant growth. The soil is suited to pastureland. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants.

Potential productivity for eastern white pine on this soil is high. A management concern is moisture stress caused by the limited available water capacity. Thinning crowded stands to accepted, standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance and retaining the sponge-like mulch of leaves allow the soil to absorb precipitation. Designing regeneration cuts to optimize shade and to reduce evapotranspiration helps to retain the limited soil moisture.

This soil has no major limitations for building site development and for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

This soil is in capability subclass IIIs.

WnB—Windsor loamy sand, 3 to 8 percent slopes. This is a very deep, gently sloping, excessively drained soil on tops and sides of glacial outwash plains, terraces, and deltas. Areas of the soil are rounded and irregular in shape and range from 6 to 100 acres.

Typically, the surface layer is dark brown loamy sand about 8 inches thick. The subsoil is about 16 inches thick. It is yellowish brown loamy sand in the upper part and yellowish brown sand in the lower part. The substratum is very pale brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Deerfield soils in low-lying areas and depressions. Merrimac and Hinckley soils are on knolls. Included areas make up about 15 percent of the map unit.

Soil properties:

Permeability: Rapid.
Available water capacity: Low.
Soil reaction: Very strongly acid to moderately acid in the surface layer and the subsoil and strongly acid to slightly acid in the substratum.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 6 feet.
Hydrologic group: A.

Most areas of this soil are woodland. Some areas are cropland or pastureland, and some are used as individual homesites. This soil is a probable source of sand. In a few areas it is used as a source of sand.

This soil is well suited to cultivated crops. It is droughty and irrigation is needed for best plant growth. Cover crops, conservation tillage, and contour farming help to control erosion. The soil is fairly suited to pastureland. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants.

Potential productivity for eastern white pine on this soil is high. A management concern is moisture stress caused by the limited available water capacity. Thinning crowded stands to accepted, standard stocking levels allows more vigorous growth. In thinning operations it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance and retaining the sponge-like mulch of leaves allow the soil to absorb precipitation. Designing regeneration cuts to optimize shade and to reduce evapotranspiration help to retain the limited soil moisture.

This soil has no major limitations for building site development and for local roads and streets. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

This soil is in capability subclass IIIs.

WnC—Windsor loamy sand, 8 to 15 percent slopes. This is a very deep, strongly sloping, excessively drained soil on side slopes of glacial outwash plains, terraces, and deltas. Areas of the soil are rounded and irregular in shape and range from 6 to 35 acres.

Typically, the surface layer is dark brown loamy sand about 6 inches thick. The subsoil is about 16 inches thick. It is yellowish brown loamy sand in the upper part and yellowish brown sand in the lower part. The substratum is very pale brown sand to a depth of 60 inches or more (fig. 12).

Included with this soil in mapping are small areas of Merrimac and Hinckley soils in positions on the landscape similar to those of the Windsor soil. Included areas make up about 20 percent of the map unit.

Soil properties:

Permeability: Rapid.
Available water capacity: Low.
Soil reaction: Very strongly acid to moderately acid in the surface layer and the subsoil and strongly acid to slightly acid in the substratum.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: More than 60 inches.
Hydrologic group: A.

Most areas of this soil are woodland. Some areas are idle cropland, and some are used as individual homesites. This soil is a probable source of sand. In a few areas it is used as a source of sand.

This soil is suited to cultivated crops. It is droughty, and irrigation is needed for best plant growth. Cover crops, conservation tillage, stripcropping, and contour farming help to control erosion. The soil is suited to pastureland. In pasture management, preventing overgrazing protects the hardiness and density of desirable plants.

Potential productivity for eastern white pine on this soil is high. A management concern is moisture stress caused by the limited available water capacity. Thinning

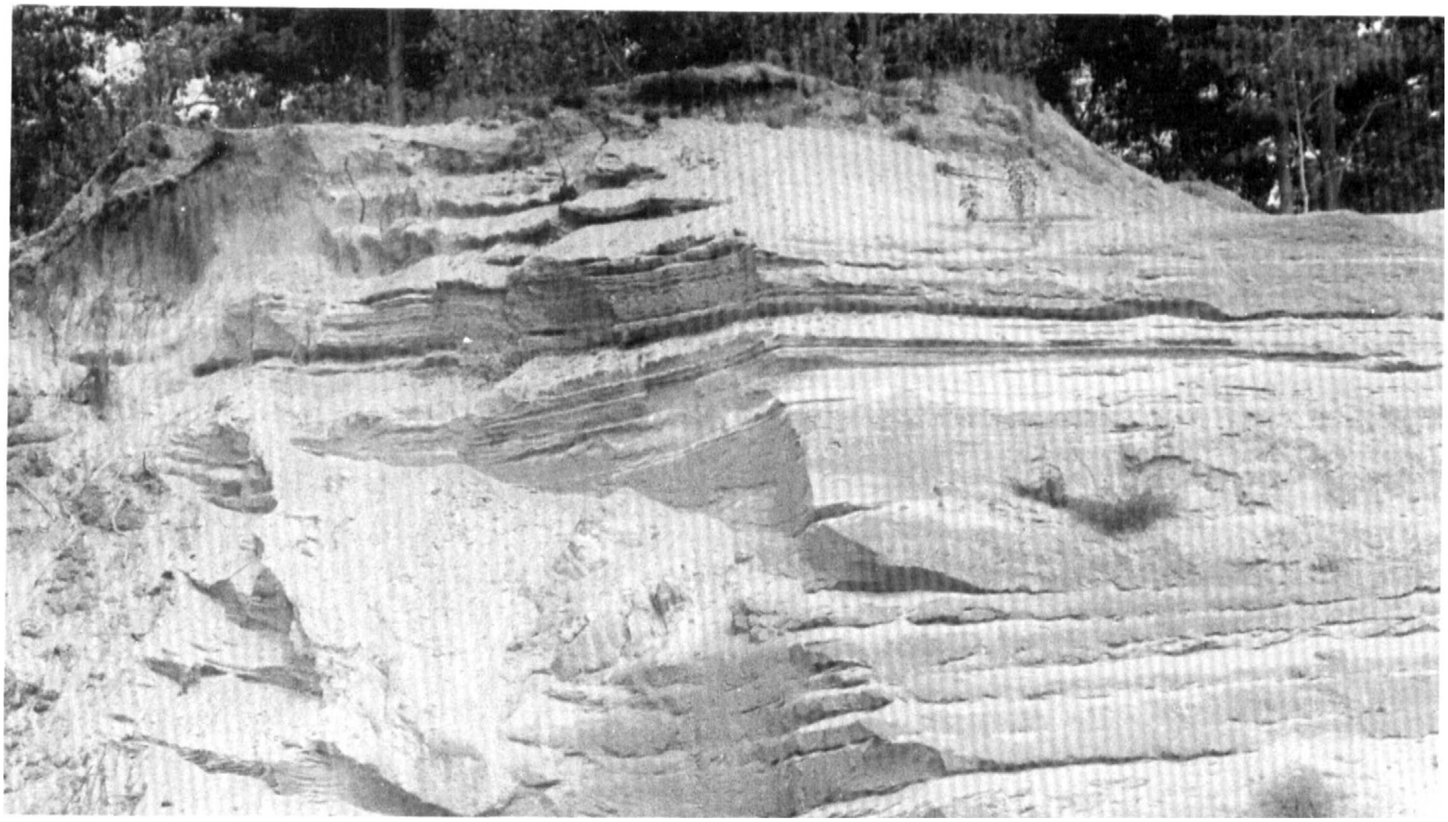


Figure 12.—Stratified sands in the substratum of Windsor loamy sand, 8 to 15 percent slopes.

crowded stands to accepted, standard stocking levels allows more vigorous growth. In thinning operations, it is important to remove diseased, poorly formed, and otherwise undesirable trees. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Minimizing soil disturbance and retaining the sponge-like mulch of leaves allow the soil to absorb precipitation. Designing regeneration cuts to optimize shade and to reduce evapotranspiration helps to retain the limited soil moisture.

Designing buildings to conform to the natural slope of the land helps to overcome the slope limitation and to control erosion in disturbed areas. Land shaping is needed in some areas. Constructing roads on the contour, where possible, and planting roadbanks to well adapted grasses help to control erosion. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent.

This soil is in capability subclass IVs.

WrA—Woodbridge fine sandy loam, 0 to 3 percent slopes. This is a very deep, moderately well drained, nearly level soil on tops of hills and in low areas within uplands. Areas of the soil are oval and range from 6 to 150 acres.

Typically, the surface layer is very dark gray fine sandy loam about 8 inches thick. The subsoil is mottled very fine sandy loam about 18 inches thick. It is light olive brown in the upper part and light yellowish brown in the lower part. The substratum is very firm, mottled, grayish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Paxton soils on subtle rises in the landscape, Ridgebury soils in depressions and low areas, and Scituate soils in positions on the landscape similar to those of the Woodbridge soil. Also included are areas that have bedrock within 48 inches, areas where topsoil has been removed, and areas where stones cover 1 to 15 percent of the surface. Included soils make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas have been developed as individual homesites. A few areas are cropland or pastureland.

This soil is well suited to cultivated crops and pasture. The perched seasonal high water table generally delays planting in spring or harvesting in fall. Drainage is needed for best crop growth and the most efficient use of machinery. The firm, compact substratum increases the difficulty of installing effective drainage systems. Cover crops and crop rotations help to reduce runoff and to control erosion. Proper stocking rates, timely grazing, and restricted grazing during wet periods help to maintain desirable pasture plant species.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland use. The high productivity of the soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted, standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings and the use of sump pumps in basements also protect the interior from damage by the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from damage by frost action.

The seasonal high water table and slow or very slow permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IIw.

WrB—Woodbridge fine sandy loam, 3 to 8 percent slopes. This is a very deep, moderately well drained, gently sloping soil on tops of hills, on side slopes, and on toe slopes within uplands. Areas of the soil are irregular or oval in shape and range from 6 to 150 acres.

Typically, the surface layer is very dark gray fine sandy loam about 8 inches thick. The subsoil is mottled very fine sandy loam about 18 inches thick. It is light olive brown very fine sandy loam in the upper part and light yellowish brown very fine sandy loam in the lower part. The substratum is very firm, mottled, grayish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Paxton soils on subtle rises in the landscape and Ridgebury soils in depressions and low areas. Also included are areas where bedrock is within a depth of 48 inches, areas where the substratum is sandier, and areas where stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. Included soils make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. Some areas have been developed as individual homesites. A few areas are cropland or pastureland.

This soil is well suited to cultivated crops and pasture. The perched seasonal high water table generally delays planting in spring or harvesting in fall. Drainage is needed for best crop growth and the most efficient use of machinery. The firm, compact substratum limits installing effective drainage systems. Farming on the contour or across the slope, conservation tillage, cover crops, and crop rotations help to reduce runoff and to control erosion. In pasture management, proper stocking rates, timely grazing, and restricted grazing during wet periods help to maintain desirable plants.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland use. The high productivity of this soil justifies intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings and the use of sump pumps in basements also protect the interior from damage by the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from damage by potential frost action.

The seasonal high water table and slow or very slow permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

This soil is in capability subclass IIe.

WsB—Woodbridge fine sandy loam, 3 to 8 percent slopes, extremely stony. This is a very deep, moderately well drained, gently sloping soil on tops of hills, on side slopes, and on toe slopes within uplands. Areas of the soil are oval or irregular in shape and range from 6 to 50 acres. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface.

Typically, the surface layer is very dark gray fine sandy loam about 8 inches thick. The subsoil is mottled very fine sandy loam about 18 inches thick. It is light olive brown very fine sandy loam in the upper part and light yellowish brown very fine sandy loam in the lower part. The substratum is very firm, mottled, grayish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of extremely stony Paxton soils on subtle rises on the landscape and extremely stony Ridgebury soils in depressions and low areas. Also included are areas where the substratum is sandier and areas where stones cover less than 1 percent of the surface or where slopes are more than 8 percent. Included soils make up about 15 percent of the map unit.

Soil properties:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

Most areas of this soil are woodland. A few areas have been developed as homesites.

This soil is poorly suited to cultivated crops, hay, and pasture because of the stones on the surface and the seasonal high water table. If the stones are removed it is well suited to these uses.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland use. The high productivity of this soil allows intensive management for either hardwoods or conifers. Plant competition at regeneration is moderate if conifers are grown. Thinning crowded stands to accepted standard stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings and the use of sump pumps in basements also help to protect the interior from damage by the seasonal high water table. The large stones in the soil generally hinder excavation operations. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from damage by potential frost action. The large stones generally hinder road construction.

The seasonal high water table and slow or very slow permeability are the main limitations to use of the soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations. The large stones generally hinder the installation of distribution lines.

This soil is in capability subclass VIs.

WuC—Woodbridge-Urban land complex, 3 to 15 percent slopes. This map unit consists of the Woodbridge soil and areas of Urban land on uplands. The Woodbridge soil is gently sloping and strongly sloping, very deep, and moderately well drained. In a typical area it is about 45 percent Woodbridge soil, 40 percent Urban land, and 15 percent other soils. The Woodbridge soil and Urban land are in such an intricate pattern that it was not practical to separate them at the scale selected for mapping. Areas of the map unit are rectangular or irregular in shape and range from 10 to 500 acres.

Typically, the surface layer of the Woodbridge soil is very dark gray fine sandy loam about 8 inches thick. The subsoil is mottled very fine sandy loam about 18 inches thick. It is light olive brown very fine sandy loam in the upper part and light yellowish brown very fine sandy loam in the lower part. The substratum is very firm, mottled, grayish brown loam to a depth of 60 inches or more.

Urban land consists of areas where the original soil has been covered with impervious surfaces, such as asphalt, concrete, and buildings. In most areas the underlying soil has been cut away or covered by fill from adjacent areas.

Included with this unit in mapping are small areas of Paxton soils on convex slopes and small areas of Ridgebury soils in depressions and in low, wet areas. Also included are areas where the substratum is sandier and areas where stones cover 1 to 15 percent of the surface. Included areas make up about 15 percent of the map unit.

Soil properties of the Woodbridge soil:

Permeability: Moderate in the surface layer and the subsoil and slow or very slow in the substratum.
Available water capacity: Moderate.
Soil reaction: Very strongly acid to moderately acid throughout.
Depth to bedrock: More than 60 inches.
Depth to the seasonal high water table: 1.5 to 2.5 feet.
Hydrologic group: C.

The mapped areas of this complex are in residential and commercial uses.

Constructing buildings without basements, above the seasonal high water table, helps to protect the interior from damage by the seasonal high water table. Tile drains around foundations and the use of sump pumps help to lower the seasonal high water table. Landscaping designed to drain surface water away from buildings also helps to protect the interior from damage by the seasonal high water table. Constructing roads on well compacted, coarse textured base material helps to protect the pavement from damage by potential frost action.

The seasonal high water table and slow or very slow permeability are the main limitations to use of the Woodbridge soil as sites for septic tank absorption fields. Placing distribution lines in a mound of more suitable fill material helps to overcome these limitations.

The Woodbridge soil is fairly suited to landscaping and to use as lawns and vegetable gardens. The seasonal high water table limits the use of machinery to periods when the soil is not saturated.

This Woodbridge soil has not been assigned to a capability subclass.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 72,300 acres of prime farmland. That acreage makes up about 25 percent of the total acreage in the survey area and is mainly in the central and western parts of the survey area.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Some soils in table 5 are classified as prime farmland if certain limitations of the soil are overcome. The measures needed to overcome the limitations of such soils are given in parentheses after the name of the map unit.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture in Norfolk County

Carol S. Litchfield, district conservationist, helped to write this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In the late sixties, a new trend in Norfolk County was the encroachment of housing developments on farmland. In neighboring Suffolk County people leaving the cities reduced the population by 18 percent.

In Norfolk County the population increased 54 percent. The rapid urbanization caused hazards of erosion and sedimentation and contributed to flooding problems and water shortages. The effect of urbanization on farming in Norfolk County from 1969 to 1974 was a decline of 26 percent, from 233 to 172, in the total number of farms.

By the late seventies, citizens of Norfolk County began to urge their local planning boards to address the subject of open space preservation. As communities responded to the challenge, agriculture began to make a comeback. By 1978, the number of farms had actually increased from 172 to 203. Unlike the agriculture practiced in the past, farming was the principal occupation of only 52 percent of the operators.

Although agriculture is making a comeback in the county, some types of operations will probably never again achieve the success they once enjoyed. Since 1969, the number of dairy farms and beef operations, as well as the number of horse farms, has steadily declined. As a result, the demand for hay has also fallen. From 1969 to 1978, the acreage of harvested hay decreased 30 percent.

In addition to hayland, Norfolk County also has 2,000 acres of pasture. On many livestock farms, only limited amounts of pasture are available. Rotation grazing, or moving animals from one pasture to another, allows the pasture grass sufficient time to recover and prevents overgrazing.

The other major agricultural enterprises in the county include livestock, orchards, and ensilage. Sheep have been increasing in numbers. The number of hogs and pigs in the county has held steady from 1974 to 1984. There were 15 orchards in 1969 and 16 in 1978. From 1969 to 1978, the acreage planted to silage corn increased from 411 to 462 acres.

Other acreages used for agriculture include 408 acres of vegetables, 49 acres of cranberries, and 73 acres of nursery stock.

The short growing season commonly is a problem in Norfolk County. Heavy spring rains and cold temperatures can delay the germination of a crop and eventually postpone the date of harvest 2 or 3 weeks. If silage corn is grown, there may not be time to plant a cover crop such as winter rye before the first freeze. Cover crops in winter help to control erosion, incorporate organic matter into the soil, and help to improve soil tilth and water holding capacity.

Erosion is generally not a significant problem. Almost half of the farmland in the county is used for the production of hay and is already adequately covered as protection against erosion. Most tracts of cropland in the county are not large enough to use stripcropping or terrace systems. The Norfolk County Agricultural School is currently experimenting with crop rotations and minimum tillage practices that help to control erosion and to improve yields. If successful, these practices may prove to be the best management alternatives available in Norfolk County.

The major crops in the county are silage corn and vegetables, including sweet corn, tomatoes, and green peas. Deep, friable soils that have good natural drainage, such as Montauk and Paxton fine sandy loams, are well suited to vegetables and nursery crops. Hinckley and Merrimac soils that have slopes of less than 8 percent are suited to these crops but generally require irrigation during droughty periods. Most soils in the county are low in natural fertility and require additions of fertilizer to produce maximum crop yields. The soils are generally strongly acid or very strongly acid. Applications of lime are needed to raise the pH to nearly neutral, as required for the best growth of most crops.

The seasonal high water table of wetland soils, such as Freetown and Swansea soils, limits their agricultural use to the production of cranberries. Unless drainage systems are installed, poorly drained soils, such as Raynham and Walpole soils, are usually too wet for good crop production.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Crop yields fluctuate widely, depending on yearly variations in rainfall and other climatic factors, as well as management techniques and soil types. The main conservation practices in Norfolk County include manure management, crop residue management, green manure crops, irrigation, and drainage systems. Soil testing is important in determining the kind and amount of lime and fertilizer to apply on the fields. Soil testing is available from the Cooperative Extension Service at the Norfolk County Agricultural School.

General estimates of crop production in Norfolk County are available from the Cooperative Extension Service. Data, however, are not yet sufficient to correlate these estimates to the productive capability of specific soils. These estimates of specific soil productivity were obtained directly from local farmers, who can be reached by contacting the Norfolk County Conservation District. Cropland on Woodbridge fine sandy loam in Franklin typically yields sweet corn at 600 to 800 dozen/acre and pumpkins at 4 or 5 tons/acre. Canton fine sandy loam in Wrentham yields strawberries at 8,200 quarts/acre, raspberries at 7,000 pints/acre, and blueberries at 25,000 pints/acre.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have slight limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

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

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

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

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, or *s*, 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); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, or *s*, because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Urban Gardening in Suffolk County

John Perry, district supervisor, Suffolk Conservation District, helped to write this section.

Urban gardening is very poplar in Suffolk County. The number of sites and the total acreage in the county have increased significantly each year in the past decade.

One problem of urban gardening in the county is the thin layer of topsoil at most new garden sites. Another problem is lead-contaminated soil. Suffolk Cooperative Extension Service conducts a free testing program to determine the content of lead and nutrients in soils used for vegetable gardens. Methods of overcoming high lead levels are removing and replacing the contaminated soil or adding organic matter to make up at least 25 percent of the content of the soil.

The other problem of urban gardening is locating reliable, nonprivate sources of irrigation water. The Boston Water and Sewer Commission has installed water spigots at many sites. Drip irrigation and extensive mulching help to overcome the limitation of low available moisture and to increase crop yields.

The problems of urban gardening are lack of sunlight, the heat, and low fertility. The surrounding buildings block sunlight. Also, in an urban complex, buildings and pavement store warmth during the day and release it at night. Also, the gardens need regular applications of manure and other soil amendments.

The city of Boston has about 16,000 vacant houselots, so the expansion of urban gardening has not been limited. In the inner city, however, the prospects of establishing permanent gardening sites are still uncertain. The Boston Redevelopment Authority, for example, considers urban gardening on land that it owns as an interim use. The authority's policy is that a garden site can be used for building at a later date. Some garden groups, however, have purchased their own sites. Also, the Boston Natural Areas Fund Organization has permanent sites for community gardening and other open spaces.

Woodland Management and Productivity

Laura Dooley, district forester, Massachusetts Department of Environmental Management, and David Welsch, forester, Soil Conservation Service, helped to write this section.

Norfolk County, one of the more densely populated counties in Massachusetts, is about 45 percent forested. Suffolk County is even more densely populated and is about 6 percent forested. The two counties make up the survey area. The major forest types in the survey area are the oak type, the red maple type, and the white pine type. Several Christmas tree plantations and a few red pine plantations are also in the survey area.

Existing stands of fair to good quality sawtimber of both oak and pine show that management for quality sawtimber products is possible in the survey area. Canton and Charlton soils are well suited to oak and pine sawtimber, respectively. Good markets exist for these products in the survey area. Thinning of the younger, smaller diameter stands is needed to improve these larger stands. The small, hardwood (deciduous) roundwood that is thinned out can be sold for firewood in the survey area. This firewood market also enables profitable management of the red maple type that grows well on both Walpole and Woodbridge soils. Because markets for small softwood (coniferous) roundwood do not exist, stands of these trees commonly must be thinned in timber stand improvement (TSI). Strong markets exist for Christmas trees and Christmas tree products. Old fields and burned-over areas on Canton, Charlton, and Paxton soils are well suited to Christmas tree production.

Most of the land in the survey area is in small private holdings. Several private groups, however, as well as towns and municipalities, the Metropolitan District Commission, and the Massachusetts Department of Environmental Management own forested land in the survey area.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 16. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 3 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occurring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Plant competition is the likelihood of the invasion or growth of undesirable species where openings are made in the canopy. The main factors that affect plant competition are depth to the water table and available water capacity of the soil. A rating of *slight* indicates that competition from unwanted plants is not likely to suppress the more desirable species or prevent their natural regeneration. Planted seedlings have good prospects for development without undue competition. A rating of *moderate* indicates that competition may delay the natural regeneration of desirable species or of planted trees and may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent natural regeneration or restrict planted seedlings unless precautionary measures are taken.

Adequate site preparation before planting the new crop can help reduce plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first tree species listed under "Common trees" for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The survey area falls within the most densely populated part of the state, and the demand for recreation areas is high. The Atlantic Ocean, numerous publicly owned parks, and many historical and cultural resources offer a variety of opportunities for recreation.

