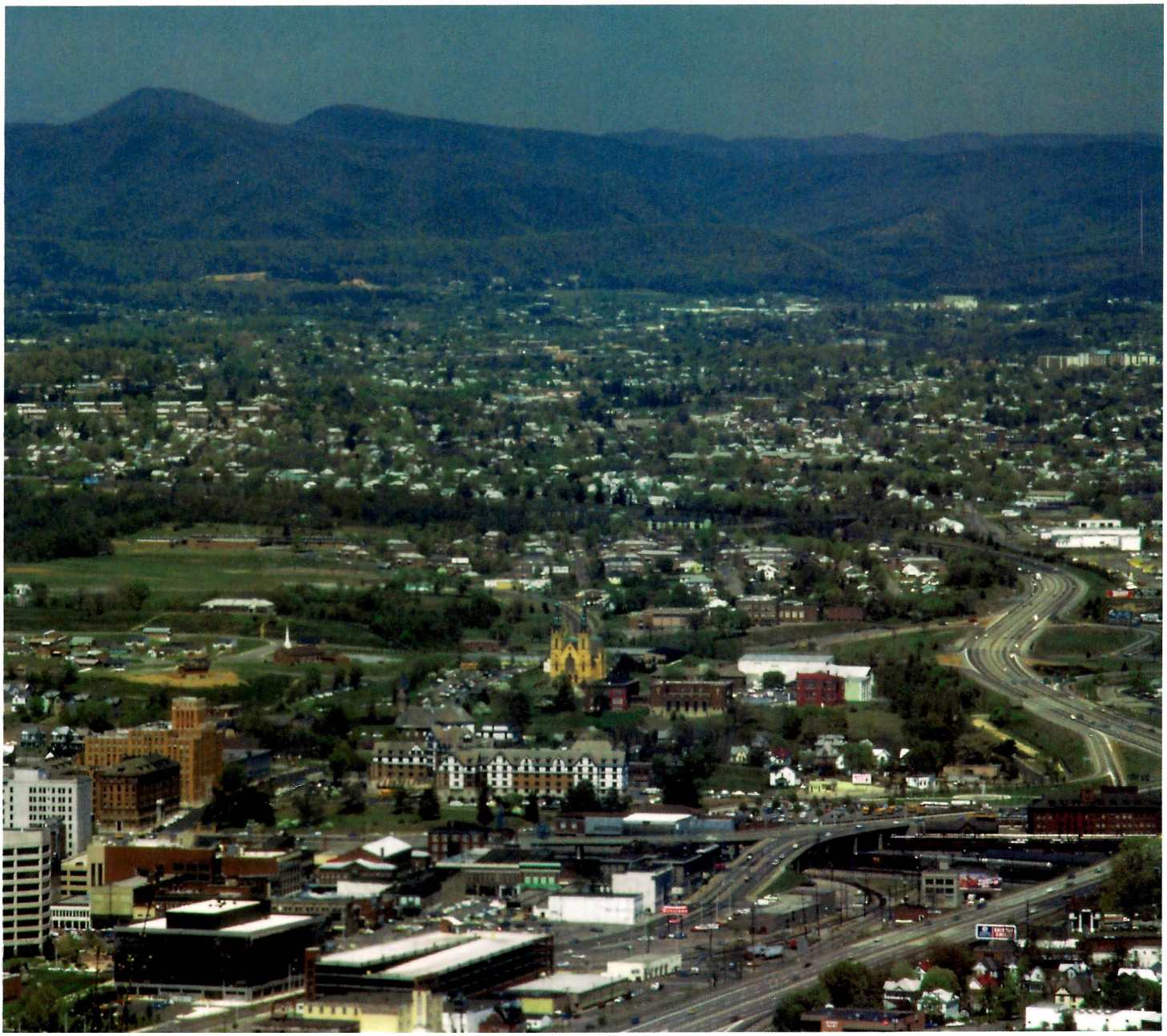
United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Virginia Polytechnic Institute and State University