Miles of coastline have many places for swimming, boating, and fishing. Salt marsh estuaries on Ipswich soils are ideal for hunting, clamming, birdwatching, and nature study. The Boston Harbor Islands constitute a unique park, are accessible only by boat, and afford a view of Boston (*18*).

Almost all communities have golf courses, and most of these are open to the public. Ski areas are in the Blue Hills Reservation and in the southwest corner of the town of Franklin.

About 12,400 acres of parks and forests are available for public use. These areas are operated by the Massachusetts Department of Environmental Management, the Metropolitan District Commission, and the Trustees of Reservations. The largest of these areas, the Blue Hills Reservation, covers 5,489 acres in the towns of Braintree, Canton, Milton, Quincy, and Randolph. Most of these areas are used for hiking, picnicking, and nature study. Some areas are available for hunting, camping, and horseback riding (*17*). Horseback riding is very popular in the western part of Norfolk County, where many miles of bridlepaths are on privately owned land.

Town commissions and town departments throughout Norfolk and Suffolk Counties own and manage land for conservation and watershed protection. This land is used by the public for hiking, picnicking, nature study, fishing, and hunting. Most cities and towns have numerous athletic fields and playgrounds.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Ralph H. Lutts, director, Blue Hills Interpretive Centers, helped to write this section.

Wildlife in great variety inhabit the survey area. Furbearers include fox, muskrat, and mink. Raccoon are prevalent. Sightings of river otter and eastern coyote have been reported. Small mammals, including cottontail, skunk, gray and red squirrels, flying squirrel, chipmunk, and various species of vole, mice, and bats are plentiful. In recent decades opossum have expanded their range northward and have been common in the area.

The most common resident raptors are red-tailed and broad-winged hawks, kestrel, and screech and great horned owls. Grouse, pheasant, woodcock, and a great variety of songbirds are also present. Pileated woodpecker are occasionally seen. In recent years cardinal, titmouse, and mockingbird have become increasingly common.

The most common reptiles include garter and milk snakes and snapping and painted turtles. Eastern box turtles are becoming scarce and should not be disturbed if found in the field. Red-backed salamander, including the lead-backed color phase, are common under rotting logs. Spotted salamander appear to be declining in number as a consequence of a reduced reproductive rate resulting from acid precipitation. Sightings of blue-spotted and marbled salamanders, which are rare and should not be disturbed, should be reported to the Massachusetts Department of Environmental Management, Natural Heritage Program.

The largest area of protected land in the survey area is the Blue Hills Reservation of the Metropolitan District Commission (MDC). This reservation and the adjacent Fowl Meadow section of the MDC's Neponset River Reservation take in nearly 7,000 acres of wildlife habitat, located only 8 miles south of downtown Boston. They cover an unusual diversity of ecological habitats and support a varied wildlife, including relict populations of timber rattlesnake and northern copperhead.

Urban areas also support a variety of wildlife. In Boston raccoon, opossum, and skunk are common, as well as nighthawks, gray squirrel, and bats. The house mouse, Norway rat, rock dove, English sparrow, and starling are also common. The loop of Route 128 (I-95) has effectively barred the movement of white-tailed deer into the enclosed Boston urban area. Other parts of the survey area support deer. Both domestic and feral dogs and cats abound and prey on wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggar-tick, quackgrass, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerelweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include kestrel, meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include nuthatches, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, frogs, and tree swallow.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. They are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Some soils have been given a rating of severe because of a poor filtering capacity. Generally, in these soils a layer of highly permeable sand and gravel is less than 48 inches below the base of the absorption field. On soils that have been given this rating, ground water pollution is a hazard. This rating means that soil properties are so unfavorable that special design, significant increases in construction costs, or possibly increased maintenance is required.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

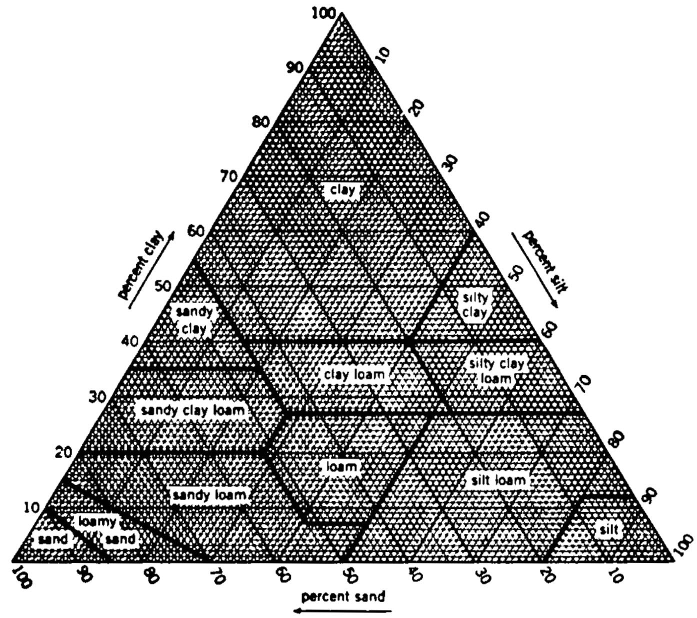


Figure 13.—Percentages of clay, silt, and sand in the basic USDA textural classes.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 13). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*4*) and the system adopted by the American Association of State Highway and Transportation Officials (*3*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested is given in table 15.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 17 are assigned to two hydrologic soil groups. Dual grouping is used for some soils that are less than 20 inches deep to bedrock. The first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*24*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquepts (*Hapl*, meaning minimal horizonation, plus *aquept*, the suborder of the Inceptisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that typifies the great group. An example is Aeric Haplaquepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*23*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*24*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Birdsall Series

The Birdsall series consists of very deep, very poorly drained soils on glacial lakebeds and on outwash plains and terraces. These soils formed in lacustrine silts and very fine sands. Slopes range from 0 to 3 percent.

Birdsall soils are similar to Scarboro soils and are adjacent to Raynham soils. Scarboro soils have more sand and less silt throughout. Raynham soils are on slight rises in the landscape.

Typical pedon of Birdsall very fine sandy loam, in an area of Scarboro and Birdsall soils, in the town of Dover, 430 feet northeast of the intersection of the Charles River and Bridge Street, and 1,400 feet north-northwest of the intersection of Bridge Street and Farm Street. On map sheet number 17, at Massachusetts grid coordinates: 449,800 N. and 646,400 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) very fine sandy loam; weak fine granular structure; very friable; common medium roots; very strongly acid; abrupt smooth boundary.

Bg1—8 to 12 inches; light olive gray (5Y 6/2) very fine sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; common fine and common medium roots; strongly acid; clear smooth boundary.

Bg2—12 to 16 inches; gray (5Y 6/1) very fine sandy loam; common medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; massive; friable; strongly acid; clear smooth boundary.

Cg—16 to 60 inches; gray (5Y 6/1) stratified very fine sand and silt; many coarse prominent yellowish red (5YR 5/6) and strong brown (7.5YR 5/6) mottles; massive; friable; moderately acid.

The solum ranges from 16 to 28 inches in thickness. Gravel content ranges from 0 to 2 percent throughout. Reaction is very strongly acid to moderately acid throughout.

The A horizon has value of 2 or 3. It is silt loam, very fine sandy loam, or their mucky analogs.

The B horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 or 2. It is silt loam or very fine sandy loam.

The C horizon has value of 4 to 6 and chroma of 0 to 2. It is silt, silt loam, or very fine sand. Its consistence is friable or firm.

Boxford Series

The Boxford series consists of very deep, moderately well drained soils on coastal plains. These soils formed in loamy material overlying stratified marine silt and clays. Slopes range from 0 to 8 percent.

Boxford soils are similar to Scio soils and are adjacent to Newport soils and Udorthents, wet substratum. Scio soils have more sand and less silt and clay in the substratum than Boxford soils. Newport soils are on drumlins. Udorthents, wet substratum, are in areas where tidal marsh, river flood plains, bays, harbors, or swamps have been filled with more than 24 inches of soil material.

Typical pedon of Boxford silt loam, in an area of Urban land-Boxford complex, 0 to 3 percent slopes, in the city of Chelsea, 200 feet north of the Mystic River and 600 feet east of Island End Road. On map sheet number 3, at Massachusetts grid coordinates: 505,600 N. and 721,700 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium granular structure; friable; common fine roots; strongly acid; abrupt clear boundary.

Bw—8 to 22 inches; light olive brown (2.5Y 5/4) silty clay loam; moderate medium blocky structure; firm; many medium prominent dark brown (7.5YR 3/2) oxide coatings on ped faces and along root channels; moderately acid; gradual wavy boundary.

C—22 to 60 inches; olive (5Y 5/3) silty clay loam; common medium faint light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; many medium distinct yellowish brown (10YR 5/4) oxide coatings on ped faces; slightly acid; neutral.

The solum ranges from 20 to 50 inches in thickness. Gravel content is less than 5 percent throughout. Reaction ranges from very strongly acid to slightly acid in the upper part of the solum and is slightly acid or neutral in the lower part of the solum and the substratum.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 2 or 3. It is silt loam or loam.

In the upper part the B horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 3 to 5. It is silt loam, loam, or silty clay loam. In the lower part the B horizon has value of 4 to 6 and chroma of 3 or 4. It is silty clay loam or silty clay.

The C horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 3 or 4. It is silty clay loam or silty clay.

Canton Series

The Canton series consists of very deep, well drained soils on uplands. These soils formed in friable glacial till overlying a loose substratum of glacial till or ice-contact, stratified drift. Slopes range from 3 to 35 percent.

Canton soils are similar to Charlton, Merrimac, and Montauk soils. Canton soils have more sand in the substratum than Charlton soils. Merrimac soils have less silt in the substratum than Canton soils. Unlike Canton soils, Montauk soils have a dense, slowly permeable substratum.

Typical pedon of Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery, in the town of Sharon, on the east side of Foxborough Road, 1,500 feet south of the junction of East Foxborough Road and Mohawk Street, in a borrow pit. On map sheet number 34, at Massachusetts grid coordinates: 397,500 N. and 684,600 E.

A—0 to 1 inch; black (10YR 2/1) fine sandy loam; weak fine granular structure; very friable; many fine roots; 10 percent gravel; extremely acid; abrupt smooth boundary.

E—1 to 2 inches; dark gray (10YR 4/1) fine sandy loam; weak fine granular structure; very friable; many fine roots; 10 percent gravel; extremely acid; abrupt broken boundary.

Bw1—2 to 12 inches; yellowish brown (10YR 5/6) fine sandy loam; massive, with weak fine and medium crumbs along roots; very friable; many fine and medium tree roots; many fine pores; 10 percent gravel; very strongly acid; clear wavy boundary.

Bw2—12 to 22 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; massive, with weak fine and medium crumbs along roots; very friable; many fine and medium tree roots; many fine pores; 15 percent gravel; very strongly acid; abrupt wavy boundary.

2C1—22 to 31 inches; light olive gray (5Y 6/2) gravelly loamy sand; single grain; very friable; common or few medium tree roots; many medium pores; 25 percent gravel; pebbles have thin patchy silt caps; very strongly acid; abrupt wavy boundary.

2C2—31 to 60 inches; olive gray (5Y 5/2) gravelly loamy sand; single grain; friable; few fine tree roots; 35 percent gravel; thick continuous silt caps on pebbles; very strongly acid.

The solum ranges from 18 to 30 inches in thickness. Rock fragments of gravel, cobbles, and stones range from 0 to 30 percent, by volume, in the solum and from 10 to 40 percent in the substratum. Reaction is extremely acid to moderately acid throughout.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. It is fine sandy loam, very fine sandy loam, or their gravelly analog.

The B horizon in the upper part has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The B horizon in the lower part has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 4 to 8. The B horizon is very fine sandy loam, fine sandy loam, loam, or their gravelly analog.

The 2C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 6. It is loamy sand, loamy coarse sand, sand, or their gravelly or very gravelly analog.

Charlton Series

The Charlton series consists of very deep, well drained soils on uplands. These soils formed in friable glacial till. Slopes range from 3 to 25 percent.

Charlton soils are similar to Canton and Paxton soils. Canton soils have more sand in the substratum than Charlton soils. Unlike Charlton soils, Paxton soils have a dense, slowly permeable substratum. Charlton soils are also adjacent to Hollis and Scituate soils. Hollis soils are on ridges and rises near rock outcrops, and Scituate soils are in saddles and depressions. Charlton soils in this survey area were mapped only in a complex with Hollis soils and Rock outcrop.

Typical pedon of Charlton fine sandy loam, in an area of Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes, in the town of Bellingham, 500 feet east of Center Street, 1,500 feet south of Cross Street, in an idle woodland. On map sheet number 36, at Massachusetts grid coordinates: 385,000 N. and 608,000 E.

A1—0 to 1 inch; black (10YR 2/1) fine sandy loam; massive; friable; common fine and few medium roots; 5 percent cobbles; very strongly acid; abrupt smooth boundary.

E—1 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak subangular blocky structure; friable; few fine and medium roots; 5 percent cobbles; strongly acid; gradual smooth boundary.

Bw1—6 to 18 inches; yellowish brown (10YR 5/6) fine sandy loam; weak subangular blocky structure; friable; few fine and medium roots; 5 percent

cobbles; moderately acid; gradual wavy boundary.
Bw2—18 to 36 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; few medium roots; 5 percent cobbles; moderately acid; clear wavy boundary.
C—36 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam; massive; friable; 5 percent cobbles; moderately acid.

The solum ranges from 20 to 38 inches in thickness. Rock fragments of gravel, cobbles, and stones make up 5 to 20 percent of the volume within a depth of 40 inches and 5 to 35 percent below. Reaction in unlimed areas ranges from very strongly acid to moderately acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 0 to 4. It is fine sandy loam or sandy loam.

The B horizon has value of 5 or 6 and chroma of 4 to 6. In the upper part it is fine sandy loam or sandy loam. In the lower part it is fine sandy loam or sandy loam.

The C horizon has hue of 10YR or 2.5Y and chroma of 2 or 3. It is fine sandy loam or sandy loam.

Deerfield Series

The Deerfield series consists of very deep, moderately well drained soils on deltas, kame terraces, and outwash plains. These soils formed in water-deposited sands. Slopes range from 0 to 8 percent.

Deerfield soils are similar to Sudbury and Windsor soils. Sudbury soils have more silt in the solum. Windsor soils are better drained and do not have mottles. Walpole soils are adjacent to Deerfield soils and are in depressions on the landscape.

Typical pedon of Deerfield loamy sand, 0 to 3 percent slopes, in the town of Dover, 100 feet south of Springdale Avenue, 300 feet east of Trout Brook. On map sheet number 17, at Massachusetts grid coordinates: 453,800 N. and 657,000 E.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) loamy sand; massive; very friable; few coarse and common medium roots; strongly acid; abrupt smooth boundary.
Bw1—11 to 22 inches; dark yellowish brown (10YR 4/4) loamy sand; many medium faint yellowish brown (10YR 5/6) mottles; massive; very friable; common medium roots; moderately acid; clear wavy boundary.
Bw2—22 to 35 inches; olive yellow (2.5Y 6/6) loamy sand; common medium distinct yellowish brown (10YR 5/8) and light olive gray (5Y 6/2) mottles; massive; friable; moderately acid; clear wavy boundary.
C—35 to 60 inches; yellowish brown (10YR 5/4) sand; common medium distinct yellowish red (5YR 5/8) mottles; single grain; loose; 10 percent gravel; moderately acid.

The solum ranges from 18 to 35 inches in thickness. Gravel content ranges from 0 to 10 percent in the solum and from 0 to 20 percent in the substratum. Reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has value of 3 or 4 and chroma of 1 to 3. It is fine sandy loam, sandy loam, or loamy sand.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. In the upper part it is sandy loam or loamy sand. In the lower part it is loamy sand or sand.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is fine sand, sand, or coarse sand.

Freetown Series

The Freetown series consists of very deep, very poorly drained soils in depressions or in low-lying areas on uplands and outwash plains. These soils formed in more than 51 inches of highly decomposed organic material. Slopes range from 0 to 2 percent.

Freetown soils are similar to Ipswich and Swansea soils and are commonly near Saco soils. Ipswich soils formed in partly decomposed sulfidic organic deposits in a marine environment. Swansea soils are underlain by mineral soil material at a depth between 16 and 51 inches. Saco soils formed in stream-deposited mineral material.

Typical pedon of Freetown muck, in the town of Medfield, 30 feet south of Hartford Road, 650 feet west of the Medfield and Walpole town line, in a wooded area. On map sheet number 17, at Massachusetts grid coordinates: 440,800 N. and 661,800 E.

Oa1—0 to 13 inches; black (N 2/0) broken face and rubbed muck; 40 percent fiber, 8 percent rubbed; massive; very friable; slightly sticky, nonplastic; many fine, few medium roots; woody fiber; 5 percent mineral; extremely acid (pH 4.2 in 0.01 *M* CaCl2); clear smooth boundary.
Oa2—13 to 29 inches; dark brown (7.5YR 4/4) and black (10YR 2/1) broken face muck; black (10YR 2/1) rubbed; 44 percent fiber, 12 percent rubbed;

massive; friable; slightly sticky, slightly plastic; few medium roots; woody fiber; 5 percent mineral; extremely acid (pH 4.2 in 0.01 *M* CaCl2); clear smooth boundary.

Oa3—29 to 43 inches; black (N 2/0) broken face and rubbed muck; 60 percent fiber, 12 percent rubbed; massive; very friable; slightly sticky, slightly plastic; woody fiber; extremely acid (pH 4.2 in 0.01 *M* CaCl2); clear smooth boundary.

Oa4—43 to 60 inches; black (10YR 2/1) broken face and rubbed muck; 52 percent fiber, 5 percent rubbed; massive; nonsticky, nonplastic; herbaceous fiber; extremely acid (pH 4.0 in 0.01 *M* CaCl2).

Woody fragments make up 0 to 25 percent of the soil. Reaction is extremely acid throughout. The soils are dominantly sapric material throughout, but many pedons have layers of hemic material.

The surface tier has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The subsurface tier has hue of 5YR to 10YR, value of 2 to 4, and chroma of 0 to 4. It is mottled in some pedons.

The bottom tier has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

Haven Series

The Haven series consists of very deep, well drained soils on glacial outwash plains and river terraces. These soils formed in loamy material overlying sand and gravel. Slopes range from 0 to 8 percent.

Haven soils are similar to Merrimac soils and are commonly near Scio soils. Merrimac soils have more sand and less silt in the solum. Scio soils are mottled and are at slightly lower elevations on the landscape.

Typical pedon of Haven silt loam, 3 to 8 percent slopes, in the town of Dover, 300 feet west of Powissett Street and 700 feet north of Walpole Street. On map sheet number 17, at Massachusetts grid coordinates: 446,200 N. and 663,800 E.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; 5 percent gravel; moderately acid; abrupt smooth boundary.

Bw1—8 to 17 inches; yellowish brown (10YR 5/6) very fine sandy loam; massive; friable; common fine roots; 5 percent gravel; slightly acid; gradual wavy boundary.

Bw2—17 to 23 inches; light olive brown (2.5Y 5/6) gravelly very fine sandy loam; massive; friable; few fine roots; 15 percent gravel; slightly acid; abrupt wavy boundary.

2C—23 to 60 inches; light olive brown (2.5Y 5/4) very gravelly coarse sand; single grain; loose; 40 percent gravel; slightly acid.

The solum ranges from 18 to 30 inches in thickness. Gravel content ranges from 0 to 15 percent in the solum and from 10 to 50 percent in the substratum. If the soils have not been limed, reaction is strongly acid to slightly acid throughout.

The A horizon has hue of 7.5YR or 10YR and value of 3 or 4. It is silt loam or very fine sandy loam.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 5 to 8. It is very fine sandy loam or silt loam. In some pedons the B horizon in the lower part is fine sandy loam or sandy loam.

The 2C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 6. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand, or their gravelly or very gravelly analog.

Hinckley Series

The Hinckley series consists of very deep, excessively drained soils on glacial outwash plains, terraces, kames, and eskers. Slopes range from 0 to 35 percent.

Hinckley soils are similar to Merrimac and Windsor soils. They are near Sudbury soils. Merrimac soils have less gravel in the solum than Hinckley soils. Windsor soils have less gravel throughout than Hinckley soils. Sudbury soils have less gravel in the solum, and are mottled in the lower part of the B horizon.

Typical pedon of Hinckley sandy loam, 3 to 8 percent slopes, in the town of Dover, 20 feet west of Conrail tracks, 300 feet south of the junction of Farm Street and Conrail tracts. On map sheet number 23, at Massachusetts grid coordinates: 441,050 N. and 650,000 E.

Ap—0 to 4 inches; dark brown (10YR 3/3) sandy loam; weak fine granular structure; very friable; common fine roots; 10 percent gravel; strongly acid; abrupt wavy boundary.

Bw1—4 to 10 inches; yellowish brown (10YR 5/6) gravelly sandy loam; massive; very friable; common fine roots; 25 percent gravel; strongly acid; gradual wavy boundary.

Bw2—10 to 14 inches; yellowish brown (10YR 5/6) gravelly loamy sand; loose; massive; very friable;

few fine roots; 25 percent gravel; strongly acid; clear wavy boundary.

2C—14 to 60 inches; light olive brown (2.5Y 5/4) stratified gravelly and very gravelly coarse sand; single grain; loose; 35 percent gravel; 10 percent cobblestones; moderately acid.

The solum ranges from 12 to 24 inches in thickness. Rock fragments of gravel and cobbles make up 10 to 40 percent of the solum and 35 to 50 percent of the substratum. Reaction is very strongly acid or strongly acid in the solum and very strongly acid to moderately acid in the substratum.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. It is fine sandy loam, sandy loam, loamy fine sand, or their gravelly analog.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. In the upper part it is fine sandy loam, sandy loam, loamy sand, loamy coarse sand, or their gravelly or very gravelly analog. In the lower part it is loamy fine sand, loamy sand, loamy coarse sand, sand, coarse sand, or their gravelly or very gravelly analog.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 4. It is stratified fine sand, sand, coarse sand, or their gravelly or very gravelly analog.

Hollis Series

The Hollis series consists of shallow, somewhat excessively drained soils on rocky uplands. These soils formed in a thin mantle of glacial till overlying hard bedrock. Slopes range from 3 to 35 percent.

Hollis soils in this survey area are mapped only in a complex with Charlton soils and Rock outcrop. Hollis soils are mapped near Scituate soils. They are less than 20 inches deep to bedrock, and Charlton soils are more than 60 inches deep to bedrock. Scituate soils are in drainageways and depressions on the landscape.

Typical pedon of Hollis fine sandy loam, in an area of Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes, in the town of Wrentham, 50 feet west of Ellery Street, 150 feet south of high tension power line. On map sheet number 39, at Massachusetts grid coordinates: 373,800 N. and 628,000 E.

A—0 to 3 inches; black (10YR 2/1) fine sandy loam; weak medium subangular blocky structure; friable; many fine and medium, few coarse roots; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Bw—3 to 14 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; friable; common medium, few coarse roots; 5 percent gravel, 5 percent stones; strongly acid; abrupt wavy boundary.

R—14 inches; granite and metaconglomerate bedrock.

The solum ranges from 10 to 17 inches in thickness. Depth to bedrock ranges from 10 to 20 inches. Rock fragments of gravel, cobbles, and stones make up 5 to 25 percent of the volume throughout. In some areas, stones and boulders cover 1 to 15 percent of the surface. Reaction is very strongly acid or strongly acid throughout.

The A horizon has value of 2 to 4 and chroma of 1 to 3. It is very fine sandy loam or fine sandy loam.

The B horizon has value of 4 or 5 and chroma of 4 to 6. It is fine sandy loam or sandy loam.

Some pedons have a C horizon that has hue of 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam or sandy loam.

Ipswich Series

The Ipswich series consists of very deep, very poorly drained soils on low-lying, coastal flats near the mouths of streams that enter Massachusetts Bay and that are subject to tidal flooding. These soils formed in more than 51 inches of sulfidic organic deposits. Slopes range from 0 to 2 percent.

Ipswich soils are similar to Freetown soils and are commonly near Beaches, Udorthents, wet substratum, and Urban land, wet substratum. Freetown soils do not have sulfidic materials and formed in a freshwater environment.

Typical pedon of Ipswich mucky peat, in the town of Milton, 100 feet south of the Neponset River, 500 feet east of the northbound entrance ramp to the Southeast Expressway at Interchange 21. On map sheet number 14, at Massachusetts grid coordinates: 464,700 N. and 722,800 E.

Oe1—0 to 14 inches; very dark grayish brown (2.5Y 3/2) rubbed mucky peat; 90 percent fiber, 75 percent rubbed; massive; firm and matted; many fine roots; herbaceous fiber; 10 percent mineral; strongly acid (pH 5.5 in 0.01 *M* CaCl2); abrupt smooth boundary.

Oe2—14 to 35 inches; very dark grayish brown (10YR 3/2) rubbed; mucky peat; 35 percent fiber, 10 percent rubbed; massive; friable; few medium roots; herbaceous fiber; 65 percent mineral; slightly acid (pH 6.2 in 0.01 *M* CaCl2); abrupt smooth boundary.

Oe3—35 to 60 inches; very dark grayish brown (2.5Y

3/2) rubbed; mucky peat; 75 percent fiber, 40 percent rubbed; massive; firm and matted; many fine dead roots; herbaceous fiber; 25 percent mineral; neutral (pH 7.0 in 0.01 *M* CaCl2); abrupt smooth boundary.

Reaction ranges from strongly acid to neutral. The organic material is dominantly hemic or fibric throughout, but some pedons have layers of sapric material. The mineral content is 5 to 80 percent throughout and is dominantly silt and clay in lenses and between fibers.

The surface tier has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 4.

The subsurface tier has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 4.

The bottom tier has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 to 3.

Some pedons have a 2C horizon that has hue of 2.5Y or 5Y or is gleyed; value is 3 or 4 and chroma is 1 to 3. It is very fine sandy loam, silt loam, silt, or silty clay loam that is commonly stratified.

Merrimac Series

The Merrimac series consists of very deep, somewhat excessively drained soils on glacial outwash plains and glacial stream terraces. Slopes range from 0 to 15 percent.

Merrimac soils are similar to Canton, Hinckley, and Sudbury soils. Canton soils formed in glacial till on ice-contact, stratified drift that has more silt in the substratum than in that of Merrimac soils. In Hinckley soils the solum has more gravel. In Sudbury soils the subsoil is mottled.

Typical pedon of Merrimac fine sandy loam, 0 to 3 percent slopes, in the town of Franklin, 250 feet south of AT&T right-of-way and 200 feet west of Grove Street, in an abandoned field. On map sheet number 36, at Massachusetts grid coordinates: 385,600 N. and 619,400 E.

Ap—0 to 9 inches; dark brown (10YR 3/3) fine sandy loam; weak medium granular structure; friable; common fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary.

Bw1—9 to 19 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 10 percent gravel; strongly acid; gradual wavy boundary.

Bw2—19 to 23 inches; yellowish brown (10YR 5/6) loamy sand; massive; very friable; few fine roots; 15 percent gravel; moderately acid; clear wavy boundary.

2C—23 to 60 inches; light yellowish brown (2.5Y 6/4) very gravelly coarse sand; single grain; loose; 45 percent gravel; moderately acid.

The solum ranges from 14 to 36 inches in thickness. The gravel content ranges from 5 to 35 percent in the solum and from 25 to 55 percent in the substratum. Cobbles make up 5 to 15 percent of the volume throughout. Reaction is very strongly acid to moderately acid throughout.

The A horizon has value and chroma of 2 to 4. It is fine sandy loam, sandy loam, or their gravelly analog.

The Bw1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, or their gravelly analog. The Bw2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loamy fine sand, loamy sand, or their gravelly analog.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 2 to 6. It is stratified loamy sand, sand, or coarse sand, or their gravelly or very gravelly analog.

Montauk Series

The Montauk series consists of very deep, well drained soils on uplands. These soils formed in a thin mantle of loamy material overlying sandy glacial till. Slopes range from 3 to 25 percent.

Montauk soils are similar to Canton and Paxton soils and are commonly near Scituate soils. Unlike Canton soils, Montauk soils have a firm or very firm substratum. Montauk soils have more sand in the substratum than Paxton soils. These soils are better drained than Scituate soils and do not have mottles that are in the subsoil of those soils.

Typical pedon of Montauk fine sandy loam, 3 to 8 percent slopes, in the town of Walpole, on top of a drumlin 2,000 feet due east of the junction of High Street and the road that goes northerly to a water tank, in a wooded area. On map sheet number 23, at Massachusetts grid coordinates: 428,850 N. and 662,000 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; common fine and few fine and medium roots; 10 percent gravel, 5 percent cobblestones; very strongly acid; abrupt wavy boundary.

Bw1—4 to 9 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few medium roots; 10 percent gravel; strongly acid; gradual wavy boundary.

Bw2—9 to 24 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; few medium roots; 10 percent gravel; strongly acid; clear wavy boundary.

BC—24 to 29 inches; light olive brown (2.5Y 5/4) sandy loam; massive; friable; few medium roots; 10 percent gravel; moderately acid; clear wavy boundary.

Cr—29 to 60 inches; olive (5Y 5/3) loamy sand; massive; firm; 10 percent gravel; moderately acid.

The solum ranges from 18 to 34 inches in thickness. Rock fragments range from 5 to 35 percent, by volume, in the solum and from 10 to 45 percent in the C horizon. Reaction ranges from extremely acid to moderately acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4. It is fine sandy loam or sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8 in the upper part. It has hue of 10YR to 5Y, value of 4 to 6, and chroma of 4 to 6 in the lower part. It is fine sandy loam, sandy loam, or their gravelly analog in the upper part. It is sandy loam, coarse sandy loam, loamy sand, and loamy coarse sand or their gravelly analog in the lower part.

The C horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 to 4. It is loamy sand, loamy fine sand, loamy coarse sand, or their gravelly analog.

Newport Series

The Newport series consists of very deep, well drained soils on drumlins and moraines in the Boston Basin and in parts of western Plainville. These soils formed in friable glacial till overlying a firm substratum derived from conglomerate, shale, or slate. Slopes range from 3 to 25 percent.

Newport soils are similar to Paxton soils and are near Pittstown soils. Paxton soils have less silt and clay and are lighter colored throughout. Pittstown soils are in depressions and in nearly level areas, and have mottles in the B horizon.

Typical pedon of Newport silt loam, 8 to 15 percent slopes, in the town of Weymouth, 200 feet north of the water tank on top of Weymouth Great Hill Town Park. On map sheet number 15, at Massachusetts grid coordinates: 456,200 N. and 751,000 E.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; 10 percent channers; very strongly acid; clear smooth boundary.

Bw—9 to 26 inches; light olive brown (2.5Y 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots in the upper part, few fine roots in the lower part; 10 percent channers; strongly acid; abrupt smooth boundary.

Cr—26 to 60 inches; light yellowish brown (2.5Y 5/4) silt loam; weak medium platy structure; firm; 10 percent channers; strongly acid.

The solum ranges from 15 to 30 inches in thickness. Rock fragments of gravel, channers, and flagstones make up 5 to 20 percent, by volume, of the solum and 10 to 25 percent of the substratum. Reaction is very strongly acid to moderately acid throughout.

The A horizon has value of 3 or 4 and chroma of 2 or 3. In the fine earth fraction it is very fine sandy loam or silt loam.

The Bw horizon has value of 4 or 5 and chroma of 2 to 4. In the fine earth fraction it is very fine sandy loam, silt loam, or loam.

The Cr horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 to 4. In the fine earth fraction it is fine sandy loam, very fine sandy loam, silt loam, or loam.

Paxton Series

The Paxton series consists of very deep, well drained soils on drumlins. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 3 to 35 percent.

Paxton soils are similar to Charlton, Montauk, and Newport soils. These soils are mapped adjacent to Woodbridge soils. Charlton soils do not have a firm substratum. Montauk soils have more sand and less silt in the substratum. Newport soils are grayer and have more silt throughout. Woodbridge soils are in less sloping areas and in depressions.

Typical pedon of Paxton fine sandy loam, 3 to 8 percent slopes, in the town of Walpole, 30 feet west of Granite Street, 100 feet south of the Walpole and Medfield town boundary, in a wooded area. On map sheet number 28, at Massachusetts grid coordinates: 418,700 N. and 658,300 E.

A—0 to 5 inches; very dark brown (10YR 2/2) fine sandy loam; weak medium subangular blocky structure; friable; common medium roots; 10 percent gravel; strongly acid; gradual wavy boundary.

Bw1—5 to 15 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common medium roots; 10 percent gravel; strongly acid; gradual wavy boundary.

B2—15 to 23 inches; brownish yellow (10YR 6/6) gravelly fine sandy loam; weak medium subangular blocky structure; friable; few medium roots; 5 percent cobbles, 10 percent gravel; moderately acid; clear wavy boundary.

B3—23 to 29 inches; brownish yellow (10YR 6/6) gravelly fine sandy loam; few medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; 5 percent cobbles, 10 percent gravel; strongly acid; clear wavy boundary.

Cr—29 to 60 inches; grayish brown (2.5Y 5/2) gravelly sandy loam; moderate thick platy structure; extremely firm; 15 percent gravel; moderately acid.

The solum ranges from 15 to 38 inches in thickness. Rock fragments of gravel, cobbles, and stones make up 5 to 35 percent of the solum and 10 to 40 percent of the substratum. Reaction is very strongly acid to moderately acid throughout.

The A horizon has value of 2 to 4 and chroma of 1 to 4. It is fine sandy loam, very fine sandy loam, or their gravelly analog.

In the upper part the B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. In the lower part it has hue of 10YR or 2.5Y and value and chroma of 4 to 6. The B horizon is sandy loam, fine sandy loam, or their gravelly or very gravelly analog.

The Cr horizon has hue of 2.5Y and 5Y, value of 4 to 6, and chroma of 2 to 4. It is fine sandy loam, sandy loam, or their gravelly or very gravelly analog. It is very firm or extremely firm. Some pedons have a few yellowish brown mottles.

Pittstown Series

The Pittstown series consists of very deep, moderately well drained soils on drumlins and moraines in the Boston Basin and in western Plainville. These soils formed in friable glacial till that overlies a firm substratum and that is derived from conglomerate, shale, and slate bedrock. Slopes range from 2 to 8 percent.

Pittstown soils are similar to Woodbridge soils and are near Newport soils. Woodbridge soils have less silt and clay and are lighter colored throughout. Newport soils are better drained and are on steeper slopes or at higher elevations on the landscape than Pittstown soils.

Typical pedon of Pittstown silt loam, 2 to 8 percent slopes, in the city of Boston, on the U.S. Naval Reservation on Deer Island. On map sheet number 7, at Massachusetts grid coordinates: 492,500 N. and 746,600 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many fine roots in the upper part, common fine roots in the lower part; 5 percent channers; moderately acid; abrupt smooth boundary.

Bw1—10 to 22 inches; light olive brown (2.5Y 5/4) silt loam; common medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; 5 percent channers, 5 percent gravel; moderately acid; gradual wavy boundary.

Bw2—22 to 30 inches; light olive brown (2.5Y 5/4) silt loam; common medium distinct light olive gray (5Y 6/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; 5 percent channers, 5 percent gravel; moderately acid; abrupt wavy boundary.

Cr—30 to 60 inches; olive gray (5Y 5/2) silt loam; common medium distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) mottles; massive parting to moderate coarse platy structure; firm; 5 percent channers, 5 percent gravel; moderately acid.

The solum ranges from 20 to 30 inches in thickness. Rock fragments make up 5 to 20 percent, by volume, of the solum and 10 to 30 percent of the substratum. Depth to mottling ranges from 15 to 24 inches. In unlimed areas reaction is strongly acid or moderately acid throughout. In limed areas it is slightly acid or neutral above a depth of 30 inches.

The A horizon has value of 3 or 4 and chroma of 2 or 3. It is silt loam or loam in the fine earth fraction.

The Bw horizon has value of 4 or 5 and chroma of 4 to 6. It is silt loam or loam in the fine earth fraction.

The Cr horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 or 3. It is silt loam, loam, or very fine sandy loam in the fine earth fraction. A few pedons have lenses of silty clay loam.

Raynham Series

The Raynham series consists of very deep, poorly drained soils on glacial lakebeds and on outwash plains and terraces. These soils formed in silty and loamy lacustrine materials. Slopes range from 0 to 3 percent.

Raynham soils are similar to Birdsall and Walpole soils. They are commonly adjacent to Scio soils on slight rises in the landscape. Birdsall soils have a thicker, darker colored A horizon. Walpole soils have a coarser texture throughout.

Typical pedon of Raynham silt loam, in the town of Norfolk, 300 feet southwest of the intersection of Spring Street and Alice Avenue and 100 feet southwest of the cul-de-sac at the entrance to the Harold Campbell Town Forest. On map sheet number 33, at Massachusetts grid coordinates: 418,700 N. and 658,300 E.

A—0 to 8 inches; black (10YR 2/1) silt loam; weak medium subangular blocky structure; friable; few coarse and common medium roots; strongly acid; clear smooth boundary.

Bg1—8 to 13 inches; grayish brown (10YR 5/2) silt loam; weak coarse subangular blocky structure; friable; few medium roots; strongly acid; clear smooth boundary.

Bg2—13 to 32 inches; light olive gray (5Y 6/2) silt loam; many medium and coarse distinct strong brown (7.5YR 5/6) and many medium faint yellowish brown (10YR 5/4) mottles; massive; firm; strongly acid; gradual wavy boundary.

C1g—32 to 39 inches; light olive gray (5Y 6/2) very fine sandy loam; many coarse distinct strong brown (7.5YR 5/6) mottles; massive; firm; strongly acid; clear wavy boundary.

C2g—39 to 60 inches; light olive gray (5Y 6/2) very fine sandy loam; many coarse faint light yellowish brown (2.5Y 6/4) mottles; massive; friable; strongly acid.

The solum ranges from 24 to 37 inches in thickness. Reaction is strongly acid or moderately acid throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam or very fine sandy loam.

The B horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 2 or 3. It is silt loam or very fine sandy loam.

The C horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2. It is stratified silt, silt loam, or very fine sandy loam. It is friable or firm.

Ridgebury Series

The Ridgebury series consists of very deep, poorly drained soils on uplands. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 0 to 8 percent.

Ridgebury soils are similar to Raynham, Whitman, and Walpole soils. They are commonly near Woodbridge soils on upper slopes. Raynham soils have more silt throughout and a more friable substratum than Woodbridge soils. Whitman soils have a thicker, darker colored A horizon. Walpole soils have more sand and less silt in the substratum.

Typical pedon of Ridgebury fine sandy loam, 2 to 8 percent slopes, extremely stony, in the town of Medway, 100 feet southeast of Lovering Street at NET&T Co. pole number 46, in a wooded area. On map sheet number 27, at Massachusetts coordinates: 423,750 N. and 621,100 E.

A—0 to 10 inches; very dark brown (10YR 2/2) fine sandy loam; weak medium subangular blocky structure; friable; common fine and few medium and coarse roots; 5 percent gravel and 5 percent stones; very strongly acid; clear smooth boundary.

Bw—10 to 15 inches; dark brown (10YR 4/3) fine sandy loam; massive; friable; common fine and few medium roots; 15 percent gravel; very strongly acid; clear wavy boundary.

Bg—15 to 19 inches; grayish brown (2.5Y 5/2) fine sandy loam; common fine and medium distinct yellowish brown (10YR 5/4) mottles; massive; friable; common fine and few medium roots; 15 percent gravel; moderately acid; clear wavy boundary.

Cr—19 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common large prominent yellowish brown (10YR 5/8) mottles; massive; very firm; 10 percent gravel; moderately acid.

Depth to the solum ranges from 14 to 30 inches. Rock fragments of gravel, cobbles, and stones make up about 5 to 35 percent, by volume, of all horizons. The soils range from very strongly acid to moderately acid throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam or sandy loam. Some pedons have a thin E horizon.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is fine sandy loam or sandy loam.

The Cr horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 to 4. It is fine sandy loam, sandy loam, or their gravelly analog. It has mottles, which decrease in abundance with depth.

Rippowam Series

The Rippowam series consists of very deep, poorly drained soils on flood plains along perennial streams and rivers. These soils formed in recent alluvium. Slopes range from 0 to 3 percent.

Rippowam soils in the survey area are outside the range defined for the series because they have more silt in the surface layer, a thinner solum, and an abrupt textural change within a depth of 40 inches. These differences, however, do not alter the usefulness or behavior of the soils.

Rippowam soils are similar to Walpole soils and are commonly near Saco soils. Walpole soils are not subject to flooding. Saco soils are wetter and are at lower elevations on the landscape.

Typical pedon of Rippowam silt loam, in the town of Norwood, adjacent to the Neponset River, in Fowl Meadow, 1,800 feet east of the southerly runway and 2,000 feet south of the easterly runway of Norwood Municipal Airport. On map sheet number 24, at Massachusetts grid coordinates: 432,350 N. and 690,000 E.

A—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium granular structure; friable; nonsticky and nonplastic; many fine and medium roots; moderately acid; abrupt smooth boundary.

C1—10 to 20 inches; brown (10YR 5/3) fine sandy loam; common large distinct light brownish gray (2.5Y 6/2) mottles; massive; friable; few fine roots; slightly acid; clear wavy boundary.

2Cg—20 to 60 inches; grayish brown (2.5Y 5/2) stratified medium and coarse sand; single grain; loose; slightly acid.

The A horizon ranges from 8 to 20 inches in thickness. Gravel content ranges from 0 to 15 percent in the A horizon and from 0 to 40 percent in the substratum. Reaction is strongly acid to slightly acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. It is silt loam, very fine sandy loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 3. In the upper part it is fine sandy loam, sandy loam, or loamy fine sand. In the lower part it is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand, or their gravelly analog. Some pedons have thin strata of silt loam, gravel, and organic material.

Saco Series

The Saco series consists of very deep, very poorly drained soils formed in recent alluvium on flood plains along perennial streams and rivers. Slopes range from 0 to 3 percent.

Saco soils are similar to Scarboro and Swansea soils and are commonly near Rippowam soils. Scarboro soils have a thinner A horizon and are sandier throughout. Swansea soils formed in organic material overlying sand and gravel. Rippowam soils are at slightly higher elevations on the landscape.

Typical pedon of Saco silt loam, in the town of Dedham, in Cutler Park, 100 feet northeast of the junction of Claybanks Road and Needham Street. On map sheet number 13, at Massachusetts grid coordinates: 463,100 N. and 684,600 E.

A1—0 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure in the upper part, massive in the lower part; friable; slightly sticky, slightly plastic; many fine roots; strongly acid; abrupt smooth boundary.

Ab—14 to 26 inches; black (N 2/0) silt loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; many fine roots; strongly acid; abrupt smooth boundary.

C1—26 to 37 inches; very dark gray (N 3/0) silt loam; massive; friable; nonsticky, slightly plastic; strongly acid; abrupt smooth boundary.

Cg2—37 to 58 inches; grayish brown (2.5Y 5/2) silt loam; massive; firm; slightly sticky, plastic; moderately acid; abrupt smooth boundary.

2C—58 to 60 inches; grayish brown (2.5Y 5/2) loamy fine sand; massive; friable; moderately acid.

Depth to the lithologic discontinuity ranges from 40 to 60 inches. Gravel content ranges from 0 to 50 percent below a depth of 40 inches. Reaction is strongly acid or moderately acid throughout.

The A horizon has hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 0 to 3. It is silt loam, mucky silt loam, very fine sandy loam, or mucky very fine sandy loam. It is friable or very friable when moist, and it is sticky or slightly sticky and plastic or slightly plastic when wet. Organic matter content ranges from 10 to 30 percent.

The C horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 or 2. In some pedons the upper part of the C horizon has mottles. The C horizon is stratified silt loam, silt, fine sandy loam, sandy loam, loamy fine sand, loamy sand, sand, or their gravelly or very gravelly analog.

Scarboro Series

The Scarboro series consists of very deep, very poorly drained soils in pockets and depressions on glacial outwash plains and glacial stream terraces. Slopes range from 0 to 3 percent.

Scarboro soils are similar to Birdsall and Walpole soils. Birdsall soils have more silt and less sand throughout. Walpole soils have redder colored B and C horizons and a thinner A horizon.

Typical pedon of Scarboro muck, in an area of Scarboro and Birdsall soils, in the town of Walpole, 20 feet south of Walpole Street, 2,700 feet west of the junction of Norfolk and Main Streets. On map sheet number 28, at Massachusetts grid coordinates: 414,700 N. and 662,000 E.

Oa—0 to 9 inches; black (5YR 2/1) broken face and rubbed muck; 40 percent fiber, 10 percent rubbed; massive; friable; woody fiber; many fine and medium roots; very strongly acid; abrupt smooth boundary.

2Cg1—9 to 12 inches; gray (10YR 5/1) coarse sand; massive; loose; 10 percent gravel; very strongly acid; clear smooth boundary.

2Cg2—12 to 60 inches; gray (N 5/0) coarse sand; massive; loose; 10 percent gravel; very strongly acid.

Depth to sand and gravel ranges from 8 to 20 inches. The gravel content ranges from 0 to 15 percent in the A horizon and from 0 to 40 percent in the C horizon. Reaction is very strongly acid to moderately acid throughout.

The O horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 0 to 2. It is muck or mucky peat.

Many pedons have an A horizon that has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam, sandy loam, loamy fine sand, loamy sand, or their mucky analog.

The C horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 3. It is sandy loam, loamy sand, loamy fine sand, fine sand, sand, coarse sand, or their gravelly or very gravelly analog, stratified to a depth of 60 inches or more.

Scio Series

The Scio series consists of very deep, moderately well drained soils on plains and on low terraces along the Charles and Neponset Rivers. These soils formed in silty, water-deposited material. Slopes range from 0 to 8 percent.

Scio soils are similar to Sudbury and Haven soils. Sudbury soils are sandier throughout. Haven soils do not have mottles, have a contrasting texture within a depth of 40 inches, and are at slightly higher elevations on the landscape.

Typical pedon of Scio very fine sandy loam, 2 to 5 percent slopes, in the town of Millis, 2,000 feet east of Massachusetts State Highway 115 and 200 feet north of the Charles River, in an abandoned field. On map sheet number 28, at Massachusetts grid coordinates: 418,500 N. and 642,300 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) very fine sandy loam; moderate fine and medium granular structure; friable; common fine, few medium roots; very strongly acid; abrupt smooth boundary.

Bw1—9 to 18 inches; light olive brown (2.5Y 5/4) silt loam; weak medium subangular blocky structure; friable; few medium roots; strongly acid; gradual wavy boundary.

Bw2—18 to 23 inches; olive (5Y 5/3) silt loam; common medium distinct yellowish brown (10YR 5/4) and common medium faint light yellowish brown (2.5Y 6/4) mottles; weak medium prismatic structure parting to moderate subangular blocky; firm; strongly acid; gradual wavy boundary.