Soil Survey of Roanoke County and the Cities of Roanoke and Salem, Virginia



How To Use This Soil Survey

General Soil Map

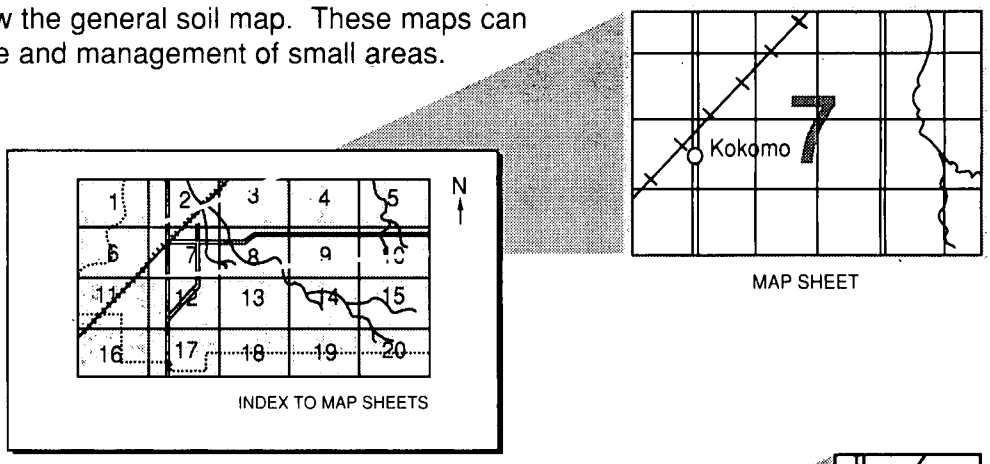
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

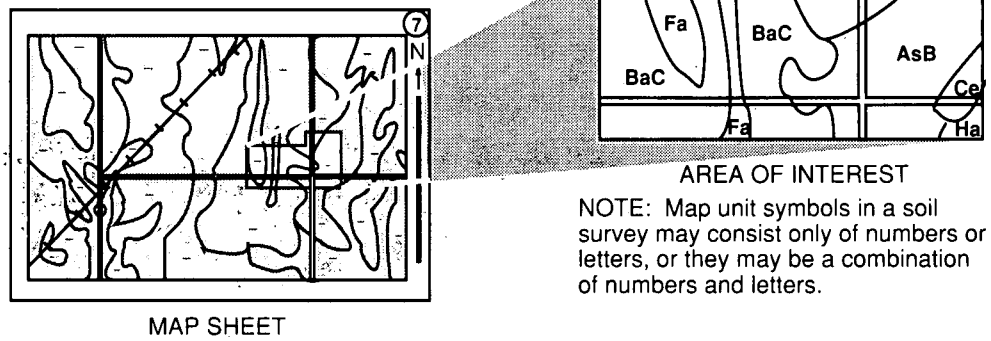
Detailed Soil Maps

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

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.



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.



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 Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This survey was made cooperatively by the Natural Resources Conservation Service and the Virginia Polytechnic Institute and State University and the United States Department of Agriculture, Forest Service. It is part of the technical assistance furnished to the Blue Ridge Soil and Water Conservation District. The Virginia Department of Conservation and Recreation, the Roanoke County Board of Supervisors, the Roanoke City Council, and the Salem City Council provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A westerly view of the Roanoke Valley and the city of Roanoke from the top of Mill Mountain. Fort Lewis, Green, and Catawba Mountains are in the background.

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Foreword

This soil survey contains information that can be used in land-planning programs in Roanoke County and the cities of Roanoke and Salem. 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 Natural Resources Conservation Service or the Cooperative Extension Service.

M. Denise Doetzer
State Conservationist
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Soil Survey of Roanoke County and the Cities of Roanoke and Salem, Virginia

By Edward P. Ealy, Jr., Natural Resources Conservation Service

Fieldwork by Edward P. Ealy, Jr., Jeannine C. Freyman, and J. Steve Osborne, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with Virginia Polytechnic Institute and State University

The survey area is in the southwestern part of Virginia (fig. 1). It has a total area of about 194,484 acres, or about 304 square miles. Roanoke County has an area of about 157,684 acres. It includes about 2,784 acres, or 4.3 square miles, that is located along the Blue Ridge Parkway and is managed by the United States National Park Service. The acreage in the Jefferson National Forest, a 4.7 square-mile mountainous area in the northwestern part of the county, is not included in this survey. The city of Roanoke has an area of about 27,600 acres, or 43.1 square miles, and the city of Salem has an area of about 9,200 acres, or 14.3 square miles. Salem is the county seat and is located near the center of Roanoke County. According to the U.S. Bureau of the Census, the population of Roanoke County in 1990 was 79,332; the city of Roanoke, 96,397; and the city of Salem, 23,756.

The survey area is bounded on the north by Botetourt County, on the northeast by Bedford County, on the east by Franklin County, on the south by Franklin and Floyd Counties, on the south and southwest by Montgomery County, and on the west by Craig County.