C—23 to 60 inches; olive (5Y 5/3) silt loam; few medium distinct yellowish brown (10YR 5/4) and light gray (5Y 7/1) mottles; weak medium platy structure; firm; strongly acid.

The solum ranges from 20 to 36 inches in thickness. Depth to contrasting texture is more than 40 inches. Gravel content ranges from 5 to 60 percent below a depth of 40 inches. If the soils have not been limed, reaction ranges from very strongly acid to moderately acid throughout. Some pedons are slightly acid or neutral below a depth of 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. It is very fine sandy loam or silt loam.

The B horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 to 6. It is very fine sandy loam or silt loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It is very fine sandy loam or silt loam above a depth of 40 inches. It ranges to loamy fine sand, loamy sand, very fine sand, fine sand, or sand below that depth.

Scituate Series

The Scituate series consists of very deep, moderately well drained soils on uplands. These soils formed in friable, loamy glacial till overlying a firm, sandy substratum. Slopes range from 3 to 8 percent.

Scituate soils are similar to Woodbridge soils and are commonly near Montauk soils. Woodbridge soils have less sand and more silt in the substratum. Montauk soils are on upper slopes of the landscape, and do not have mottles.

Typical pedon of Scituate fine sandy loam, 3 to 8 percent slopes, in the town of Medfield, 50 feet north of Algonquin Road, 2,000 feet west of Orchard Street, in a wooded area. On map sheet number 28, at Massachusetts grid coordinates: 420,000 N. and 645,400 E.

A—0 to 5 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; friable; few coarse and common fine roots; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Bw—5 to 24 inches; dark brown (7.5YR 4/4) sandy loam that grades to dark yellowish brown (10YR 4/4) with depth; weak medium subangular blocky structure; friable; few coarse and common medium and fine roots; 5 percent gravel, 10 percent cobbles; strongly acid; clear wavy boundary.

BC—24 to 32 inches; light olive brown (2.5Y 5/4) gravelly loamy sand; common medium prominent yellowish brown (10YR 5/6) mottles; massive; firm; 20 percent gravel; moderately acid; clear wavy boundary.

Cr—32 to 60 inches; grayish brown (2.5Y 5/2) gravelly loamy sand; common medium prominent yellowish red (5YR 4/6) mottles; moderate medium and coarse platy structure; firm; 20 percent gravel; moderately acid.

The solum ranges from 21 to 36 inches in thickness. The depth to mottling ranges from 12 to 30 inches. Content of gravel ranges from 5 to 20 percent in the solum and from 10 to 25 percent in the C horizon. Content of cobblestones ranges from 0 to 10 percent throughout. Content of stones ranges from 0 to 20 percent in the surface layer and from 0 to 50 percent in the B and C horizons. Reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Ap horizon has value of 2 to 4 and chroma of 1 to 3. It is fine sandy loam, very fine sandy loam, sandy loam, or loam.

In the upper part the B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. In the lower part it has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 6, and it is mottled. It is fine sandy loam or sandy loam in the upper part and sandy loam or loamy sand in the lower part.

The Cr horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3, and it is mottled. It is loamy sand, loamy fine sand, or their gravelly analog.

Sudbury Series

The Sudbury series consists of very deep, moderately well drained soils in slight depressions on glacial outwash plains and terraces. Slopes range from 0 to 8 percent.

Sudbury soils are similar to Deerfield and Merrimac soils and are near Walpole soils. Deerfield soils have more sand in the solum, and Merrimac soils do not have mottles. Walpole soils are in depressions and along drainageways on the landscape.

Typical pedon of Sudbury fine sandy loam, 2 to 8 percent slopes, in the town of Millis, 1,500 feet east of Massachusetts State Highway 115, 100 feet south of the road to the Norfolk Fish and Game Club Road, in a wooded area. On map sheet number 28, at Massachusetts grid coordinates: 419,300 N. and 641,000 E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam, pale brown (10YR 6/3) dry; weak medium granular structure; very friable; many medium roots; very strongly acid; abrupt irregular boundary.

BA—8 to 11 inches; dark brown (10YR 3/3) sandy loam, pale brown (10YR 6/3) dry; massive; very friable; common medium roots; very strongly acid; clear wavy boundary.

Bw1—11 to 16 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; few medium roots; 5 percent gravel; very strongly acid; gradual wavy boundary.

Bw2—16 to 22 inches; yellowish brown (10YR 5/4) loamy sand; few medium faint yellowish brown (10YR 5/8) mottles; massive; very friable; 15 percent gravel; very strongly acid; gradual wavy boundary.

Bw3—22 to 30 inches; yellowish brown (10YR 5/6) loamy sand; few medium prominent yellowish red

(5YR 5/8) and few fine faint grayish brown (10YR 5/2) mottles; massive; very friable; 15 percent gravel; strongly acid; clear wavy boundary.

2C1—30 to 36 inches; light olive brown (2.5Y 5/4) sand; few moderate distinct strong brown (7.5YR 5/8) and common medium distinct grayish brown (10YR 5/2) mottles; massive; very friable; strongly acid; clear wavy boundary.

2C2—36 to 60 inches; light yellowish brown (2.5Y 6/4) fine sand; few medium faint light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/8) mottles; massive; very friable; strongly acid.

The solum ranges from 18 to 30 inches in thickness. Gravel and small cobbles make up 0 to 20 percent, by volume, of the solum. The substratum is 0 to 50 percent gravel, by volume, and 0 to 15 percent cobbles. Reaction is very strongly acid to moderately acid throughout.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. It is fine sandy loam, sandy loam, or their gravelly analog.

The B horizon has value of 4 or 5 and chroma of 4 to 8. Depth to grayish and brownish mottles ranges from 12 to 24 inches. In the upper part the B horizon is fine sandy loam or sandy loam. In the lower part it is sandy loam, loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, or their gravelly analog.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 to 8. It is stratified loamy sand, sand, coarse sand, or their gravelly or very gravelly analog to a depth of 60 inches or more.

Swansea Series

The Swansea series consists of very deep, very poorly drained organic soils in depressions and in low, level areas on uplands and glacial outwash plains and terraces. Slopes range from 0 to 3 percent.

Swansea soils are similar to and commonly are near Freetown, Saco, and Scarboro soils. Freetown soils have more than 51 inches of organic material. Saco soils have less organic matter, and formed in mineral material. Scarboro soils formed in less than 16 inches of organic material.

Typical pedon of Swansea muck, in the town of Dedham, 100 feet southeast of Scott Circle Annex. On map sheet number 18, at Massachusetts grid coordinates: 445,550 N. and 694,900 E.

Oa1—0 to 24 inches; black (10YR 2/1) broken face and rubbed muck; 13 percent fiber, 4 percent rubbed; weak medium granular structure in the upper part, massive in the lower part; friable; slightly sticky, slightly plastic; many fine and very fine roots, few medium and coarse roots; woody fiber; extremely acid (pH 4.0 in 0.01 *M* CaCl2); abrupt smooth boundary.

Oa2—24 to 34 inches; dark yellowish brown (10YR 3/4) broken face and very dark grayish brown (10YR 3/2) rubbed muck; 64 percent fiber, 12 percent rubbed; massive; herbaceous fiber; extremely acid (pH 4.0 in 0.01 *M* CaCl2); abrupt smooth boundary.

2C—34 to 60 inches; grayish brown (10YR 5/2) gravelly sand; single grain; loose; 25 percent gravel; strongly acid.

Depth to the mineral material ranges from 16 to 51 inches. Woody fragments in the O horizon are ½ inch to 12 inches or more in diameter. Reaction is extremely acid in the organic material and is extremely acid to strongly acid in the underlying mineral material.

The surface tier has hue of 5YR to 10YR and chroma of 0 to 2. It is dominantly sapric material. Some pedons have, in various proportions, both sapric and hemic material.

The subsurface and bottom tiers have hue of 5YR to 10YR, value of 2 or 3, and chroma of 0 to 4.

The 2C horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2. It is coarse sand, sand, fine sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or their gravelly analog. Gravel content ranges from 0 to 40 percent.

Udorthents

Udorthents consist of deep and very deep, excessively drained to moderately well drained soils on uplands, outwash plains, stream terraces, and coastal plains. These soils are in areas where the upper 24 inches or more of the original soils has been cut away and removed or where the original soils have been covered with more than 14 inches of fill. Slopes range from 0 to 35 percent.

Udorthents are on the landscape with excessively drained Hinckley and Windsor soils, somewhat excessively drained Merrimac soils, and well drained Canton, Charlton, Montauk, Newport, and Paxton soils. They are also on the landscape with moderately well drained Pittstown, Scituate, Sudbury, and Woodbridge soils and very poorly drained Freetown, Ipswich, Saco, Scarboro, and Swansea soils. Udorthents are mapped near Pits, sand and gravel, and Urban land.

Coarse fragments range from 0 to 65 percent throughout. Udorthents are very strongly acid to moderately acid.

Some pedons have an A horizon that has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3. It is silt loam, fine sandy loam, sandy loam, or loamy sand.

The C horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 6.

Walpole Series

The Walpole series consists of very deep, poorly drained soils in low-lying, wet areas on glacial outwash plains and terraces. Slopes range from 0 to 8 percent.

Walpole soils are similar to Raynham and Scarboro soils and are commonly near Sudbury soils. Raynham soils have more silt and less sand throughout. Scarboro soils have a thicker, darker colored A horizon and a grayer substratum than Walpole soils. Sudbury soils are at slightly higher elevations on the landscape.

Typical pedon of Walpole sandy loam, 0 to 5 percent slopes, in the town of Norfolk, 0.5 mile east of Myrtle Street, 60 feet south of Medway Street, in a wooded area. On map sheet number 28, at Massachusetts grid coordinates: 410,050 N. and 640,000 E.

A—0 to 9 inches; very dark brown (10YR 2/2) sandy loam; massive; very friable; common medium roots; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Bw—9 to 18 inches; grayish brown (2.5Y 5/2) sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine and common medium roots; 5 percent gravel; very strongly acid; clear smooth boundary.

2C1—18 to 32 inches; yellowish brown (10YR 5/4) gravelly loamy sand; common medium distinct light yellowish brown (2.5Y 6/4) mottles; single grain; loose; few fine and medium roots; 15 percent gravel; strongly acid; clear smooth boundary.

2C2—32 to 60 inches; pale olive (5Y 6/3) gravelly loamy sand; single grain; loose; 15 percent gravel; strongly acid.

The solum ranges from 18 to 28 inches in thickness. The content of rock fragments ranges from 0 to 15 percent, by volume, in the solum and from 0 to 25 percent in the substratum. Reaction is very strongly acid to moderately acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. It is sandy loam, fine sandy loam, or their gravelly analog.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is mottled sandy loam, fine sandy loam, or their gravelly analog in the upper part. It is mottled sandy loam, loamy fine sand, loamy sand, or their gravelly analog in the lower part.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It is mottled coarse sand, sand, fine sand, loamy sand, loamy fine sand, or their gravelly analog.

Whitman Series

The Whitman series consists of very deep, very poorly drained soils on uplands. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 0 to 5 percent.

Whitman soils are similar to Birdsall and Ridgebury soils. Birdsall soils have more silt in the solum and a more friable substratum. Ridgebury soils have a thinner, lighter colored A horizon.

Typical pedon of Whitman fine sandy loam, in an area of Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony, in the town of Dover, 300 feet south of Dedham Street and 30 feet west of Powisset Brook. On map sheet number 13, at Massachusetts grid coordinates: 457,700 N. and 669,900 E.

A—0 to 9 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly sticky and slightly plastic; friable; many medium and few large roots; 10 percent gravel; strongly acid; clear wavy boundary.

Bg—9 to 22 inches; grayish brown (10YR 5/2) gravelly fine sandy loam; common medium distinct pale olive (5Y 6/3) and yellowish brown (10YR 5/6) mottles; massive; friable; few fine and medium roots; 15 percent gravel, 3 percent cobbles; moderately acid; gradual wavy boundary.

Cr—22 to 60 inches; grayish brown (2.5Y 5/2) gravelly sandy loam; common medium distinct pale olive (5Y 6/3) mottles; massive; firm; 5 percent gravel, 4 percent cobbles, 5 percent stones; strongly acid.

The solum ranges from 12 to 26 inches in thickness. The A horizon contains 5 to 25 percent gravel, 0 to 15 percent cobbles, and 0 to 25 percent stones, by volume. The B and C horizons have 5 to 25 percent gravel, less than 5 percent cobbles, and 0 to 5 percent stones, by volume. Reaction is strongly acid or moderately acid throughout.

The A horizon has a hue of 10YR to 5Y, value of 2 or

3, and chroma of 1 or 2. It is fine sandy loam, loam, or their gravelly or mucky analog.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. They are fine sandy loam, sandy loam, or their gravelly analog.

The Cr horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is fine sandy loam, sandy loam, or their gravelly analog. It is firm or very firm to a depth of 60 inches or more.

Windsor Series

The Windsor series consists of very deep, excessively drained soils on outwash plains, terraces, and deltas. These soils formed in sandy, water-deposited material. Slopes range from 0 to 15 percent.

Windsor soils are similar to Deerfield, Hinckley, and Merrimac soils. Deerfield soils have mottles in the lower part of the B horizon. Hinckley soils have more gravel throughout. Merrimac soils have more silt in the solum.

Typical pedon of Windsor loamy sand, 3 to 8 percent slopes, in the town of Dover, 800 feet north of Haven Street, 1,250 feet east of Main Street. On map sheet number 12, at Massachusetts grid coordinates: 458,000 N. and 655,800 E.

Ap—0 to 8 inches; dark brown (10YR 3/3) loamy sand; massive; very friable; common fine and few medium roots; strongly acid; abrupt smooth boundary.

Bw—8 to 18 inches; yellowish brown (10YR 5/8) loamy sand; massive; very friable; few fine roots; moderately acid; clear wavy boundary.

BC—18 to 24 inches; yellowish brown (10YR 5/4) sand; single grain; loose; few fine roots; moderately acid; gradual wavy boundary.

C—24 to 60 inches; very pale brown (10YR 7/4) sand; single grain; loose; slightly acid; gradual wavy boundary.

The solum ranges from 18 to 36 inches in thickness. Gravel content ranges from 0 to 10 percent in the solum and from 0 to 15 percent in the substratum. Reaction is very strongly acid to moderately acid in the solum and strongly acid to slightly acid in the C horizon.

The A horizon has chroma of 2 or 3. It is loamy fine sand or loamy sand.

In the upper part the B horizon has value of 4 or 5 and chroma of 4 to 8. It is loamy fine sand or loamy sand. In the lower part it has value of 5 or 6 and chroma of 2 to 6. It is loamy fine sand, loamy sand, fine sand, or sand.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. It is fine sand and sand.

Woodbridge Series

Woodbridge series consists of very deep, moderately well drained soils on uplands. These soils formed in friable glacial till overlying a firm substratum. Slopes range from 0 to 8 percent.

Woodbridge soils are similar to Paxton, Ridgebury, and Scituate soils. Paxton soils are well drained and do not have mottles. Ridgebury soils are poorly drained and have grayer colors in the B and C horizons. Scituate soils have more sand and less silt in the substratum.

Typical pedon of Woodbridge fine sandy loam, 0 to 3 percent slopes, in the town of Norwood, 200 feet west of Nahatan Street, 800 feet south of the entrance to Nor-West Woods Apartments, in a wooded residential area. On map sheet number 24, at Massachusetts grid coordinates: 438,600 N. and 678,200 E.

A—0 to 8 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; many medium and few coarse roots; 10 percent gravel; very strongly acid; abrupt wavy boundary.

Bw1—8 to 16 inches; light olive brown (2.5Y 5/4) fine sandy loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few medium and coarse roots; 10 percent gravel; very strongly acid; clear wavy boundary.

Bw2—16 to 26 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; many medium distinct light gray (2.5Y 7/2) and many medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few medium roots; 10 percent gravel; strongly acid; clear smooth boundary.

Cr—26 to 60 inches; grayish brown (2.5Y 5/2) loam; few large faint light brownish gray (2.5Y 6/2) and few large distinct yellowish brown (10YR 5/8) mottles; weak coarse platy structure; very firm; slightly sticky; 15 percent gravel; moderately acid.

The solum ranges from 18 to 36 inches in thickness. Rock fragments of gravel, cobbles, and stones make up from 5 to 30 percent of the content throughout. Reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It is fine sandy loam or gravelly fine sandy loam.

The B horizon has hue of 7.5YR to 2.5Y. In the upper part it has value of 4 or 5 and chroma of 3 to 8. In the lower part it has value of 5 or 6, chroma of 4 to 6, and distinct or prominent low chroma mottles. The horizon is sandy loam, fine sandy loam, loam, or their gravelly analog.

The Cr horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam, fine sandy loam, loam, or their gravelly analog. It is very firm or extremely firm to a depth of 60 inches or more.

Formation of the Soils

Soils are formed through the action of climate, plant and animal life, and man on parent material in different topographic locations over time. The relative influence of each of these factors differs in different locations. In Norfolk and Suffolk Counties, differences among named soils are generally the result of differences in parent material and topographic position.

Factors of Soil Formation

This section describes the five major factors of soil formation and the effect of each on the soils in the survey area.

Parent Material

Parent material is the unconsolidated mineral deposits in which a soil develops. It determines the mineralogical composition and contributes largely to the physical and chemical characteristics of the soil. The kind of parent material can also influence the rate of soil-forming processes. Five major kinds of parent material have been identified in this survey area: glacial till, glacial outwash, lacustrine and marine sediments, recent alluvium, and organic deposits.

Glacial till is dominantly unsorted and unstratified sediments deposited from glacial ice. In this survey area it is a hetrogeneous mixture of mostly stones, gravel, sand, and silt and is generally less than 5 percent clay, by volume. In the Boston Basin the glacial till is more than 5 percent clay, by volume.

Two broad groups of till are in the survey area. Basal till, or lodgement till, was deposited beneath advancing or retreating glaciers (*12*). It has a dense, firm, olive gray substratum that has a loamy texture. Paxton soils, for example, formed in basal till. Ablation till was deposited from melting ice and dropped out on bedrock or other surficial deposits (*12*). In this survey area it is generally coarse-textured, is dominantly sand, gravel, cobbles, and stones, and has a loose, permeable substratum. Canton soils, for example, formed in ablation till.

Glacial outwash is a broad category of glacial deposits that have been transported and laid down by glacial meltwater. This category can be further subdivided, depending on the location, velocity, or duration of meltwater flow. These deposits generally consist of a substratum of stratified sand and gravel commonly overlain by a more weathered, loamy or sandy surface layer and subsoil. This parent material is generally in major stream valleys. Hinckley, Merrimac, and Sudbury soils, for example, formed in glacial outwash. Because of the nature of deposition of this parent material, the soils are in complex patterns on the landscape.

Lacustrine and marine sediments are stratified deposits of sand, silt, and clay that have settled out of water in glacial lakes or in the ocean. Lacustrine sediments settled in freshwater that has since drained, leaving a nearly level plain with depressions and generally poor internal drainage. In the survey area they consist mainly of stratified sands and silt. Raynham and Scio soils, for example, formed in lacustrine sediments.

When ocean levels receded following glaciation, marine sediments were left exposed. These formed low plains along the present coast of Massachusetts Bay. The sediments generally are at elevations as high as 50 feet above sea level and grade gently to sea level. In the survey area they consist mainly of stratified fine sand, silt, and clay. Boxford soils formed in marine sediments.

Recent alluvium consists of sediments deposited by existing streams and rivers. It is on terraces above streams, on bottom lands, and in basins that are normally flooded. It consists of strata of gravel, sand, silt, clay, and organic material in all variations and mixtures. In the survey area it is generally silty and has a large amount of organic matter on the surface. This material has been deposited during recent history and does not have a developed soil profile. Saco and Rippowam soils formed in recent alluvium.

Organic deposits are accumulations of plant material in various stages of decomposition and are generally more than 16 inches thick. This parent material is in inland and coastal wetlands. Freetown and Swansea soils formed in highly decomposed organic material derived from woody and herbaceous plants in inland swamps and marshes. Ipswich soils formed in organic material derived mainly from semidecomposed herbaceous plants in tidal marshes.

Topography

The shape of the land surface, slope, and the position of the soil on the landscape are dominant factors in the different soil types in Norfolk and Suffolk Counties.

Soils that formed in identical parent materials and under the same climatic conditions are different because of their positions on the landscape. These differences are largely the result of different drainage conditions caused by differences in surface runoff or depth to the seasonal high water table.

Soils that formed at higher elevations and in sloping areas generally are excessively drained or well drained. Depth to ground water is generally more than 6 feet, and surface runoff is moderate or rapid. In these areas soil profiles commonly are bright strong brown to yellowish brown in the solum grading to a lighter, grayer, unweathered substratum.

On soils at lower elevations, such as those in swales, adjacent to drainageways and water bodies, and in depressions, generally surface runoff flows down from higher elevations and the seasonal high water table is at a shallow depth. In these areas the soils are moderately well drained and poorly drained and generally have a yellowish brown matrix color and gray mottles in the solum. In very poorly drained soils, the seasonal high water table is at or near the surface for prolonged periods. Also, the soil profile typically has a dark colored organic or organic-rich surface layer and a strongly mottled or gleyed subsoil and substratum.

Climate

The kind of climate under which a soil forms largely determines the nature and the rate of physical and chemical weathering of parent materials. Climate directly affects the type of vegetation in an area, which in turn affects those soil-forming processes related to plant life. Moderate temperatures in the survey area allow the accumulation of organic matter in the surface layer of most soils. Rainfall leaches water-soluble minerals down through the soil, and this leaching results in an acid soil. In winter cold temperatures and high moisture cause frost action, which is especially active in loamy soils not under forest vegetation. Frost action breaks apart rock fragments, and in some soils influences soil structure.

Plant and Animal Life and the Activities of Man

All living things influence the soil-forming process. Micro-organisms, such as bacteria, fungi, actinomycetes, algae, and protozoa, are active in the surface layer of most soils (*2*). They are constantly recycling organic materials and minerals, which in turn are used by plants. The dark brown color of the surface layer in most soils is attributable to the activities of these organisms.

Larger animals, such as earthworms, woodchucks, and moles, mix the soil and change its physical characteristics. They help to make the soil more permeable to air and water. Their waste products help to aggregate soil particles, to improve soil structure, and to conserve nutrients in a less mobile state.

The native forest of Norfolk and Suffolk Counties is mixed coniferous and hardwood trees. The mineral content of leaves and branches influences the soils that develop beneath the trees. In a very efficient cycle, hardwood trees, such as red oak, take up bases (calcium, magnesium, and potassium) from the soil and eventually return the bases to the soil surface as litter. Coniferous trees, such as white pine, take up smaller amounts of bases than hardwood trees; consequently, the soil beneath them is commonly more acid and bases are leached through the soil. Windthrow is a hazard in places where trees are shallow-rooted because of a seasonal high water table or an impermeable layer. The result is deeper mixing of the soil and irregular boundaries between the surface layer and subsoil. Soils that have been in grass for long periods of time generally develop a thicker, darker surface layer. The surface layer of these soils also has a higher moisture-holding capacity and a higher cation exchange capacity than similar soils developed under forest vegetation.

Human activities have significantly altered many areas of natural soil in Norfolk and Suffolk Counties. Many soils have a distinct plow layer formed by mechanical cultivation and additions of organic matter, lime, and fertilizer. Some naturally wet soils have been altered by artificial drainage and filling. In urban areas the natural soil has been covered, removed, or replaced. On Udorthents, loamy, Udorthents, sandy, and Udorthents, wet substratum, man has had a direct influence on soil development.

Time

The soils of Norfolk and Suffolk Counties formed in the period since glaciation. They have weathered little compared to soils in unglaciated areas and have developed weak soil profiles.

Soil Profile Development

A soil profile is a vertical section of the soil extending from the surface through all its horizons, or layers, into the parent material. A soil horizon is a roughly horizontal layer of soil and has distinct characteristics produced by soil-forming processes. The physical and chemical characteristics observed within the soil profile are the basis for differentiating one soil from another.

The majority of soils in the survey area exhibit weak soil profile development and little change or alteration of parent material. The depth of soil profile development is different among the different soils. It averages about 30 inches in the well drained soils but is generally shallower in both the poorly drained and very poorly drained soils. Some of the recently deposited material has very weak soil profile development or none at all.

Organic matter has accumulated on the surface of soils as an O horizon that has undergone different degrees of decomposition. In the Freetown and Swansea soils, the thick, mucky organic deposits have resulted from very poor drainage. These soils formed where organic material accumulates with a lack of oxygen and decomposes very slowly. Soils have an A horizon where humified organic material and the underlying mineral matter have been naturally mixed.

Soil profile development is similar in many excessively drained, well drained, and moderately well drained soils in the survey area. It is the result of movement and deposition of aluminum, iron, and humified organic matter within the soil profile. Weak organic acids generated by the decomposition of surface organic litter have been percolated by rainwater downward through the soil. Aluminum and iron in the upper part of the soil profile are released into solution and leached downward, along with fine particles of humified organic matter. In the coarser textured soils a light gray E horizon just below the surface horizon has resulted from this leaching. The finer textured soils commonly do not have this horizon.

The chemical environment within the soil changes with depth, and aluminum, iron, and organic material precipitate out. The greatest concentration of leached material precipitates out just below the E horizon and commonly forms a strong brown B horizon. The soil color within the subsoil is caused primarily by iron oxide stains on the surfaces of sand-sized particles and generally fades with depth to the weathered parent material of the C horizon.

The soil is mottled where a water table is in the soil or fluctuates within the soil profile. The mottles are gray, and red spots are produced in the oxidation-reduction process (aerated-saturated conditions) principally when iron within peds migrate, deplete, or concentrate (*23*). Gleying is a condition that develops when the soil is wet for most of the year. In a gleyed soil the matrix color is gray or bluish gray because of prolonged reducing conditions. Gleying is common in the upper part of the solum of poorly drained Raynham, Ridgebury, and Walpole soils and in the lower part of the subsoil in moderately well drained Scio, Scituate, Sudbury, and Woodbridge soils. Gleying is a characteristic of very poorly drained Birdsall, Scarboro, and Whitman soils. Indurated sand grains called ortstein are caused by concentrated iron (ferric oxide) in some areas of poorly drained Walpole soils.

The movement of clay within some soil profiles is evidenced by clay films on the surfaces of ped faces and within pores in the lower part of the solum and in the substratum. The degree of clay movement within the soil profile is believed to be slight and has been observed within some of Boxford and Pittstown soils.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Basal till. Compact glacial till deposited beneath the ice.

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

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

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

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

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Boston Basin. A low-lying physiographic area surrounding Boston. The area extends northward to the town of Lynn and southward to the town of Weymouth and includes the Boston Harbor Islands. It extends westward up the Charles River Valley to the town of Natick and southwestward up the Neponset River Valley to the town of Norwood. Most of the Boston Basin is less than 50 feet above sea level. The few hills that protrude above the plain are 50 to 160 feet above Mean Sea Level (MSL).

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

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

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

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

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

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate

pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

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

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic

crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Dry spot. This symbol is used on the soil maps to indicate an area 1 to 3 acres in size that is at least two drainage classes drier than the surrounding soil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

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

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

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

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

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

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

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

Low strength. The soil is not strong enough to support loads.

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

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

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

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

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

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

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The pH values are defined as follows:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

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

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates, in millimeters, recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5

Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

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

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

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

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

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

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. 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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

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

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt 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."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

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

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

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

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

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

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

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

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

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1957-81 at West Medway, Massachusetts)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	35.9	12.9	24.4	59	-15	15	3.95	1.64	5.90	6	11.0
February----	37.7	14.4	26.1	61	-13	7	3.58	1.99	4.99	6	13.0
March-------	46.5	24.8	35.7	73	3	38	3.65	1.59	5.40	7	10.2
April-------	58.9	34.1	46.5	86	18	209	3.91	2.19	5.42	7	1.1
May---------	70.0	43.5	56.8	90	26	521	3.40	1.93	4.69	7	.2
June--------	78.5	53.0	65.8	95	35	774	3.09	1.48	4.47	7	.0
July--------	83.6	58.4	71.0	97	42	961	3.34	1.60	4.84	6	.0
August------	82.2	56.4	69.3	95	36	908	3.44	1.56	5.04	6	.0
September---	74.5	48.0	61.3	92	26	639	4.09	1.91	5.95	6	.0
October-----	64.2	37.0	50.6	84	18	338	3.73	2.30	5.01	6	.1
November----	52.3	29.9	41.1	74	10	102	4.34	2.42	6.03	7	1.2
December----	39.8	18.7	29.3	65	-8	17	4.62	2.44	6.52	7	8.9
Yearly:											
Average---	60.3	35.9	48.2	---	---	---	---	---	---	---	---
Extreme---	---	---	---	98	-19	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,529	45.14	36.64	52.60	78	45.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1957-81 at West Medway, Massachusetts)

Probability	Temperature		
	24^{o} F or lower	28^{o} F or lower	32^{o} F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 21	May 13	May 30
2 years in 10 later than--	Apr. 18	May 8	May 25
5 years in 10 later than--	Apr. 13	Apr. 30	May 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 5	Sept. 23	Sept. 11
2 years in 10 earlier than--	Oct. 10	Sept. 28	Sept. 16
5 years in 10 earlier than--	Oct. 20	Oct. 7	Sept. 24

TABLE 3.--GROWING SEASON

(Recorded in the period 1957-81 at West Medway, Massachusetts)

Probability	Daily minimum temperature during growing season		
	Higher than 24^{o} F	Higher than 28^{o} F	Higher than 32^{o} F
	Days	Days	Days
9 years in 10	174	139	113
8 years in 10	179	146	119
5 years in 10	190	159	130
2 years in 10	200	173	141
1 year in 10	205	180	147

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

Map symbol	Soil name	Norfolk County	Suffolk County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
Be	Beaches	110	260	370	0.1
CaB	Canton fine sandy loam, 3 to 8 percent slopes	6,400	200	6,600	2.3
CaC	Canton fine sandy loam, 8 to 15 percent slopes	1,825	25	1,850	0.6
CaD	Canton fine sandy loam, 15 to 35 percent slopes	670	15	685	0.2
CbB	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	7,975	0	7,975	2.8
CbC	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	3,225	5	3,230	1.1
CbD	Canton fine sandy loam, 15 to 25 percent slopes, extremely stony	1,110	5	1,115	0.4
CcB	Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery	2,065	0	2,065	0.7
CcC	Canton fine sandy loam, 8 to 15 percent slopes, extremely bouldery	2,145	0	2,145	0.8
CcD	Canton fine sandy loam, 15 to 25 percent slopes, extremely bouldery	790	0	790	0.3
CdC	Canton-Urban land complex, 3 to 15 percent slopes	2,490	700	3,190	1.1
ChB	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	6,100	370	6,470	2.3
ChC	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	9,570	590	10,160	3.6
ChD	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	2,530	70	2,600	0.9
CuC	Charlton-Hollis-Urban land complex, 3 to 15 percent slopes	3,361	1,390	4,751	1.6
DeA	Deerfield loamy sand, 0 to 3 percent slopes	240	5	245	0.1
DeB	Deerfield loamy sand, 3 to 8 percent slopes	470	0	470	0.2
Fm	Freetown muck	9,840	60	9,900	3.4
Fp	Freetown muck, ponded	2,100	110	2,210	0.8
HaA	Haven silt loam, 0 to 3 percent slopes	340	0	340	0.1
HaB	Haven silt loam, 3 to 8 percent slopes	485	0	485	0.2
HfB	Hinckley sandy loam, 3 to 8 percent slopes	6,755	50	6,805	2.4
HfC	Hinckley sandy loam, 8 to 15 percent slopes	9,000	125	9,125	3.2
HfD	Hinckley loamy sand, 15 to 35 percent slopes	1,835	0	1,835	0.6
HrC	Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes	12,330	1,005	13,335	4.6
HrD	Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes	5,125	200	5,325	1.8
Ip	Ipswich mucky peat	1,015	835	1,850	0.6
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes	3,360	60	3,420	1.2
MmB	Merrimac fine sandy loam, 3 to 8 percent slopes	12,740	375	13,115	4.5
MmC	Merrimac fine sandy loam, 8 to 15 percent slopes	1,135	5	1,140	0.4
MnB	Merrimac-Urban land complex, 0 to 8 percent slopes	12,465	3,035	15,500	5.4
MoB	Montauk fine sandy loam, 3 to 8 percent slopes	2,705	40	2,745	0.9
MoC	Montauk fine sandy loam, 8 to 15 percent slopes	645	25	670	0.2
MsB	Montauk fine sandy loam, 3 to 8 percent slopes, extremely stony	2,035	0	2,035	0.7
MsC	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	1,340	0	1,340	0.5
NpB	Newport silt loam, 3 to 8 percent slopes	305	305	610	0.2
NpC	Newport silt loam, 8 to 15 percent slopes	375	110	485	0.2
NpD	Newport silt loam, 15 to 25 percent slopes	450	880	1,330	0.5
NuC	Newport-Urban land complex, 3 to 15 percent slopes	2,060	2,895	4,955	1.7
PaB	Paxton fine sandy loam, 3 to 8 percent slopes	5,901	35	5,936	2.1
PaC	Paxton fine sandy loam, 8 to 15 percent slopes	980	50	1,030	0.4
PaD	Paxton fine sandy loam, 15 to 25 percent slopes	1,070	180	1,250	0.4
PbB	Paxton fine sandy loam, 3 to 8 percent slopes, extremely stony	1,165	0	1,165	0.4
PbC	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	1,470	0	1,470	0.5
PbD	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	655	10	665	0.2
Pr	Pits, quarry	340	75	415	0.1
Ps	Pits, sand and gravel	1,110	0	1,110	0.4
PtB	Pittstown silt loam, 2 to 8 percent slopes	195	130	325	0.1
Ra	Raynham silt loam	1,010	15	1,025	0.4

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

Map symbol	Soil name	Norfolk County	Suffolk County	Total-- Area	Extent
		Acres	Acres	Acres	Pct
RdA	Ridgebury fine sandy loam, 0 to 5 percent slopes	635	47	682	0.2
RgB	Ridgebury fine sandy loam, 2 to 8 percent slopes, extremely stony	5,870	15	5,885	2.0
Rm	Rippowam silt loam	900	0	900	0.3
RoD	Rock outcrop-Hollis complex, 3 to 25 percent slopes	3,275	480	3,755	1.3
Sa	Saco silt loam	4,535	140	4,675	1.6
Sb	Scarboro and Birdsall soils	5,520	10	5,530	1.9
ScB	Scio very fine sandy loam, 2 to 5 percent slopes	920	0	920	0.3
SeB	Scituate fine sandy loam, 3 to 8 percent slopes	1,725	50	1,775	0.6
StB	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	1,935	0	1,935	0.7
SuB	Sudbury fine sandy loam, 2 to 8 percent slopes	5,915	10	5,925	2.0
Sw	Swansea muck	8,805	25	8,830	3.0
Ua	Udorthents, sandy	8,110	480	8,590	3.0
Ud	Udorthents, loamy	3,270	920	4,190	1.4
Ue	Udorthents, wet substratum	2,395	4,140	6,535	2.3
Uf	Udorthents, refuse substratum	775	125	900	0.3
Ur	Urban land, 0 to 15 percent slopes	12,200	4,740	16,940	5.9
Uw	Urban land, wet substratum, 0 to 3 percent slopes	1,290	6,375	7,665	2.6
UxA	Urban land-Boxford complex, 0 to 3 percent slopes	25	215	240	0.1
WaA	Walpole sandy loam, 0 to 5 percent slopes	1,710	30	1,740	0.6
WhA	Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony	3,640	70	3,710	1.3
WnA	Windsor loamy sand, 0 to 3 percent slopes	420	0	420	0.1
WnB	Windsor loamy sand, 3 to 8 percent slopes	2,305	0	2,305	0.8
WnC	Windsor loamy sand, 8 to 15 percent slopes	1,000	0	1,000	0.3
WrA	Woodbridge fine sandy loam, 0 to 3 percent slopes	1,070	25	1,095	0.4
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes	7,740	165	7,905	2.7
WsB	Woodbridge fine sandy loam, 3 to 8 percent slopes, extremely stony	5,585	0	5,585	1.9
WuC	Woodbridge-Urban land complex, 3 to 15 percent slopes	4,430	2,070	6,500	2.2
	Water	5,340	426	5,766	2.0
	Total	254,752	34,803	289,555	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
CaB	Canton fine sandy loam, 3 to 8 percent slopes
DeA	Deerfield loamy sand, 0 to 3 percent slopes
DeB	Deerfield loamy sand, 3 to 8 percent slopes
HaA	Haven silt loam, 0 to 3 percent slopes
HaB	Haven silt loam, 3 to 8 percent slopes
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes
MmB	Merrimac fine sandy loam, 3 to 8 percent slopes
MoB	Montauk fine sandy loam, 3 to 8 percent slopes
NpB	Newport silt loam, 3 to 8 percent slopes
PaB	Paxton fine sandy loam, 3 to 8 percent slopes
PtB	Pittstown silt loam, 2 to 8 percent slopes
ScB	Scio very fine sandy loam, 2 to 5 percent slopes
SeB	Scituate fine sandy loam, 3 to 8 percent slopes
SuB	Sudbury fine sandy loam, 2 to 8 percent slopes
WrA	Woodbridge fine sandy loam, 0 to 3 percent slopes
WrB	Woodbridge fine sandy loam, 3 to 8 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn silage	Alfalfa hay	Grass-clover	Sweet corn
		Tons	Tons	AUM*	Tons
Be**. Beaches					
CaB Canton	IIe	22	4.5	8.5	5.3
CaC Canton	IIIe	20	4.5	7.5	5.0
CaD Canton	IVe	18	4.0	6.5	4.5
CbB, CbC, CbD Canton	VIs	---	---	---	---
CcB, CcC, CcD Canton	VIIs	---	---	---	---
CdC**. Canton-Urban land					
ChB** Charlton-Hollis-Rock outcrop	VIIs	---	---	---	---
ChC Charlton-Hollis-Rock outcrop	VIIs	---	---	---	---
ChD** Charlton-Hollis-Rock outcrop	VIIs	---	---	---	---
CuC**. Charlton-Hollis-Urban land					
DeA, DeB Deerfield	IIIw	16	3.5	5.8	6.0
Fm Freetown	Vw	---	---	---	---
Fp Freetown	VIIw	---	---	---	---
HaA Haven	I	24	5.0	8.5	6.0
HaB Haven	IIe	24	5.0	8.5	6.0
HfB Hinckley	IIIs	12	2.5	3.6	3.0
HfC Hinckley	IVs	---	---	2.5	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn silage	Alfalfa hay	Grass-clover	Sweet corn
		Tons	Tons	AUM*	Tons
HfD: Hinckley	VIIs	---	---	---	---
HrC: Hollis-Rock outcrop-Charlton	VIIs	---	---	---	---
HrD: Hollis-Rock outcrop-Charlton	VIIs	---	---	---	---
Ip: Ipswich	VIIIw	---	---	---	---
MmA, MmB: Merrimac	IIs	18	4.0	5.7	6.1
MmC: Merrimac	IIIe	16	4.0	5.7	6.0
MnB**. Merrimac-Urban land					
MoB: Montauk	IIe	22	4.0	6.5	5.3
MoC: Montauk	IIIe	20	4.0	6.5	5.0
MsB, MsC: Montauk	VIs	---	---	---	---
NpB: Newport	IIe	24	4.5	7.5	6.0
NpC: Newport	IIIe	22	4.5	7.5	5.9
NpD: Newport	IVe	18	4.0	6.5	---
NuC**. Newport-Urban land					
PaB: Paxton	IIe	24	4.5	7.5	5.9
PaC: Paxton	IIIe	22	4.5	7.5	5.3
PaD: Paxton	IVe	18	4.0	6.5	---
PbB: Paxton	VIIs	---	---	---	---
PbC, PbD: Paxton	VIIs	---	---	---	---
Pr**, Ps**. Pits					

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn silage	Alfalfa hay	Grass-clover	Sweet corn
		Tons	Tons	AUM*	Tons
PtB----------------------- Pittstown	IIe	20	4.0	6.5	5.0
Ra------------------------ Raynham	IVw	---	---	---	---
RdA----------------------- Ridgebury	IIIw	16	3.5	7.6	4.5
RgB----------------------- Ridgebury	VIIs	---	---	---	---
Rm------------------------ Rippowam	IVw	---	---	3.5	---
RoD----------------------- Rock outcrop-Hollis	VIIs	---	---	---	---
Sa------------------------ Saco	VIw	---	---	---	---
Sb------------------------ Scarboro and Birdsall	Vw	---	---	---	---
ScB----------------------- Scio	IIe	22	4.5	7.5	5.9
SeB----------------------- Scituate	IIw	24	4.0	6.5	6.0
StB----------------------- Scituate	VIs	---	---	---	---
SuB----------------------- Sudbury	IIe	18	3.5	7.6	5.9
Sw------------------------ Swansea	Vw	---	---	---	---
Ua, Ud, Ue, Uf. Udorthents					
Ur**, Uw**. Urban land					
UxA. Urban land-Boxford					
WaA----------------------- Walpole	IVw	---	---	4.7	---
WhA----------------------- Whitman	VIIs	---	---	---	---
WnA, WnB------------------ Windsor	IIIs	14	3.0	5.5	5.0
WnC----------------------- Windsor	IVs	12	3.0	5.0	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn silage	Alfalfa hay	Grass-clover	Sweet corn
		Tons	Tons	AUM*	Tons
WrA------------------------ Woodbridge	IIw	24	4.0	8.0	5.6
WrB------------------------ Woodbridge	IIe	24	4.0	8.0	5.6
WsB------------------------ Woodbridge	VIs	---	---	---	---
WuC**. Woodbridge-Urban land					

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

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

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Dashes indicate no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Norfolk County	340	---	---	---
Suffolk County	---	---	---	---
II:				
Norfolk County	65,300	33,932	2,803	28,565
Suffolk County	6,660	3,045	145	3,470
III:				
Norfolk County	17,330	6,505	1,345	9,480
Suffolk County	2,488	2,386	52	50
IV:				
Norfolk County	14,100	2,190	1,910	10,000
Suffolk County	1,215	1,075	15	125
V:				
Norfolk County	24,164	---	24,164	---
Suffolk County	94	---	94	---
VI:				
Norfolk County	54,138	---	4,535	49,603
Suffolk County	2,638	---	140	2,498
VII:				
Norfolk County	23,675	---	2,100	21,575
Suffolk County	438	---	110	328
VIII:				
Norfolk County	1,015	---	1,015	---
Suffolk County	835	---	835	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
CaB, CaC-------- Canton	7A	Slight	Slight	Slight	--------	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
CaD------------- Canton	7R	Slight	Moderate	Slight	--------	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
CbB, CbC-------- Canton	7A	Slight	Slight	Slight	Slight	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
CbD------------- Canton	7R	Slight	Moderate	Slight	Slight	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
CcB, CcC, CcD--- Canton	7X	Slight	Moderate	Slight	Slight	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
CdC**:									
Canton---------	7A	Slight	Slight	Slight	--------	Eastern white pine-- Northern red oak----	58 58	7 2	Eastern white pine, white spruce.
Urban land.									
ChB**, ChC**:									
Charlton-------	3A	Slight	Slight	Slight	Slight	Northern red oak---- Eastern white pine-- Red pine------------ Red spruce---------- Red maple----------- Shagbark hickory----	65 65 70 50 55 ---	3 8 8 8 2 ---	Eastern white pine, red pine, white spruce, eastern hemlock, European larch.
Hollis---------	2D	Slight	Slight	Moderate	Slight	Northern red oak---- Eastern white pine-- Sugar maple---------	47 55 56	2 6 2	Eastern white pine.
Rock outcrop.									
ChD**:									
Charlton-------	3R	Moderate	Moderate	Slight	Slight	Northern red oak---- Eastern white pine-- Red pine------------ Red spruce---------- Red maple----------- Shagbark hickory----	65 65 70 50 55 ---	3 8 8 8 2 ---	Eastern white pine, red pine, white spruce, eastern hemlock, European larch.
Hollis---------	2D	Moderate	Moderate	Moderate	Slight	Northern red oak---- Eastern white pine-- Sugar maple---------	47 55 56	2 6 2	Eastern white pine.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Plant competi-tion	Potential productivity: Common trees	Site index	Produc-tivity class*	Trees to plant
ChD**:									
Rock outcrop.									
CuC**:									
Charlton	3A	Slight	Slight	Slight	Slight	Northern red oak	65	3	Eastern white pine, red pine, white spruce, eastern hemlock, European larch.
						Eastern white pine	65	8	
						Red pine	70	8	
						Red spruce	50	8	
						Red maple	55	2	
						Shagbark hickory	---	---	
Hollis	2D	Slight	Slight	Moderate	Slight	Northern red oak	47	2	Eastern white pine.
						Eastern white pine	55	6	
						Sugar maple	56	2	
Urban land.									
DeA, DeB Deerfield	8S	Slight	Slight	Moderate	--------	Eastern white pine	60	8	Eastern white pine, red pine, European larch.
						Northern red oak	64	3	
Fm Freetown	2W	Slight	Severe	Severe	--------	Red maple	50	2	White spruce, eastern hemlock, balsam fir.
						Atlantic white-cedar	60	---	
						Eastern hemlock	55	---	
						Green ash	35	2	
						American elm	55	---	
						Red spruce	50	8	
						Balsam fir	45	6	
HaA, HaB Haven	10A	Slight	Slight	Slight	--------	Eastern white pine	75	10	Eastern white pine, red pine, Norway spruce, European larch.
						Northern red oak	55	3	
						Sugar maple	65	3	
						Red pine	75	8	
HfB, HfC Hinckley	7S	Slight	Slight	Severe	Slight	Eastern white pine	60	7	Eastern white pine.
						Northern red oak	51	2	
						Red pine	58	6	
						Sugar maple	57	2	
HfD Hinckley	7S	Moderate	Moderate	Severe	Slight	Eastern white pine	60	7	Eastern white pine.
						Northern red oak	51	2	
						Red pine	58	6	
						Sugar maple	57	2	
HrC**:									
Hollis	2D	Slight	Slight	Moderate	Slight	Northern red oak	47	2	Eastern white pine.
						Eastern white pine	55	6	
						Sugar maple	56	2	
Rock outcrop.									