Several scenic points of interest are in the survey area. The Blue Ridge Parkway, which runs through the Blue Ridge Mountains, is in the eastern part of the county. The Appalachian Trail runs to the south out of Botetourt County. It runs into Craig County from an area south of Catawba. Dixie Caverns is also in the southern part of Roanoke County. The Virginia Transportation Museum is in the city of Roanoke.

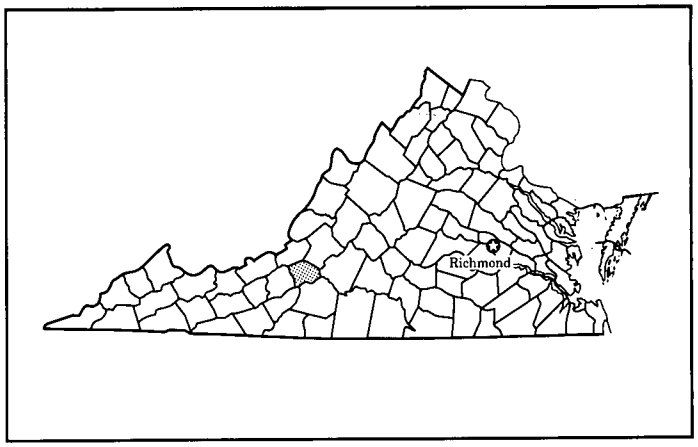

Figure 1.—Location of Roanoke County and the cities of Roanoke and Salem in Virginia.

Although farming historically has been the main land use in Roanoke County, since the mid-1970's urban expansion from Roanoke and Salem has replaced farms with housing developments, industry, and shopping centers. Most of the farms currently produce small grain, corn, hay, dairy products, and specialty crops, such as apples, peaches, and cabbage.

The enterprises in the survey area include the railroad industry; the trucking industry; the manufacturing of furniture, rubber goods,

construction equipment, and small electrical appliances; and the production of bottled water.

General Nature of the Survey Area

This section provides information about the history and development, climate, and physiography, relief, and drainage of the survey area. It also describes farming, transportation, and industry in the area.

History and Development

Roanoke County was formed in 1838 from a portion of Botetourt County. In 1849, a portion of Montgomery County was annexed to Roanoke County. In 1851, parts of Roanoke County, Giles County, and what is now Monroe County, West Virginia, were annexed to create Craig County. The name Roanoke comes from the Indian word "Rawrenoke," which means "shell money." It first was used to describe the Islands that form the outer barrier of the North Carolina Coast. It later was used to describe the river that flows west to east from the Allegheny Mountains through Roanoke County and then empties into the Albemarle Sound.

The Roanoke Valley area was first explored in 1671 by Europeans. These people probably explored the bottom land along the Roanoke River in the southeastern part of what is now Roanoke County. They remained in the area only briefly because they were interested in searching for "western waters." The early settlers, who were of Scotch-Irish and German descent, came to the area from Pennsylvania and Maryland during the 1700's.

The town of Salem was founded in 1802. James Simpson purchased the original tract of land, which was 31 acres in size, from Captain William Lewis for one hundred dollars. Because Salem was on the main road that led west, the town began to flourish. It was incorporated in 1836. When Roanoke County was formed in 1836, Salem was selected as county seat. It has remained the county seat of Roanoke County until the present time. In 1968, Salem became designated as a city instead of a town.

The city of Roanoke, which was originally called Big Lick, was incorporated as a town in 1847. The name was changed to Roanoke in 1882.

The town of Vinton was incorporated in 1884. Vinton was originally called Gish's Mill, or Gish's. The name Vinton was derived from the names of the largest landowners in the town *(3)*.

Climate

Table 1 gives data on temperatures and precipitation for the survey area as recorded at Roanoke in the period 1948 to 1989. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 37.3 degrees F and the average daily minimum temperature is 27.8 degrees F. The lowest temperature on record, which occurred on January 21, 1985, is -11.0 degrees F. In summer, the average temperature is 74.4 degrees F and the average daily maximum temperature is 85.5 degrees F. The highest recorded temperature, which occurred on August 21, 1983, is 105.0 degrees F.

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 40 degrees F. The normal monthly accumulation is used to schedule successive plantings of crops between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 40.3 inches. Of this, 21.4 inches, or 53.0 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 16.9 inches. The heaviest 1-day rainfall during the period of record was 6.6 inches on November 4, 1985.