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
HrC**:									
Charlton-------	3A	Slight	Slight	Slight	Slight	Northern red oak----	65	3	Eastern white pine, red pine, white spruce, eastern hemlock, European larch.
						Eastern white pine--	65	8	
						Red pine-----------	70	8	
						Red spruce----------	50	8	
						Red maple-----------	55	2	
						Shagbark hickory----	---	---	
HrD**:									
Hollis---------	2D	Moderate	Moderate	Moderate	Slight	Northern red oak----	47	2	Eastern white pine.
						Eastern white pine--	55	6	
						Sugar maple---------	56	2	
Rock outcrop.									
Charlton-------	3R	Moderate	Moderate	Slight	Slight	Northern red oak----	65	3	Eastern white pine, red pine, white spruce, eastern hemlock, European larch.
						Eastern white pine--	65	8	
						Red pine-----------	70	8	
						Red spruce----------	50	8	
						Red maple-----------	55	2	
						Shagbark hickory----	---	---	
MmA, MmB, MmC--- Merrimac	2S	Slight	Slight	Moderate	--------	Northern red oak----	51	2	Eastern white pine, red pine.
						Eastern white pine--	60	8	
						Sugar maple---------	58	3	
MnB**:									
Merrimac-------	2S	Slight	Slight	Moderate	--------	Northern red oak----	51	2	Eastern white pine, red pine.
						Eastern white pine--	60	8	
						Sugar maple---------	58	3	
Urban land.									
MoB, MoC-------- Montauk	3A	Slight	Slight	Slight	--------	Sugar maple---------	65	3	Norway spruce, white spruce, European larch.
						Northern red oak----	70	4	
						Red pine-----------	75	8	
						Eastern white pine--	75	10	
MsB, MsC-------- Montauk	3A	Slight	Slight	Slight	--------	Sugar maple---------	65	3	Norway spruce, white spruce, red pine.
						Northern red oak----	70	4	
						Red pine-----------	75	8	
NpB, NpC-------- Newport	4D	Slight	Slight	Slight	Moderate	Northern red oak----	70	4	Eastern white pine, red pine.
						Eastern white pine--	75	10	
						Sugar maple---------	63	3	
NpD------------ Newport	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	4	Eastern white pine, red pine.
						Eastern white pine--	75	10	
						Sugar maple---------	63	3	
NuC**:									
Newport--------	4D	Slight	Slight	Slight	Moderate	Northern red oak----	70	4	Eastern white pine, red pine.
						Eastern white pine--	75	10	
						Sugar maple---------	63	3	
Urban land.									

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
PaB, PaC-------- Paxton	3D	Slight	Slight	Moderate	Moderate	Northern red oak---- Red pine------------ Eastern white pine-- Sugar maple---------	62 71 62 75	3 8 8 3	Red pine, eastern white pine, Norway spruce, European larch.
PaD------------- Paxton	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Red pine------------ Eastern white pine-- Sugar maple---------	62 71 62 75	3 8 8 3	Red pine, eastern white pine, Norway spruce, European larch.
PbB------------- Paxton	3X	Slight	Moderate	Slight	Moderate	Northern red oak---- Red pine------------ Eastern white pine-- Sugar maple---------	62 71 62 75	3 8 8 3	Red pine, eastern white pine, Norway spruce, European larch.
PbC------------- Paxton	3D	Slight	Slight	Slight	Moderate	Northern red oak---- Red pine------------ Eastern white pine-- Sugar maple---------	62 71 62 75	3 8 8 3	Red pine, eastern white pine, Norway spruce, European larch.
PbD------------- Paxton	3R	Moderate	Moderate	Slight	Moderate	Northern red oak---- Red pine------------ Eastern white pine-- Sugar maple---------	62 71 62 75	3 8 8 3	Red pine, eastern white pine, Norway spruce, European larch.
PtB------------- Pittstown	4A	Slight	Slight	Slight	--------	Northern red oak---- Sugar maple--------- Eastern white pine-- Eastern hemlock----- Red spruce----------	72 66 80 75 50	4 3 10 --- 8	Eastern white pine, eastern hemlock, white spruce.
Ra-------------- Raynham	3W	Slight	Severe	Moderate	--------	Red maple----------- Eastern white pine-- White spruce-------- Red spruce---------- Elm----------------- Eastern hemlock----- Gray birch---------- Sugar maple--------- Balsam fir---------- Tamarack------------	58 69 55 45 --- --- --- --- --- ---	3 8 9 7 --- --- --- --- --- ---	Eastern white pine, white spruce.
RdA, RgB-------- Ridgebury	3W	Slight	Severe	Severe	--------	Northern red oak---- Red spruce---------- Eastern white pine-- Sugar maple---------	66 50 74 52	3 7 8 2	Eastern white pine, white spruce.
Rm-------------- Rippowam	3W	Slight	Severe	Severe	Severe	Red maple----------- Eastern white pine--	75 65	3 8	Eastern white pine, white spruce.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity class*	
RoD**: Rock outcrop.									
Hollis	2X	Slight	Moderate	Moderate	Slight	Northern red oak	47	2	Eastern white pine.
						Eastern white pine	55	6	
						Sugar maple	56	2	
Sa Saco	6W	Slight	Severe	Severe	Severe	Eastern white pine	50	6	
						Red maple	50	2	
						Northern white-cedar	45	5	
Sb**: Scarboro	6W	Slight	Severe	Severe	--------	Eastern white pine	55	6	Northern white-cedar.
						Red maple	50	2	
						Atlantic white-cedar	45	---	
Birdsall	2W	Slight	Severe	Severe	Severe	Red maple	50	2	
ScB Scio	4A	Slight	Slight	Slight	--------	Northern red oak	75	4	European larch, eastern white pine, red pine, Norway spruce, white spruce.
						White ash	85	4	
						Sugar maple	70	3	
						Black cherry	80	4	
						Eastern hemlock	70	--	
						Eastern white pine	85	10	
SeB, StB Scituate	3A	Slight	Slight	Slight	Moderate	Northern red oak	55	3	Eastern white pine.
						Eastern white pine	60	8	
						Sugar maple	55	2	
						Red pine	70	9	
SuB Sudbury	7A	Slight	Slight	Slight	--------	Eastern white pine	70	7	Eastern white pine, red pine, European larch, white spruce, Norway spruce.
						Northern red oak	45	2	
						Red spruce	47	7	
						Red pine	60	6	
Sw Swansea	2W	Slight	Severe	Severe	--------	Red maple	50	2	White spruce, eastern hemlock.
						Atlantic white-cedar	60	---	
						Eastern hemlock	55	---	
						Green ash	35	2	
						American elm	55	---	
						Red spruce	50	8	
						Balsam fir	45	6	
UxA**: Urban land.									
Boxford	8A	Slight	Slight	Slight	Moderate	Eastern white pine	65	8	Eastern white pine, white spruce.
						Northern red oak	55	3	
WaA Walpole	3W	Slight	Severe	Severe	Severe	Red maple	75	3	Eastern white pine, white spruce, northern white-cedar, Norway spruce.
						White ash	61	3	
						Eastern hemlock	54	8	
						Eastern white pine	73	8	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
WhA------------- Whitman	7W	Slight	Severe	Severe	--------	Eastern white pine-- Red spruce---------- Red maple-----------	56 44 55	7 6 2	
WnA, WnB, WnC--- Windsor	7S	Slight	Slight	Severe	Slight	Eastern white pine-- Northern red oak---- Red pine------------ Sugar maple---------	57 52 66 55	7 2 7 2	Eastern white pine, red pine, Norway spruce.
WrA, WrB-------- Woodbridge	8A	Slight	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Red pine------------ Red spruce---------- Sugar maple---------	67 68 70 50 65	8 4 8 8 3	Eastern white pine, European larch.
WsB------------- Woodbridge	8A	Slight	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Red pine------------ Red spruce---------- Sugar maple---------	67 68 70 50 65	8 4 8 8 3	Eastern white pine, red pine, European larch.
WuC**:									
Woodbridge-----	8A	Slight	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Red pine------------ Red spruce---------- Sugar maple---------	67 68 70 50 65	8 4 8 8 3	Eastern white pine, European larch.
Urban land.									

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

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

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Be*. Beaches					
CaB Canton	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
CaC Canton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CaD Canton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CbB Canton	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Slight	Moderate: large stones.
CbC Canton	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, large stones.	Slight	Moderate: large stones, slope.
CbD Canton	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope.	Severe: slope.
CcB Canton	Severe: large stones.	Severe: large stones.	Severe: large stones.	Slight	Moderate: large stones.
CcC Canton	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Slight	Moderate: large stones, slope.
CcD Canton	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.	Moderate: slope.	Severe: slope.
CdC*: Canton	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land.					
ChB*: Charlton	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Slight	Moderate: large stones.
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Slight	Severe: depth to rock.
Rock outcrop.					
ChC*: Charlton	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ChC*:					
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, depth to rock.	Slight	Severe: thin layer.
Rock outcrop.					
ChD*:					
Charlton	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Hollis	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
Rock outcrop.					
CuC*:					
Charlton	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Slight	Moderate: large stones.
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Slight	Severe: thin layer.
Urban land.					
DeA, DeB Deerfield	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Moderate: wetness.
Fm Freetown	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Fp Freetown	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
HaA Haven	Slight	Slight	Moderate: small stones.	Slight	Slight.
HaB Haven	Slight	Slight	Moderate: slope, small stones.	Moderate: erodes easily.	Slight.
HfB Hinckley	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
HfC Hinckley	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
HfD Hinckley	Moderate: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HrC*:					
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, depth to rock.	Slight	Severe: depth to rock.
Rock outcrop.					
Charlton	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, slope.
HrD*:					
Hollis	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
Charlton	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Ip Ipswich	Severe: ponding, flooding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: ponding, flooding, excess humus.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
MmA Merrimac	Slight	Slight	Moderate: small stones.	Slight	Slight.
MmB Merrimac	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MmC Merrimac	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
MnB*:					
Merrimac	Slight	Slight	Moderate: small stones.	Slight	Slight.
Urban land.					
MoB Montauk	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight	Slight.
MoC Montauk	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
MsB Montauk	Moderate: large stones, percs slowly.	Moderate: large stones.	Severe: large stones, small stones.	Slight	Moderate: small stones, large stones.
MsC Montauk	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight	Moderate: small stones, large stones, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
NpB------------------ Newport	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight----------	Slight.
NpC------------------ Newport	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
NpD------------------ Newport	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
NuC*: Newport-------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
Urban land.					
PaB------------------ Paxton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight----------	Slight.
PaC------------------ Paxton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
PaD------------------ Paxton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PbB------------------ Paxton	Severe: large stones.	Severe: large stones.	Severe: large stones.	Slight----------	Moderate: large stones.
PbC------------------ Paxton	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight----------	Moderate: large stones, slope.
PbD------------------ Paxton	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Pr*, Ps*. Pits					
PtB------------------ Pittstown	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, small stones.	Moderate: wetness.	Slight.
Ra------------------- Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
RdA------------------ Ridgebury	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
RgB------------------ Ridgebury	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, large stones, small stones.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Rm Rippowam	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
RoD*: Rock outcrop.					
Hollis	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, depth to rock.	Slight	Severe: depth to rock.
Sa Saco	Severe: flooding.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Sb*: Scarboro	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Birdsall	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: wetness, ponding.	Severe: ponding.
ScB Scio	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: erodes easily, wetness.	Moderate: wetness.
SeB Scituate	Moderate: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.	Moderate: wetness.	Moderate: small stones, wetness.
StB Scituate	Moderate: large stones, small stones.	Moderate: large stones, wetness.	Severe: large stones, small stones.	Moderate: wetness.	Moderate: large stones, small stones.
SuB Sudbury	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness, small stones.	Slight	Slight.
Sw Swansea	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Ua, Ud, Ue, Uf. Udorthents					
Ur*, Uw*. Urban land					
UxA*: Urban land.					
Boxford	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
WaA Walpole	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WhA------------------- Whitman	Severe: ponding.	Severe: ponding.	Severe: ponding, large stones.	Severe: ponding.	Severe: ponding.
WnA------------------- Windsor	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
WnB------------------- Windsor	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
WnC------------------- Windsor	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
WrA------------------- Woodbridge	Moderate: wetness.	Moderate: wetness.	Moderate: small stones.	Moderate: wetness.	Moderate: wetness.
WrB------------------- Woodbridge	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.
WsB------------------- Woodbridge	Moderate: large stones, wetness.	Moderate: wetness, large stones.	Severe: large stones.	Moderate: wetness.	Moderate: large stones, wetness.
WuC*:					
Woodbridge-----------	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Moderate: wetness.	Moderate: wetness.
Urban land.					

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

TABLE 10.--WILDLIFE HABITAT

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Be*. Beaches										
CaB: Canton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaC: Canton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CaD: Canton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CbB: Canton	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
CbC, CbD: Canton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CcB: Canton	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
CcC, CcD: Canton	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
CdC*:										
Canton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
ChB*:										
Charlton	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Hollis	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
ChC*, ChD*:										
Charlton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Hollis	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
CuC*:										
Charlton	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Hollis	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
DeA, DeB Deerfield	Poor	Fair	Fair	Poor	Poor	Poor	Poor	Fair	Poor	Poor.
Fm Freetown	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Fp Freetown	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
HaA Haven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HaB Haven	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HfB, HfC Hinckley	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
HfD Hinckley	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
HrC*, HrD*:										
Hollis	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
Charlton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ip Ipswich	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
MmA, MmB, MmC Merrimac	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MnB*:										
Merrimac	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
MoB Montauk	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoC Montauk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MsB Montauk	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
MsC Montauk	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
NpB Newport	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NpC Newport	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
NpD----------------- Newport	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
NuC*:										
Newport-----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
PaB----------------- Paxton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PaC----------------- Paxton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaD----------------- Paxton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PbB----------------- Paxton	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
PbC, PbD----------- Paxton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Pr*, Ps*. Pits										
PtB----------------- Pittstown	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Ra------------------ Raynham	Poor	Fair	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair.
RdA----------------- Ridgebury	Poor	Poor	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.
RgB----------------- Ridgebury	Very poor.	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Rm------------------ Rippowam	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
RoD*:										
Rock outcrop.										
Hollis-------------	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Sa------------------ Saco	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Sb*:										
Scarboro----------	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Birdsall----------	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
ScB----------------- Scio	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
SeB---------------- Scituate	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
StB---------------- Scituate	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
SuB---------------- Sudbury	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sw----------------- Swansea	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ua, Ud, Ue, Uf. Udorthents										
Ur*, Uw*. Urban land										
UxA*: Urban land.										
Boxford-----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WaA---------------- Walpole	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
WhA---------------- Whitman	Very poor.	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.
WnA, WnB, WnC------ Windsor	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
WrA---------------- Woodbridge	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WrB---------------- Woodbridge	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WsB---------------- Woodbridge	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
WuC*: Woodbridge--------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										

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

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Be*. Beaches						
CaB----------- Canton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
CaC----------- Canton	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
CaD----------- Canton	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CbB----------- Canton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: large stones.
CbC----------- Canton	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.
CbD----------- Canton	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CcB----------- Canton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: large stones.
CcC----------- Canton	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.
CcD----------- Canton	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CdC*: Canton-----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
Urban land.						
ChB*: Charlton---------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: large stones.
Hollis-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
ChC*: Charlton---------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ChC*:						
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
ChD*:						
Charlton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hollis	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
CuC*:						
Charlton	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Urban land.						
DeA, DeB Deerfield	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: frost action, wetness.	Moderate: wetness.
Fm Freetown	Severe: wetness, excess humus.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength, frost action.	Severe: wetness, excess humus.
Fp Freetown	Severe: ponding, excess humus.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength, frost action.	Severe: ponding, excess humus.
HaA Haven	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
HaB Haven	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
HfB Hinckley	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
HfC Hinckley	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
HfD Hinckley	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
HrC*:						
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HrC*:						
Rock outcrop.						
Charlton	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, slope.
HrD*:						
Hollis	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
Charlton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ip Ipswich	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
MmA Merrimac	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
MmB Merrimac	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
MmC Merrimac	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
MnB*:						
Merrimac	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
Urban land.						
MoB Montauk	Moderate: dense layer, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Slight.
MoC Montauk	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope.
MsB Montauk	Moderate: dense layer, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones, large stones.
MsC Montauk	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: small stones, large stones, slope.
NpB Newport	Moderate: dense layer, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NpC----------- Newport	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope.
NpD----------- Newport	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
NuC*:						
Newport----------	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope.
Urban land.						
PaB----------- Paxton	Moderate: dense layer, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Slight.
PaC----------- Paxton	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope.
PaD----------- Paxton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PbB----------- Paxton	Moderate: dense layer, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: large stones.
PbC----------- Paxton	Moderate: dense layer, wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: large stones, slope.
PbD----------- Paxton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pr*, Ps*. Pits						
PtB----------- Pittstown	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness, frost action.	Slight.
Ra------------ Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
RdA, RgB------ Ridgebury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Rm------------ Rippowam	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RoD*: Rock outcrop.						
Hollis	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Sa: Saco	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
Sb*: Scarboro	Severe: cutbanks cave, excess humus, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Birdsall	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
ScB: Scio	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness.
SeB: Scituate	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones, wetness.
StB: Scituate	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: large stones, small stones.
SuB: Sudbury	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness, frost action.	Slight.
Sw: Swansea	Severe: wetness, excess humus, cutbanks cave.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength, frost action.	Severe: wetness, excess humus.
Ua, Ud, Ue, Uf. Udorthents						
Ur*, Uw*. Urban land						
UxA*: Urban land.						
Boxford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
WaA: Walpole	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WhA--------------- Whitman	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: ponding.
WnA--------------- Windsor	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
WnB--------------- Windsor	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
WnC--------------- Windsor	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
WrA--------------- Woodbridge	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness.
WrB--------------- Woodbridge	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
WsB--------------- Woodbridge	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: large stones, wetness.
WuC*:						
Woodbridge-------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
Urban land.						

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

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Be*. Beaches					
CaB----- Canton	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CaC----- Canton	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CaD----- Canton	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
CbB----- Canton	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CbC----- Canton	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CbD----- Canton	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
CcB----- Canton	Severe: large stones.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CcC----- Canton	Severe: large stones.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
CcD----- Canton	Severe: slope, large stones.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
CdC*: Canton-----	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
Urban land.					
ChB*: Charlton-----	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ChB*:					
Hollis	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Rock outcrop.					
ChC*:					
Charlton	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
Hollis	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Rock outcrop.					
ChD*:					
Charlton	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Hollis	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope, thin layer.
Rock outcrop.					
CuC*:					
Charlton	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Hollis	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Urban land.					
DeA, DeB Deerfield	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, seepage.
Fm Freetown	Severe: wetness.	Severe: wetness, excess humus, seepage.	Severe: wetness, excess humus, seepage.	Severe: wetness, seepage.	Poor: excess humus, wetness.
Fp Freetown	Severe: ponding.	Severe: ponding, excess humus, seepage.	Severe: ponding, excess humus, seepage.	Severe: ponding, seepage.	Poor: ponding, excess humus.
HaA, HaB Haven	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HfB----------------- Hinckley	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
HfC----------------- Hinckley	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
HfD----------------- Hinckley	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy, slope.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
HrC*:					
Hollis-------------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Rock outcrop.					
Charlton-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
HrD*:					
Hollis-------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope, thin layer.
Rock outcrop.					
Charlton-----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Ip------------------ Ipswich	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.
MmA, MmB------------ Merrimac	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
MmC----------------- Merrimac	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
MnB*:					
Merrimac-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Urban land.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MoB: Montauk	Severe: percs slowly, wetness.	Severe: seepage.	Moderate: wetness.	Severe: seepage.	Poor: seepage.
MoC: Montauk	Severe: percs slowly, wetness.	Severe: slope, seepage.	Moderate: slope, wetness.	Severe: seepage.	Poor: seepage.
MsB: Montauk	Severe: percs slowly, wetness.	Moderate: slope.	Slight	Severe: seepage.	Poor: seepage.
MsC: Montauk	Severe: percs slowly, wetness.	Severe: slope.	Moderate: slope.	Severe: seepage.	Poor: seepage.
NpB: Newport	Severe: percs slowly.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
NpC: Newport	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
NpD: Newport	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
NuC*:					
Newport	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
Urban land.					
PaB: Paxton	Severe: percs slowly.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
PaC: Paxton	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
PaD: Paxton	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PbB: Paxton	Severe: percs slowly.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
PbC: Paxton	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PbD: Paxton	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pr*, Ps*. Pits					
PtB: Pittstown	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
Ra: Raynham	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
RdA, RgB: Ridgebury	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Rm: Rippowam	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
RoD*: Rock outcrop.					
Hollis	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Sa: Saco	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness.
Sb*: Scarboro	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, small stones.
Birdsall	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: ponding.
ScB: Scio	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: wetness, thin layer.
SeB: Scituate	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
StB: Scituate	Severe: wetness, percs slowly.	Moderate: slope, large stones.	Severe: wetness.	Moderate: wetness.	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SuB: Sudbury	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
Sw: Swansea	Severe: wetness, poor filter.	Severe: wetness, excess humus, seepage.	Severe: wetness, too sandy, seepage.	Severe: wetness, seepage.	Poor: wetness, excess humus, seepage.
Ua, Ud, Ue, Uf. Udorthents					
Ur*, Uw*. Urban land					
UxA*: Urban land.					
Boxford	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
WaA: Walpole	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
WhA: Whitman	Severe: percs slowly, ponding.	Moderate: slope.	Severe: ponding.	Severe: ponding.	Poor: ponding.
WnA, WnB: Windsor	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WnC: Windsor	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WrA: Woodbridge	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
WrB, WsB: Woodbridge	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
WuC*: Woodbridge	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
Urban land.					

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

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Be*. Beaches				
CaB, CaC: Canton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
CaD: Canton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
CbB, CbC: Canton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CbD: Canton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
CcB, CcC: Canton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CcD: Canton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
CdC*:				
Canton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Urban land.				
ChB*:				
Charlton	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hollis	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Rock outcrop.				
ChC*:				
Charlton	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Hollis	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ChD*:				
Charlton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Hollis	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
CuC*:				
Charlton	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hollis	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Urban land.				
DeA, DeB Deerfield	Fair: wetness.	Probable	Improbable: excess fines.	Poor: too sandy, thin layer.
Fm, Fp Freetown	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
HaA, HaB Haven	Good	Probable	Probable	Poor: too sandy, area reclaim.
HfB, HfC Hinckley	Good	Probable	Probable	Poor: too sandy, area reclaim, small stones.
HfD Hinckley	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, slope.
HrC*:				
Hollis	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Rock outcrop.				
Charlton	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
HrD*:				
Hollis	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
Charlton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ip------------------- Ipswich	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, excess salt, wetness.
MmA, MmB, MmC--------- Merrimac	Good-----------------	Probable------------	Probable------------	Poor: small stones, area reclaim.
MnB*:				
Merrimac-------------	Good-----------------	Probable------------	Probable------------	Poor: small stones, area reclaim.
Urban land.				
MoB, MoC, MsB, MsC---- Montauk	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
NpB------------------ Newport	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
NpC------------------ Newport	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
NpD------------------ Newport	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
NuC*:				
Newport--------------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Urban land.				
PaB------------------ Paxton	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
PaC------------------ Paxton	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
PaD------------------ Paxton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
PbB------------------ Paxton	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
PbC------------------ Paxton	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PbD------------------ Paxton	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Pr*, Ps*. Pits				
PtB------------------ Pittstown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Ra------------------- Raynham	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
RdA, RgB------------- Ridgebury	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones, area reclaim.
Rm------------------- Rippowam	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
RoD*: Rock outcrop.				
Hollis---------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
Sa------------------- Saco	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: wetness.
Sb*: Scarboro-------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
Birdsall-------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
ScB------------------ Scio	Fair: wetness.	Probable-------------	Probable-------------	Fair: area reclaim.
SeB, StB------------- Scituate	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SuB------------------ Sudbury	Fair: wetness.	Probable-------------	Probable-------------	Poor: small stones, too sandy, area reclaim.
Sw------------------- Swansea	Poor: wetness.	Probable-------------	Improbable: excess fines.	Poor: wetness, excess humus.
Ua, Ud, Ue, Uf. Udorthents				
Ur*, Uw*. Urban land				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UxA*: Urban land.				
Boxford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WaA Walpole	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
WhA Whitman	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, large stones, area reclaim.
WnA, WnB, WnC Windsor	Good	Probable	Improbable: too sandy.	Poor: too sandy.
WrA, WrB, WsB Woodbridge	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
WuC*: Woodbridge	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Urban land.				

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

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
Be*. Beaches						
CaB: Canton	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Favorable.
CaC, CaD: Canton	Severe: slope, seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope.
CbB: Canton	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones.
CbC, CbD: Canton	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope.
CcB: Canton	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones.
CcC, CcD: Canton	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope.
CdC*:						
Canton	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Favorable.
Urban land.						
ChB*:						
Charlton	Severe: seepage.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Favorable	Favorable.
Hollis	Severe: depth to rock.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
Rock outcrop.						
ChC*, ChD*:						
Charlton	Severe: slope, seepage.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Slope	Slope.
Hollis	Severe: depth to rock, slope.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
CuC*:						
Charlton	Severe: seepage.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Favorable	Favorable.
Hollis	Severe: depth to rock.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock
Urban land.						
DeA, DeB Deerfield	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Droughty.
Fm Freetown	Severe: seepage.	Severe: excess humus, wetness.	Slight	Frost action	Wetness	Wetness.
Fp Freetown	Severe: seepage.	Severe: excess humus, ponding.	Slight	Frost action, ponding.	Ponding	Wetness.
HaA, HaB Haven	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
HfB Hinckley	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
HfC, HfD Hinckley	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
HrC*, HrD*:						
Hollis	Severe: depth to rock, slope.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock
Rock outcrop.						
Charlton	Severe: slope, seepage.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Slope	Slope.
Ip Ipswich	Severe: seepage.	Severe: excess humus, ponding, excess salt.	Severe: salty water.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
MmA, MmB Merrimac	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Favorable.
MmC Merrimac	Severe: slope, seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope.
MnB*:						
Merrimac	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Favorable.
Urban land.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MoB: Montauk	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Rooting depth, percs slowly.	Rooting depth, percs slowly.
MoC: Montauk	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
MsB: Montauk	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Percs slowly	Rooting depth, percs slowly.
MsC: Montauk	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, rooting depth, percs slowly.
NpB: Newport	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, rooting depth, percs slowly.
NpC, NpD: Newport	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
NuC*:						
Newport	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
Urban land.						
PaB: Paxton	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Percs slowly	Rooting depth, percs slowly.
PaC, PaD: Paxton	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, rooting depth, percs slowly.
PbB: Paxton	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Percs slowly	Rooting depth, percs slowly.
PbC, PbD: Paxton	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, rooting depth, percs slowly.
Pr*, Ps*. Pits						
PtB: Pittstown	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, wetness.	Percs slowly, wetness, rooting depth.
Ra: Raynham	Slight	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
RdA: Ridgebury	Slight	Severe: wetness, piping.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly, rooting depth.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
RgB: Ridgebury	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Slope, percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly rooting depth.
Rm: Rippowam	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, cutbanks cave.	Wetness, too sandy, poor outlets.	Wetness.
RoD*: Rock outcrop.						
Hollis	Severe: depth to rock, slope.	Severe: thin layer, piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Sa: Saco	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, frost action, poor outlets.	Wetness, poor outlets.	Wetness.
Sb*: Scarboro	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Ponding, too sandy.	Wetness, droughty.
Birdsall	Slight	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
ScB: Scio	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave, frost action.	Erodes easily, wetness.	Erodes easily.
SeB: Scituate	Moderate: slope.	Moderate: piping.	Severe: no water.	Percs slowly, slope.	Large stones, wetness, percs slowly.	Droughty, rooting depth.
StB: Scituate	Moderate: slope.	Severe: seepage.	Severe: no water.	Percs slowly, slope.	Large stones, wetness, percs slowly.	Large stones, droughty, rooting depth.
SuB: Sudbury	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Too sandy, wetness.	Favorable.
Sw: Swansea	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave, frost action.	Wetness, too sandy.	Wetness.
Ua, Ud, Ue, Uf. Udorthents						
Ur*, Uw*. Urban land						
UxA*: Urban land.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
UxA*:						
Boxford	Slight	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily.
WaA Walpole	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
WhA Whitman	Slight	Severe: piping, ponding.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, large stones.	Wetness, percs slowly, rooting depth.
WnA, WnB Windsor	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Droughty.
WnC Windsor	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
WrA Woodbridge	Slight	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Rooting depth, percs slowly.
WrB, WsB Woodbridge	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly.	Rooting depth, percs slowly.
WuC*:						
Woodbridge	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly.	Rooting depth, percs slowly.
Urban land.						

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

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Be*. Beaches											
CaB, CaC, CaD---- Canton	0-3	Fine sandy loam	SM, ML	A-2, A-4	0-5	85-95	75-90	55-85	30-60	<25	NP-8
	3-22	Fine sandy loam, very fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-10	80-95	70-90	50-85	30-60	<25	NP-8
	22-60	Gravelly loamy sand, loamy fine sand, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	10-25	65-85	50-80	20-60	10-30	---	NP
CbB, CbC, CbD---- Canton	0-3	Fine sandy loam	SM, ML	A-2, A-4	5-15	80-95	70-90	50-85	30-60	<25	NP-8
	3-22	Fine sandy loam, very fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-10	80-95	70-90	50-85	30-60	<25	NP-8
	22-60	Gravelly loamy sand, loamy fine sand, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	10-25	65-85	50-80	20-60	10-30	---	NP
CcB, CcC, CcD---- Canton	0-3	Fine sandy loam	SM, ML	A-2, A-4	10-30	70-95	60-90	40-85	25-60	<25	NP-8
	3-22	Fine sandy loam, very fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-10	80-95	70-90	50-85	30-60	<25	NP-8
	22-60	Gravelly loamy sand, loamy fine sand, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	10-25	65-85	50-80	20-60	10-30	---	NP
CdC*:											
Canton----------	0-3	Fine sandy loam	SM, ML	A-2, A-4	0-5	85-95	75-90	55-85	30-60	<25	NP-8
	3-22	Fine sandy loam, very fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-10	80-95	70-90	50-85	30-60	<25	NP-8
	22-60	Gravelly loamy sand, loamy fine sand, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	10-25	65-85	50-80	20-60	10-30	---	NP
Urban land.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ChB*, ChC*, ChD*:											
Charlton--------	0-6	Fine sandy loam	SM, ML	A-2, A-4	10-20	75-95	70-90	60-85	30-70	<25	NP-5
	6-36	Fine sandy loam, gravelly fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-15	65-90	60-90	50-80	20-65	<25	NP-3
	36-60	Fine sandy loam, gravelly fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	5-25	60-90	55-85	40-75	20-45	---	NP
Hollis----------	0-3	Fine sandy loam	SM, ML, GM	A-2, A-4	5-15	65-100	60-95	40-85	20-65	<25	NP-5
	3-14	Gravelly fine sandy loam, sandy loam, loam.	SM, ML, GM	A-2, A-4	0-15	65-100	60-95	40-80	20-65	<25	NP-5
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CuC*:											
Charlton--------	0-6	Fine sandy loam	SM, ML	A-2, A-4	10-20	75-95	70-90	60-85	30-70	<25	NP-5
	6-36	Fine sandy loam, gravelly fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-15	65-90	60-90	50-80	20-65	<25	NP-3
	36-60	Fine sandy loam, gravelly fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	5-25	60-90	55-85	40-75	20-45	---	NP
Hollis----------	0-3	Fine sandy loam	SM, ML, GM	A-2, A-4	5-15	65-100	60-95	40-85	20-65	<25	NP-5
	3-14	Gravelly fine sandy loam, sandy loam, loam.	SM, ML, GM	A-2, A-4	0-15	65-100	60-95	40-80	20-65	<25	NP-5
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
DeA, DeB--------- Deerfield	0-11	Loamy sand-------	SP-SM, SM	A-1, A-2, A-3, A-4	0	95-100	80-100	40-75	5-40	---	NP
	11-35	Loamy sand, sand, coarse sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	80-100	40-75	5-30	---	NP
	35-60	Sand, fine sand, coarse sand.	SP, SM	A-1, A-2, A-3	0	95-100	65-100	30-75	3-30	---	NP
Fm--------------- Freetown	0-13	Sapric material	PT	A-8	---	---	---	---	---	---	---
	13-60	Sapric material, hemic material.	PT	A-8	---	---	---	---	---	---	---
Fp--------------- Freetown	0-60	Sapric material	PT	A-8	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HaA, HaB--------- Haven	0-8	Silt loam--------	ML, SM	A-4	0	80-100	75-100	65-100	40-90	<25	NP-4
	8-23	Gravelly loam, silt loam, gravelly very fine sandy loam.	ML, SM	A-4, A-2, A-1	0	60-100	55-95	40-95	20-85	<25	NP-4
	23-60	Stratified loamy fine sand to gravel.	SP, SW, GP, SM	A-1, A-3, A-2	0-20	30-90	25-85	10-60	1-25	---	NP
HfB, HfC--------- Hinckley	0-4	Sandy loam-------	SM	A-2, A-4	0-5	85-95	75-90	45-75	25-50	---	NP
	4-14	Gravelly loamy sand, gravelly sandy loam, very gravelly loamy coarse sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	0-20	50-95	30-85	15-70	2-30	---	NP
	14-60	Stratified very gravelly loamy fine sand to cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	5-25	50-65	30-50	10-40	0-20	---	NP
HfD-------------- Hinckley	0-10	Loamy sand-------	SM, SP-SM	A-1, A-2	0-5	85-95	75-90	35-75	10-35	---	NP
	10-14	Gravelly loamy sand, gravelly sandy loam, very gravelly loamy coarse sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	0-20	50-95	30-85	15-70	2-30	---	NP
	14-60	Stratified very gravelly loamy fine sand to cobbly coarse sand.	SP, SP-SM, GP, GP-GM	A-1	5-25	50-65	30-50	10-40	0-20	---	NP
HrC*, HrD*:											
Hollis-----------	0-3	Fine sandy loam	SM, ML, GM	A-2, A-4	5-15	65-100	60-95	40-85	20-65	<25	NP-5
	3-14	Gravelly fine sandy loam, sandy loam, loam.	SM, ML, GM	A-2, A-4	0-15	65-100	60-95	40-80	20-65	<25	NP-5
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Charlton---------	0-6	Fine sandy loam	SM, ML	A-2, A-4	10-20	75-95	70-90	60-85	30-70	<25	NP-5
	6-36	Fine sandy loam, gravelly fine sandy loam, gravelly loam.	SM, ML	A-2, A-4	0-15	65-90	60-90	50-80	20-65	<25	NP-3
	36-60	Fine sandy loam, gravelly fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4	5-25	60-90	55-85	40-75	20-45	---	NP
Ip--------------- Ipswich	0-14	Hemic material---	PT	A-8	0	---	---	---	---	---	NP
	14-35	Hemic material---	PT	A-8	0	---	---	---	---	---	NP
	35-60	Sapric material, hemic material.	PT	A-8	0	---	---	---	---	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MmA, MmB, MmC----Merrimac	0-19	Fine sandy loam	SM, ML	A-2, A-4	0	85-95	70-90	40-85	20-55	<20	NP
	19-23	Loamy sand, sandy loam, gravelly sandy loam.	SP, SM, SP-SM	A-1, A-2, A-3	0	65-95	55-90	30-60	0-35	<25	NP
	23-60	Stratified sand to very gravelly coarse sand.	GP, SP, SP-SM, GP-GM	A-1	5-25	40-65	30-60	15-40	0-10	---	NP
MnB*:											
Merrimac--------	0-19	Fine sandy loam	SM, ML	A-2, A-4	0	85-95	70-90	40-85	20-55	<20	NP
	19-23	Loamy sand, sandy loam, gravelly sandy loam.	SP, SM, SP-SM	A-1, A-2, A-3	0	65-95	55-90	30-60	0-35	<25	NP
	23-60	Stratified sand to very gravelly coarse sand.	GP, SP, SP-SM, GP-GM	A-1	5-25	40-65	30-60	15-40	0-10	---	NP
Urban land.											
MoB, MoC---------Montauk	0-9	Sandy loam-------	SM, SM-SC	A-2, A-4	0-5	80-100	75-100	45-95	20-85	<20	NP-4
	9-29	Fine sandy loam, gravelly sandy loam, silt loam.	SM, ML, SM-SC, CL-ML	A-2, A-4, A-1	0-15	60-100	55-95	35-90	15-80	<20	NP-4
	29-60	Sandy loam, loamy sand, gravelly sandy loam.	SM, SP-SM, GM, GP-GM	A-2, A-1, A-4	0-15	60-100	55-95	20-80	10-50	<20	NP-2
MsB, MsC---------Montauk	0-9	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-1, A-2, A-4	5-15	65-80	60-75	30-75	15-70	<20	NP-4
	9-29	Fine sandy loam, silt loam, gravelly sandy loam.	SM, ML, SM-SC, CL-ML	A-1, A-2, A-4	0-5	60-100	55-95	35-90	15-80	<20	NP-4
	29-60	Sandy loam, loamy sand, gravelly sandy loam.	SM, SP-SM, GM, GP-GM	A-1, A-2, A-4	0-5	60-100	55-95	20-80	10-50	<20	NP-2
NpB, NpC, NpD----Newport	0-9	Silt loam--------	SM, ML	A-4	0-5	80-95	75-90	60-85	40-75	<35	NP-10
	9-26	Channery silt loam, silt loam, very fine sandy loam.	SM, ML, GM	A-2, A-4	0-10	65-95	60-90	45-85	30-75	<30	NP-7
	26-60	Channery silt loam, channery loam, silt loam.	SM, ML, GM	A-2, A-4	0-15	60-90	55-85	45-80	25-70	<25	NP-4
NuC*:											
Newport---------	0-9	Silt loam--------	SM, ML	A-4	0-5	80-95	75-90	60-85	40-75	<35	NP-10
	9-26	Channery silt loam, silt loam, very fine sandy loam.	SM, ML, GM	A-2, A-4	0-10	65-95	60-90	45-85	30-75	<30	NP-7
	26-60	Channery silt loam, channery loam, silt loam.	SM, ML, GM	A-2, A-4	0-15	60-90	55-85	45-80	25-70	<25	NP-4

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NuC*: Urban land.											
PaB, PaC, PaD---- Paxton	0-5	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	0-10	85-95	75-90	50-80	20-65	<40	NP-10
	5-29	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-65	<30	NP-7
	29-60	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
PbB-------------- Paxton	0-5	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	10-25	65-95	60-80	40-80	25-65	<40	NP-10
	5-29	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-65	<30	NP-7
	29-60	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
PbC, PbD--------- Paxton	0-5	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	5-20	65-95	60-90	40-80	25-65	<40	NP-10
	5-29	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-65	<30	NP-7
	29-60	Fine sandy loam, loam, gravelly sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
Pr*, Ps*. Pits											
PtB-------------- Pittstown	0-10	Silt loam--------	ML, CL-ML	A-4, A-6, A-7	0-5	80-100	70-95	65-95	50-85	25-45	4-15
	10-60	Silt loam, channery loam, very fine sandy loam.	ML, SM, CL-ML, SM-SC	A-2, A-4	0-15	65-95	60-90	50-90	30-80	20-35	2-10
Ra--------------- Raynham	0-8	Silt loam--------	ML, CL-ML	A-4	0	100	95-100	80-100	55-95	<25	NP-5
	8-32	Silt loam, silt, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	55-95	<25	NP-5
	32-60	Silt loam, silt, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	80-100	70-95	<25	NP-5
RdA-------------- Ridgebury	0-10	Fine sandy loam	SM, ML	A-1, A-2, A-4	0-5	80-100	75-90	40-90	20-70	---	NP
	10-19	Sandy loam, fine sandy loam, gravelly loam.	SM, ML	A-1, A-2, A-4	0-15	65-95	55-90	40-80	20-60	---	NP
	19-60	Sandy loam, fine sandy loam, gravelly loam.	SM, ML	A-1, A-2, A-4	0-15	65-95	55-90	35-80	20-60	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
RgB--------------- Ridgebury	0-10	Fine sandy loam	SM, ML	A-2, A-4	5-20	70-100	60-90	45-85	25-65	---	NP
	10-19	Sandy loam, fine sandy loam, gravelly loam.	SM, ML	A-1, A-2, A-4	0-15	65-95	55-90	40-80	20-60	---	NP
	19-60	Sandy loam, fine sandy loam, gravelly loam.	SM, ML	A-1, A-2, A-4	0-15	65-95	55-90	35-80	20-60	---	NP
Rm---------------- Rippowam	0-10	Silt loam--------	ML	A-4	0	100	100	95-100	70-95	<40	NP-10
	10-20	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	95-100	80-100	55-85	30-50	<20	NP-2
	20-60	Stratified loamy fine sand to very gravelly coarse sand.	SP, SP-SM, SM	A-1, A-2, A-3	0-10	70-100	45-100	25-75	0-25	---	NP
RoD*: Rock outcrop.											
Hollis-----------	0-3	Fine sandy loam	SM, ML, GM	A-2, A-4	15-30	65-100	60-95	40-85	20-65	<25	NP-5
	3-14	Gravelly fine sandy loam, sandy loam, loam.	SM, ML, GM	A-2, A-4	0-15	65-100	60-95	40-80	20-65	<25	NP-5
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sa---------------- Saco	0-26	Silt loam--------	ML	A-4	0	100	100	95-100	70-95	<40	NP-10
	26-58	Silt loam, very fine sandy loam.	ML	A-4	0	100	100	90-100	70-95	<40	NP-10
	58-60	Stratified loamy fine sand to very gravelly coarse sand.	SP, SM, SP-SM	A-1, A-2, A-3	0	80-100	45-100	25-85	0-30	---	NP
Sb*: Scarboro---------	0-9	Mucky fine sandy loam.	SM, SP-SM	A-1, A-2, A-3, A-4	0	95-100	85-100	45-85	5-50	---	NP
	9-60	Stratified loamy fine sand to gravelly coarse sand.	SP, SM, SP-SM	A-1, A-2, A-3	0	70-100	35-100	15-80	0-35	---	NP
Birdsall---------	0-8	Very fine sandy loam.	ML, OL, CL-ML	A-4	0	100	100	90-100	70-90	<30	NP-7
	8-16	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	<30	NP-7
	16-60	Silt loam, very fine sandy loam, silty clay loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	<30	NP-7
ScB--------------- Scio	0-9	Very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	9-40	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	40-60	Stratified very gravelly sand to silt loam.	ML, SM, SP, GP-GM	A-4, A-2, A-1, A-3	0	35-95	30-90	15-85	2-80	<20	NP-4

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SeB------------- Scituate	0-5	Fine sandy loam	SM, ML	A-2, A-4, A-1	0-5	80-95	70-90	40-85	20-65	<20	NP-4
	5-24	Fine sandy loam, sandy loam, loam.	SM, ML	A-2, A-4, A-1	0-25	70-95	60-90	35-85	20-65	<20	NP-4
	24-60	Loamy sand, gravelly loamy fine sand, gravelly loamy sand.	SM	A-1, A-2	0-25	65-85	50-75	30-65	12-30	<20	NP-2
StB------------- Scituate	0-5	Fine sandy loam	SM, ML	A-2, A-4, A-1	10-20	70-90	60-85	35-80	20-65	<20	NP-4
	5-24	Fine sandy loam, loam, sandy loam.	SM, ML	A-2, A-4, A-1	0-25	70-95	60-90	35-85	20-65	<20	NP-4
	24-60	Loamy sand, gravelly loamy fine sand, gravelly loamy sand.	SM	A-1, A-2	0-25	65-85	50-75	30-65	12-30	<20	NP-2
SuB------------- Sudbury	0-8	Sandy loam-------	SM, ML	A-2, A-4, A-1	0-5	85-100	70-100	40-90	20-55	---	NP
	8-30	Sandy loam, loamy sand, gravelly sandy loam.	SM	A-2, A-4, A-1	0-5	85-100	60-100	40-80	20-50	---	NP
	30-60	Gravelly coarse sand, loamy sand, sand.	SM, SP-SM	A-1, A-2, A-3	0-5	70-100	60-100	30-70	5-35	---	NP
Sw-------------- Swansea	0-24	Sapric material	PT	A-8	---	---	---	---	---	---	---
	24-34	Sapric material, hemic material.	PT	A-8	---	---	---	---	---	---	---
	34-60	Sand, loamy coarse sand, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2, A-3	0	55-100	45-100	30-70	5-30	---	NP
Ua, Ud, Ue, Uf. Udorthents											
Ur*, Uw*. Urban land											
UxA*: Urban land.											
Boxford---------	0-8	Silt loam--------	ML	A-4, A-5, A-6, A-7	0	98-100	95-100	90-100	85-95	35-50	5-15
	8-22	Silt loam, silty clay loam.	ML, CL	A-4, A-5, A-6, A-7	0	98-100	95-100	90-100	85-95	30-45	5-18
	22-60	Silty clay loam, silty clay.	ML, CL	A-4, A-5, A-6, A-7	0	98-100	95-100	90-100	85-95	30-45	5-18

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WaA-------------- Walpole	0-9	Sandy loam-------	SM, ML	A-2, A-4	0-5	90-100	75-100	55-90	25-60	<25	NP-3
	9-18	Sandy loam, fine sandy loam, gravelly sandy loam.	SM	A-2, A-4	0-5	85-100	60-100	40-85	20-50	---	NP
	18-60	Stratified loamy fine sand to very gravelly coarse sand.	SP, SM, GP, GM	A-1, A-2, A-3	0-20	55-100	50-100	25-80	2-30	---	NP
WhA-------------- Whitman	0-9	Fine sandy loam	ML, SM, CL-ML	A-1, A-2, A-4	3-15	65-80	60-75	35-70	20-65	16-35	NP-10
	9-22	Sandy loam, gravelly fine sandy loam, loam.	ML, SM, CL-ML	A-1, A-2, A-4	0-10	65-95	60-90	35-85	20-60	16-32	NP-8
	22-60	Loamy sand, gravelly loamy sand, gravelly sandy loam.	SM	A-1, A-2	0-10	65-95	60-90	30-65	15-35	---	NP
WnA, WnB, WnC---- Windsor	0-8	Loamy sand-------	SM	A-1, A-2	0	95-100	80-100	45-90	20-35	---	NP
	8-18	Loamy sand, loamy fine sand.	SM	A-1, A-2	0	95-100	80-100	45-90	15-30	---	NP
	18-60	Sand, fine sand, loamy sand.	SM, SP, SP-SM	A-1, A-2, A-3	0	90-100	75-100	40-90	2-30	---	NP
WrA, WrB--------- Woodbridge	0-8	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	0-10	85-95	75-90	50-80	25-65	<40	NP-10
	8-26	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-65	<30	NP-7
	26-60	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
WsB-------------- Woodbridge	0-8	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	5-20	65-95	60-90	40-80	25-65	<40	NP-10
	8-26	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-60	<30	NP-7
	26-60	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
WuC*:											
Woodbridge------	0-8	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	0-10	85-95	75-90	50-80	25-65	<40	NP-10
	8-26	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-2, A-4	0-15	65-95	60-90	45-80	25-65	<30	NP-7
	26-60	Fine sandy loam, loam, gravelly fine sandy loam.	SM, ML, SM-SC	A-1, A-2, A-4	0-15	65-95	60-90	40-75	20-60	<30	NP-7
Urban land.											