The average seasonal snowfall is 23.5 inches. The greatest snowfall during the period of record was 15.0 inches. On the average, 13 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from to year.

Physiography, Relief, and Drainage

The survey area is within two major land resource areas. The eastern part of the survey area is in the Blue Ridge physiographic province, which accounts for about 35 percent of the survey area. The western part of the survey area is in the Southern Appalachian Ridges and Valley physiographic province, which accounts for about 65 percent of the survey area.

Roanoke County is nearly hexagonal in shape. It is located in the southernmost end of the Shenandoah Valley, between the Allegheny and Blue Ridge Mountains. Roanoke County is divided by a valley that extends through the county from northeast to southwest. The mean width of the Roanoke Valley is about 7 or 8 miles. The elevation of Roanoke County ranges from about 900 feet above sea level on the valley floor to about 3,900 feet on Poor Mountain in the southwestern part of the county. Two narrow valleys, the Catawba Valley and Mason Cove, are to the north of the Roanoke Valley. The Back Creek Valley is to the south.

The Roanoke Valley is surrounded by mountain

ranges. Catawba Mountain is to the north. It has a peak, called McAfee's Knob, at an elevation of 3,197 feet above sea level. To the northeast are the Tinker and Read Mountains. To the east is the Blue Ridge. Weaver and Stewart Knobs are at an elevation of 2,400 feet. The Blue Ridge is also to the south. It has a peak called Mason's Knob, which is at an elevation of 3,217 feet and is on the border with Franklin County. To the southwest are Poor Mountain, which has an elevation of 2,707 feet at Twelve o'clock Knob; Bent Mountain at an elevation of 3,202 feet; and Sugar Loaf Mountain. Fort Lewis Mountain is to the west. It has a peak at an elevation of 3,280 feet. It extends northward to the northwest boundary of Salem.

The Roanoke River Valley drainage system serves the cities of Roanoke and Salem and most of Roanoke County. It drains into Albemarle Sound in North Carolina. A small area in the northern part of the county is drained by the Catawba Creek, which is part of the James River drainage system that drains into the Chesapeake Bay. The Roanoke River enters Roanoke County from Montgomery County to the south. It flows east through the middle of the county and drains into Smith Mountain Lake in Bedford County. It is fed by several major creeks in the survey area. Mason Creek, which drains the area around Mason Cove, flows into the Roanoke River in Salem, just west of Roanoke. Tinker Creek, which drains from the north out of Botetourt County, joins Carvin Creek, which drains from Carvin Reservoir to the northwest. These creeks join the Roanoke River at Roanoke, near the Roanoke County line. Back Creek, which drains from the Poages Mill area, joins the Roanoke River east of the Bedford County line. The southern part of the Catawba Valley is drained by the North Fork of the Roanoke River. The Bent Mountain in Roanoke County is drained by Bottom Creek.

Farming

About 9,000 acres is used for cultivated crops in the survey area, and about 18,000 acres is used as pasture. The number of farms and the acreage used for cultivated crops have been decreasing. The major crops are corn, corn silage, wheat, barley, and oats. Several small apple and peach orchards and Christmas tree plantations are located in the eastern part of Roanoke County. A small amount of cabbage is grown in the area around Bent Mountain.

Most of the pastures consist of tall fescue or tall fescue and white clover. Most of the hay planted is orchardgrass or tall fescue. A significant acreage is used to grow alfalfa for hay.

Dairy farming has been declining in recent years, but a few dairy farms are active in the county. These farms are mainly in the Catawba Valley in the western part of the county and in the Poages Mill area in the eastern part. Raising beef cattle has been an increasing industry in the survey area, but herds are generally small and are mainly used for local consumption.

Industry

Most of the major manufacturing industries and businesses in the survey area are in or near the cities of Roanoke and Salem. A variety of large manufacturing enterprises are in the survey area, including those that produce home furniture, rubber tires, heavy construction equipment parts, bricks, concrete blocks, iron and steel reinforcement rods, paper products, and electrical appliance parts. Small businesses produce screws and bolts, medical supplies, and computer products. The survey area also has several branch offices of insurance companies.

The transportation industry is also viable in the survey area, and the railroad industry is one of the largest employers. Several large trucking companies are in operation. The airline industry has experienced a steady increase in recent years, resulting in the expansion and improvement of airport runways and the construction of a new air terminal building.