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

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Be*. Beaches										
CaB, CaC, CaD----Canton	0-3	1-8	0.90-1.20	2.0-6.0	0.11-0.19	4.5-6.0	Low-----------	0.24	3	1-6
	3-22	1-8	1.20-1.50	2.0-6.0	0.09-0.17	4.5-6.0	Low-----------	0.28		
	22-60	0-5	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low-----------	0.17		
CbB, CbC, CbD----Canton	0-3	1-8	0.90-1.20	2.0-6.0	0.13-0.20	4.5-6.0	Low-----------	0.20	3	---
	3-22	1-8	1.20-1.50	2.0-6.0	0.09-0.17	4.5-6.0	Low-----------	0.28		
	22-60	0-5	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low-----------	0.17		
CcB, CcC, CcD----Canton	0-3	1-8	0.90-1.20	2.0-6.0	0.13-0.17	4.5-6.0	Low-----------	0.20	3	---
	3-22	1-8	1.20-1.50	2.0-6.0	0.09-0.17	4.5-6.0	Low-----------	0.28		
	22-60	0-5	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low-----------	0.17		
CdC*:										
Canton-----------	0-3	1-8	0.90-1.20	2.0-6.0	0.11-0.19	4.5-6.0	Low-----------	0.24	3	1-6
	3-22	1-8	1.20-1.50	2.0-6.0	0.09-0.17	4.5-6.0	Low-----------	0.28		
	22-60	0-5	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low-----------	0.17		
Urban land.										
ChB*, ChC*, ChD*:										
Charlton---------	0-6	3-8	1.00-1.25	0.6-6.0	0.08-0.23	4.5-6.0	Low-----------	0.20	3	---
	6-36	3-8	1.40-1.65	0.6-6.0	0.07-0.20	4.5-6.0	Low-----------	0.24		
	36-60	1-8	1.45-1.70	0.6-6.0	0.05-0.16	4.5-6.0	Low-----------	0.24		
Hollis-----------	0-3	3-10	1.10-1.40	0.6-6.0	0.10-0.18	4.5-6.0	Low-----------	0.20	1	---
	3-14	1-8	1.30-1.55	0.6-6.0	0.06-0.18	4.5-6.0	Low-----------	0.32		
	14-18	---	---	---	---	---	--------------	----		
Rock outcrop.										
CuC*:										
Charlton---------	0-6	3-8	1.00-1.25	0.6-6.0	0.08-0.23	4.5-6.0	Low-----------	0.20	3	---
	6-36	3-8	1.40-1.65	0.6-6.0	0.07-0.20	4.5-6.0	Low-----------	0.24		
	36-60	1-8	1.45-1.70	0.6-6.0	0.05-0.16	4.5-6.0	Low-----------	0.24		
Hollis-----------	0-3	3-10	1.10-1.40	0.6-6.0	0.10-0.18	4.5-6.0	Low-----------	0.20	1	---
	3-14	1-8	1.30-1.55	0.6-6.0	0.06-0.18	4.5-6.0	Low-----------	0.32		
	14-18	---	---	---	---	---	--------------	----		
Urban land.										
DeA, DeB---------Deerfield	0-11	2-7	1.00-1.20	6.0-20	0.07-0.13	4.5-6.0	Low-----------	0.17	5	1-4
	11-35	1-7	1.20-1.45	6.0-20	0.01-0.13	4.5-6.0	Low-----------	0.17		
	35-60	0-5	1.40-1.50	>6.0	0.01-0.08	4.5-6.0	Low-----------	0.17		
Fm---------------Freetown	0-13	---	0.10-0.30	0.6-6.0	0.35-0.45	3.6-4.4	Low-----------	----	---	>50
	13-60	---	0.15-0.30	0.6-6.0	0.35-0.45	3.6-4.4	Low-----------	----		
Fp---------------Freetown	0-60	---	0.10-0.30	0.6-6.0	0.35-0.45	3.6-4.4	Low-----------	----	---	>50

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
HaA, HaB--------- Haven	0-8	5-18	1.10-1.40	0.6-2.0	0.15-0.25	5.1-6.5	Low----------	0.32	3	2-6
	8-23	2-18	1.25-1.55	0.6-2.0	0.08-0.12	5.1-6.5	Low----------	0.24		
	23-60	0-3	1.45-1.65	>20	0.01-0.03	5.1-6.5	Low----------	0.17		
HfB, HfC--------- Hinckley	0-4	4-8	0.90-1.10	6.0-20	0.11-0.18	3.6-6.0	Low----------	0.20	3	2-7
	4-14	1-5	1.20-1.40	6.0-20	0.01-0.10	3.6-6.0	Low----------	0.17		
	14-60	0-3	1.30-1.50	>20	0.01-0.06	3.6-6.0	Low----------	0.10		
HfD-------------- Hinckley	0-10	4-8	1.00-1.20	6.0-20	0.09-0.13	3.6-6.0	Low----------	0.17	3	2-7
	10-14	1-5	1.20-1.40	6.0-20	0.01-0.10	3.6-6.0	Low----------	0.17		
	14-60	0-3	1.30-1.50	>20	0.01-0.06	3.6-6.0	Low----------	0.10		
HrC*, HrD*: Hollis-----------	0-3	3-10	1.10-1.40	0.6-6.0	0.10-0.18	4.5-6.0	Low----------	0.20	1	---
	3-14	1-8	1.30-1.55	0.6-6.0	0.06-0.18	4.5-6.0	Low----------	0.32		
	14-18	---	---	---	---	---	-------------	----		
Rock outcrop.										
Charlton---------	0-6	3-8	1.00-1.25	0.6-6.0	0.08-0.23	4.5-6.0	Low----------	0.20	3	---
	6-36	3-8	1.40-1.65	0.6-6.0	0.07-0.20	4.5-6.0	Low----------	0.24		
	36-60	1-8	1.45-1.70	0.6-6.0	0.05-0.16	4.5-6.0	Low----------	0.24		
Ip--------------- Ipswich	0-14	---	0.10-0.30	0.6-20	0.18-0.35	5.1-7.3	-------------	----	---	---
	14-35	---	0.10-0.30	0.6-20	0.18-0.35	5.1-7.3	-------------	----		
	35	---	0.10-0.30	0.6-20	0.18-0.35	5.1-7.3	-------------	----		
MmA, MmB, MmC---- Merrimac	0-19	3-7	1.10-1.20	2.0-6.0	0.14-0.19	4.5-6.0	Low----------	0.24	3	1-5
	19-23	1-3	1.20-1.40	2.0-6.0	0.03-0.12	4.5-6.0	Low----------	0.17		
	23-60	0-3	1.30-1.50	6.0-20	0.01-0.06	4.5-6.0	Low----------	0.10		
MnB*: Merrimac---------	0-19	3-7	1.10-1.20	2.0-6.0	0.14-0.19	4.5-6.0	Low----------	0.24	3	1-5
	19-23	1-3	1.20-1.40	2.0-6.0	0.03-0.12	4.5-6.0	Low----------	0.17		
	23-60	0-3	1.30-1.50	6.0-20	0.01-0.06	4.5-6.0	Low----------	0.10		
Urban land.										
MoB, MoC--------- Montauk	0-9	6-18	1.00-1.25	0.6-6.0	0.10-0.14	3.6-6.0	Low----------	0.24	3	---
	9-29	6-18	1.30-1.60	0.6-6.0	0.10-0.16	3.6-6.0	Low----------	0.24	---	---
	29-60	1-18	1.70-1.90	0.06-0.6	0.02-0.08	3.6-6.0	Low----------	0.24		
MsB, MsC--------- Montauk	0-9	6-18	1.00-1.25	0.6-6.0	0.10-0.14	3.6-6.0	Low----------	0.24	3	---
	9-29	6-18	1.30-1.60	0.6-6.0	0.10-0.16	3.6-6.0	Low----------	0.24		
	29-60	1-18	1.70-1.90	0.06-0.6	0.02-0.08	3.6-6.0	Low----------	0.24		
NpB, NpC, NpD---- Newport	0-9	4-10	1.10-1.30	0.6-2.0	0.14-0.24	4.5-6.0	Low----------	0.28	3	2-6
	9-26	3-10	1.30-1.60	0.6-2.0	0.11-0.21	4.5-6.0	Low----------	0.37		
	26-60	3-10	1.70-2.00	0.06-0.2	0.05-0.12	4.5-6.0	Low----------	0.24		
NuC*: Newport----------	0-9	4-10	1.10-1.30	0.6-2.0	0.14-0.24	4.5-6.0	Low----------	0.28	3	2-6
	9-26	3-10	1.30-1.60	0.6-2.0	0.11-0.21	4.5-6.0	Low----------	0.37		
	26-60	3-10	1.70-2.00	0.06-0.2	0.05-0.12	4.5-6.0	Low----------	0.24		
Urban land.										
PaB, PaC, PaD---- Paxton	0-5	3-12	1.00-1.25	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.24	3	2-5
	5-29	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	29-60	3-12	1.70-2.00	<0.2	0.05-0.10	4.5-6.0	Low----------	0.24		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
PbB-------------- Paxton	0-5	3-12	1.00-1.25	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.20	3	---
	5-29	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	29-60	3-12	1.70-2.00	<0.2	0.05-0.10	4.5-6.0	Low----------	0.24		
PbC, PbD--------- Paxton	0-5	3-12	1.00-1.25	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.20	3	---
	5-29	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	29-60	3-12	1.70-2.00	<0.2	0.05-0.10	4.5-6.0	Low----------	0.24		
Pr*, Ps*. Pits										
PtB-------------- Pittstown	0-10	2-12	1.00-1.30	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.28	3	2-6
	10-60	2-12	1.30-1.60	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.37		
Ra--------------- Raynham	0-8	3-16	1.20-1.50	0.2-0.6	0.18-0.24	5.1-6.0	Low----------	0.49	3	3-10
	8-32	3-16	1.20-1.50	0.2-0.6	0.18-0.22	5.1-6.0	Low----------	0.64		
	32-60	3-16	1.20-1.60	0.2-0.6	0.17-0.21	5.1-6.0	Low----------	0.64		
RdA-------------- Ridgebury	0-10	3-10	1.00-1.30	0.6-6.0	0.06-0.24	4.5-6.5	Low----------	0.24	3	4-7
	10-19	2-8	1.60-1.90	0.6-6.0	0.04-0.20	4.5-6.5	Low----------	0.32		
	19-60	2-8	1.80-2.00	<0.2	0.01-0.05	4.5-6.5	Low----------	0.24		
RgB-------------- Ridgebury	0-10	3-10	1.00-1.30	0.6-6.0	0.06-0.24	4.5-6.5	Low----------	0.20	3	---
	10-19	2-8	1.60-1.90	0.6-6.0	0.04-0.20	4.5-6.5	Low----------	0.32		
	19-60	2-8	1.80-2.00	<0.2	0.01-0.05	4.5-6.5	Low----------	0.24		
Rm--------------- Rippowam	0-10	2-6	1.10-1.35	0.6-6.0	0.11-0.21	5.1-6.5	Low----------	0.20	5	3-8
	10-20	1-6	1.20-1.45	0.6-6.0	0.09-0.18	5.1-6.5	Low----------	0.20		
	20-60	0-2	1.25-1.50	>6.0	0.01-0.10	5.1-6.5	Low----------	0.17		
RoD*: Rock outcrop.										
Hollis----------	0-3	3-10	1.10-1.40	0.6-6.0	0.08-0.17	4.5-6.0	Low----------	0.20	1	---
	3-14	1-8	1.30-1.55	0.6-6.0	0.06-0.18	4.5-6.0	Low----------	0.32		
	14-18	---	---	---	---	---	-------------	----		
Sa--------------- Saco	0-26	4-15	1.00-1.40	0.6-2.0	0.20-0.30	5.1-6.0	Low----------	0.49	5	3-10
	26-58	2-15	1.20-1.50	0.6-2.0	0.16-0.26	5.1-6.0	Low----------	0.64		
	58-60	1-8	1.30-1.60	6.0-20	0.01-0.13	5.1-6.0	Low----------	0.10		
Sb*: Scarboro--------	0-9	1-7	0.70-1.00	>6.0	0.10-0.23	4.5-6.0	Low----------	0.17	5	---
	9-60	0-2	1.35-1.55	>6.0	0.01-0.13	4.5-6.0	Low----------	0.10		
Birdsall--------	0-8	3-16	1.00-1.10	0.2-0.6	0.17-0.30	4.5-6.0	Low----------	0.49	5	2-8
	8-16	3-16	1.20-1.50	0.2-0.6	0.15-0.26	4.5-6.0	Low----------	0.64		
	16-60	3-16	1.20-1.50	0.2-0.6	0.15-0.26	4.5-6.0	Low----------	0.64		
ScB-------------- Scio	0-9	2-15	1.20-1.50	0.6-2.0	0.18-0.21	4.5-6.0	Low----------	0.49	3	2-8
	9-40	2-15	1.20-1.50	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.64		
	40-60	0-5	1.45-1.65	0.6-2.0	0.02-0.19	4.5-6.0	Low----------	0.17		
SeB-------------- Scituate	0-5	4-10	1.00-1.30	0.6-2.0	0.11-0.21	4.5-6.0	Low----------	0.24	3	2-6
	5-24	2-9	1.25-1.50	0.6-2.0	0.09-0.16	4.5-6.0	Low----------	0.24		
	24-60	2-9	1.75-2.00	0.06-0.2	0.01-0.07	4.5-6.0	Low----------	0.24		
StB-------------- Scituate	0-5	4-10	1.00-1.30	0.6-2.0	0.09-0.18	4.5-6.0	Low----------	0.17	3	---
	5-24	2-9	1.25-1.50	0.6-2.0	0.09-0.16	4.5-6.0	Low----------	0.24		
	24-60	2-5	1.75-2.00	0.06-0.2	0.01-0.07	4.5-6.0	Low----------	0.24		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SuB--------------	0-8	2-6	1.10-1.40	2.0-6.0	0.10-0.25	4.5-6.0	Low----------	0.24	3	2-6
Sudbury	8-30	2-7	1.15-1.45	2.0-6.0	0.07-0.18	4.5-6.0	Low----------	0.24		
	30-60	0-4	1.25-1.45	6.0-20	0.01-0.15	4.5-6.0	Low----------	0.17		
Sw---------------	0-24	---	0.10-0.30	0.6-6.0	0.35-0.45	3.6-4.4	Low----------	----	---	>50
Swansea	24-34	---	0.15-0.30	0.6-6.0	0.35-0.45	3.6-4.4	Low----------	----		
	34-60	1-5	1.15-1.40	>20	0.01-0.08	3.6-5.5	Low----------	0.10		
Ua, Ud, Ue, Uf. Udorthents										
Ur*, Uw*. Urban land										
UxA*: Urban land.										
Boxford---------	0-8	20-40	1.05-1.25	0.2-0.6	0.16-0.24	5.1-6.5	Low----------	0.32	3	2-6
	8-22	25-50	1.20-1.45	0.06-0.2	0.15-0.22	5.1-6.5	Low----------	0.49		
	22-60	35-50	1.40-1.60	0.06-0.2	0.13-0.15	6.1-7.3	Moderate-----	0.49		
WaA--------------	0-9	2-6	1.00-1.25	2.0-6.0	0.10-0.18	4.5-6.0	Low----------	0.20	3	2-8
Walpole	9-18	2-6	1.30-1.55	2.0-6.0	0.07-0.15	4.5-6.0	Low----------	0.24		
	18-60	0-2	1.40-1.65	>6.0	0.01-0.10	4.5-6.0	Low----------	0.10		
WhA--------------	0-9	5-8	1.10-1.30	0.6-6.0	0.15-0.28	5.1-6.0	Low----------	0.20	3	---
Whitman	9-22	1-3	1.85-2.00	<0.2	0.03-0.04	5.1-6.0	Low----------	0.24		
	22-60	1-6	1.90-2.10	<0.2	0.02-0.03	5.1-6.0	Low----------	0.24		
WnA, WnB, WnC----	0-8	1-3	1.00-1.20	6.0-20	0.09-0.12	4.5-6.0	Low----------	0.17	5	2-4
Windsor	8-18	0-3	1.30-1.55	6.0-20	0.07-0.10	4.5-6.0	Low----------	0.17		
	18-60	0-2	1.40-1.65	6.0-20	0.04-0.10	5.1-6.5	Low----------	0.10		
WrA, WrB---------	0-8	3-12	1.00-1.25	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.24	3	2-6
Woodbridge	8-26	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	26-60	3-12	1.70-2.00	<0.2	0.05-0.12	4.5-6.0	Low----------	0.24		
WsB--------------	0-8	3-12	1.00-1.25	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.20	3	---
Woodbridge	8-26	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	26-60	3-12	1.70-2.00	<0.2	0.05-0.12	4.5-6.0	Low----------	0.24		
WuC*:										
Woodbridge------	0-8	3-12	1.00-1.25	0.6-2.0	0.10-0.18	4.5-6.0	Low----------	0.24	3	2-6
	8-26	3-12	1.35-1.60	0.6-2.0	0.08-0.18	4.5-6.0	Low----------	0.32		
	26-60	3-12	1.70-2.00	<0.2	0.05-0.12	4.5-6.0	Low----------	0.24		
Urban land.										

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

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
Be*. Beaches											
CaB, CaC, CaD, CbB, CbC, CbD, CcB, CcC, CcD----: Canton	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
CdC*:											
Canton-----------	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Urban land.											
ChB*, ChC*, ChD*:											
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Hollis-----------	C/D	None--------	---	---	>6.0	---	---	10-20	Moderate----	Low------	High.
Rock outcrop.											
CuC*:											
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Hollis-----------	C/D	None--------	---	---	>6.0	---	---	10-20	Moderate----	Low------	High.
Urban land.											
DeA, DeB---------- Deerfield	B	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	Moderate----	Low------	High.
Fm---------------- Freetown	D	None--------	---	---	0-1.0	Apparent	Jan-Dec	>60	High--------	High-----	High.
Fp---------------- Freetown	D	None--------	---	---	+3-0	Apparent	Jan-Dec	>60	High--------	High-----	High.
HaA, HaB---------- Haven	B	None--------	---	---	>6.0	---	---	>60	Moderate----	Low------	High.
HfB, HfC, HfD----- Hinckley	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
HrC*, HrD*:											
Hollis-----------	C/D	None--------	---	---	>6.0	---	---	10-20	Moderate----	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
HrC*, HrD*: Rock outcrop.											
Charlton---------	B	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Ip---------------- Ipswich	D	Frequent----	Very brief	Jan-Dec	+1-0	Apparent	Jan-Dec	>60	---	High-----	High.
MmA, MmB, MmC----- Merrimac	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
MnB*: Merrimac---------	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
Urban land.											
MoB, MoC, MsB, MsC-------------- Montauk	C	None--------	---	---	2.0-2.5	Perched	Feb-May	>60	Moderate----	Low------	High.
NpB, NpC, NpD----- Newport	C	None--------	---	---	1.5-2.5	Perched	Feb-Apr	>60	Moderate----	Low------	Moderate.
NuC*: Newport----------	C	None--------	---	---	1.5-2.5	Perched	Feb-Apr	>60	Moderate----	Low------	Moderate.
Urban land.											
PaB, PaC, PaD, PbB, PbC, PbD---- Paxton	C	None--------	---	---	1.5-2.5	Perched	Feb-Apr	>60	Moderate----	Low------	Moderate.
Pr*, Ps*. Pits											
PtB--------------- Pittstown	C	None--------	---	---	1.5-2.5	Perched	Nov-Apr	>60	Moderate----	Moderate	High.
Ra---------------- Raynham	C	None--------	---	---	0-2.0	Apparent	Nov-May	>60	High--------	High-----	Moderate.
RdA, RgB---------- Ridgebury	C	None--------	---	---	0-1.5	Perched	Nov-May	>60	High--------	High-----	High.
Rm---------------- Rippowam	C	Frequent----	Brief-----	Oct-May	0-1.5	Apparent	Sep-Jun	>60	High--------	High-----	High.
RoD*: Rock outcrop.											

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
RoD*:											
Hollis	C/D	None	---	---	>6.0	---	---	10-20	Moderate	Low	High.
Sa Saco	D	Frequent	Brief	Oct-May	0-0.5	Apparent	Sep-Jun	>60	High	Low	Moderate.
Sb*:											
Scarboro	D	None	---	---	+1-1.0	Apparent	Jan-Dec	>60	High	High	High.
Birdsall	D	None	---	---	+1-1.0	Apparent	Oct-Jul	>60	High	High	High.
ScB Scio	B	None	---	---	1.5-2.0	Apparent	Mar-May	>60	High	Moderate	Moderate.
SeB, StB Scituate	C	None	---	---	1.5-2.5	Perched	Nov-May	>60	Moderate	Low	High.
SuB Sudbury	B	None	---	---	1.5-3.0	Apparent	Dec-Apr	>60	Moderate	Low	High.
Sw Swansea	D	None	---	---	0-1.0	Apparent	Jan-Dec	>60	High	High	High.
Ua, Ud. Udorthents											
Ue. Udorthents											
Uf. Udorthents											
Ur*. Urban land											
Uw*. Urban land											
UxA*: Urban land.											
Boxford	C	None	---	---	1.0-3.0	Perched	Nov-Apr	>60	High	High	Moderate.
WaA Walpole	C	None	---	---	0-1.0	Apparent	Nov-May	>60	High	Low	Moderate.
WhA Whitman	D	None	---	---	+1-0.5	Perched	Sep-Jun	>60	High	High	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
WnA, WnB, WnC----- Windsor	A	None--------	---	---	>6.0	---	---	>60	Low---------	Low------	High.
WrA, WrB, WsB----- Woodbridge	C	None--------	---	---	1.5-2.5	Perched	Nov-May	>60	High--------	Low------	Moderate.
WuC*:											
Woodbridge-------	C	None--------	---	---	1.5-2.5	Perched	Nov-May	>60	High--------	Low------	Moderate.
Urban land.											

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

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Birdsall	Coarse-silty, mixed, nonacid, mesic Typic Humaquepts
Boxford	Fine, mixed, mesic Aquic Dystric Eutrochrepts
Canton	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Dystrochrepts
Charlton	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Deerfield	Mixed, mesic Aquic Udipsamments
Freetown	Dysic, mesic Typic Medisaprists
Haven	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Dystrochrepts
Hinckley	Sandy-skeletal, mixed, mesic Typic Udorthents
Hollis	Loamy, mixed, mesic Lithic Dystrochrepts
Ipswich	Euic, mesic Typic Sulfihemists
Merrimac	Sandy, mixed, mesic Typic Dystrochrepts
Montauk	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Newport	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Paxton	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Pittstown	Coarse-loamy, mixed, mesic Aquic Dystrochrepts
Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
Ridgebury	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Rippowam	Coarse-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Saco	Coarse-silty, mixed, nonacid, mesic Fluvaquentic Humaquepts
Scarboro	Sandy, mixed, mesic Histic Humaquepts
Scio	Coarse-silty, mixed, mesic Aquic Dystrochrepts
Scituate	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Sudbury	Sandy, mixed, mesic Aquic Dystrochrepts
Swansea	Sandy or sandy-skeletal, mixed, dysic, mesic Terric Medisaprists
Walpole	Sandy, mixed, mesic Aeric Haplaquepts
Whitman	Coarse-loamy, mixed, nonacid, mesic Typic Humaquepts
Windsor	Mixed, mesic Typic Udipsamments
Woodbridge	Coarse-loamy, mixed, mesic Aquic Dystrochrepts

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