Transportation

Roanoke County and the cities of Roanoke and Salem are served by a system of Federal, State, and local highways. Interstate 81 runs northeast-southwest through the western part of Roanoke County. It connects the Roanoke Valley with southwestern Virginia and with the Shenandoah Valley to the north. Interstate spur 581 connects the city of Roanoke with Interstate 81 to the west. It joins U.S. Highway 220 to the southeast. U.S. Highway 220 connects the Roanoke Valley with Martinsville, Virginia, and Greensboro, North Carolina. U.S. Highway 11 runs through the survey area from the northeast to the southwest. It connects the Roanoke Valley with the Shenandoah Valley to the north and with the southwestern part of Virginia. U.S. Highway 460 runs from the northeast to the southwest through Roanoke County and connects the Roanoke Valley with Blacksburg to the southwest and with the Lynchburg and Richmond areas to the east. U.S. Highway 221 runs from the northeast to the south in the southern part of the county, connecting the Roanoke Valley with Bent Mountain and Floyd County. The Blue Ridge Parkway runs from the northeast to the south in the eastern part of the county. Virginia Highway 311 runs northwest from the city of Salem, connecting the Roanoke Valley with the Catawba Valley in the western

part of Roanoke County and with New Castle in Craig County. Virginia Highway 24 runs northeast from Roanoke City through the town of Vinton and connects the Roanoke Valley with Bedford and Smith Mountain Lake. Virginia Highway 116 runs southeast from the city of Roanoke, connecting the Roanoke Valley with Smith Mountain Lake.

Rail transportation is furnished by the Norfolk and Southern Railway. The Norfolk and Southern Railway is a major transporter of coal from southwest Virginia and West Virginia. Amtrak provides rail passenger service in Clifton Forge in Allegheny County and in the city of Lynchburg.

Woodrum Field in the city of Roanoke provides the survey area with commercial air service. Complete passenger, air express, and air freight services are available through several major U.S. air carriers.

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 is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and 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 a considerable degree of 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, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, 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 interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are 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 are 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 predict with a fairly high degree of accuracy 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 two or three 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 noncontrasting (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 (dissimilar) 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

Areas of Urban land and Areas of Soils Formed in Residuum of Limestone and Interbedded Limestone and Calcareous Shale; on Uplands

1. Frederick-Chilhowie

Gently sloping to very steep, very deep and moderately deep, well drained soils that have a clayey subsoil

These soils are on broad, moderately dissected uplands. Slopes range from 2 to 45 percent. They are generally long and smooth and have small, short, intermittent drainageways. Sinkholes are common in some areas.

This map unit makes up about 5 percent of the survey area. It is about 52 percent Frederick soils, 24 percent Chilhowie soils, and 24 percent soils of minor extent (fig. 2).

Frederick soils are gently sloping to very steep and are very deep. They have a surface layer of silt loam and have a clayey subsoil. In some areas the surface layer is very gravelly or bedrock is exposed. Chilhowie soils are strongly sloping to very steep and are moderately deep. They have a surface layer of silty clay loam and have a clayey subsoil. They are very rocky in some areas.

Of minor extent in this unit are the moderately deep, well drained Berks and Dekalb soils, the shallow, well drained Opequon and Weikert soils, and areas of rock outcrop on the higher adjacent slopes; the very deep, well drained Combs and Speedwell soils, the very deep, moderately well drained Sindion soils, and the very deep, poorly drained Clubcaf soils on flood plains; and the very deep, well drained Timberville soils along drainageways on side slopes in the limestone uplands.

The soils in this map unit are used mainly for woodland, pasture, hay, and a few cultivated crops. The gently sloping areas that are not gravelly or rocky are well suited to cultivated crops. The hazard of erosion, the rocky or gravelly surface, and the slope are the main limitations affecting agricultural uses. The clayey subsoil, the rockiness, and the slope are the main limitations affecting other uses.

2. Frederick-Urban land-Chilhowie

Areas of Urban land and gently sloping to very steep, very deep and moderately deep, well drained soils that have a clayey subsoil

This unit is on broad, moderately dissected uplands. Slopes range from 2 to 60 percent. They are generally long and smooth. Sinkholes are common in some areas.

This map unit makes up about 5 percent of the survey area. It is about 43 percent Frederick soils, 22 percent Urban land, 13 percent Chilhowie soils, and 22 percent soils of minor extent.

Frederick soils are gently sloping to very steep and are very deep. They have a surface layer of silt loam and have a clayey subsoil. They have a very gravelly surface layer in some areas. The areas of Urban land consist of parking lots, buildings, roads, and other impervious surfaces. Chilhowie soils are strongly sloping to very steep and are moderately deep.

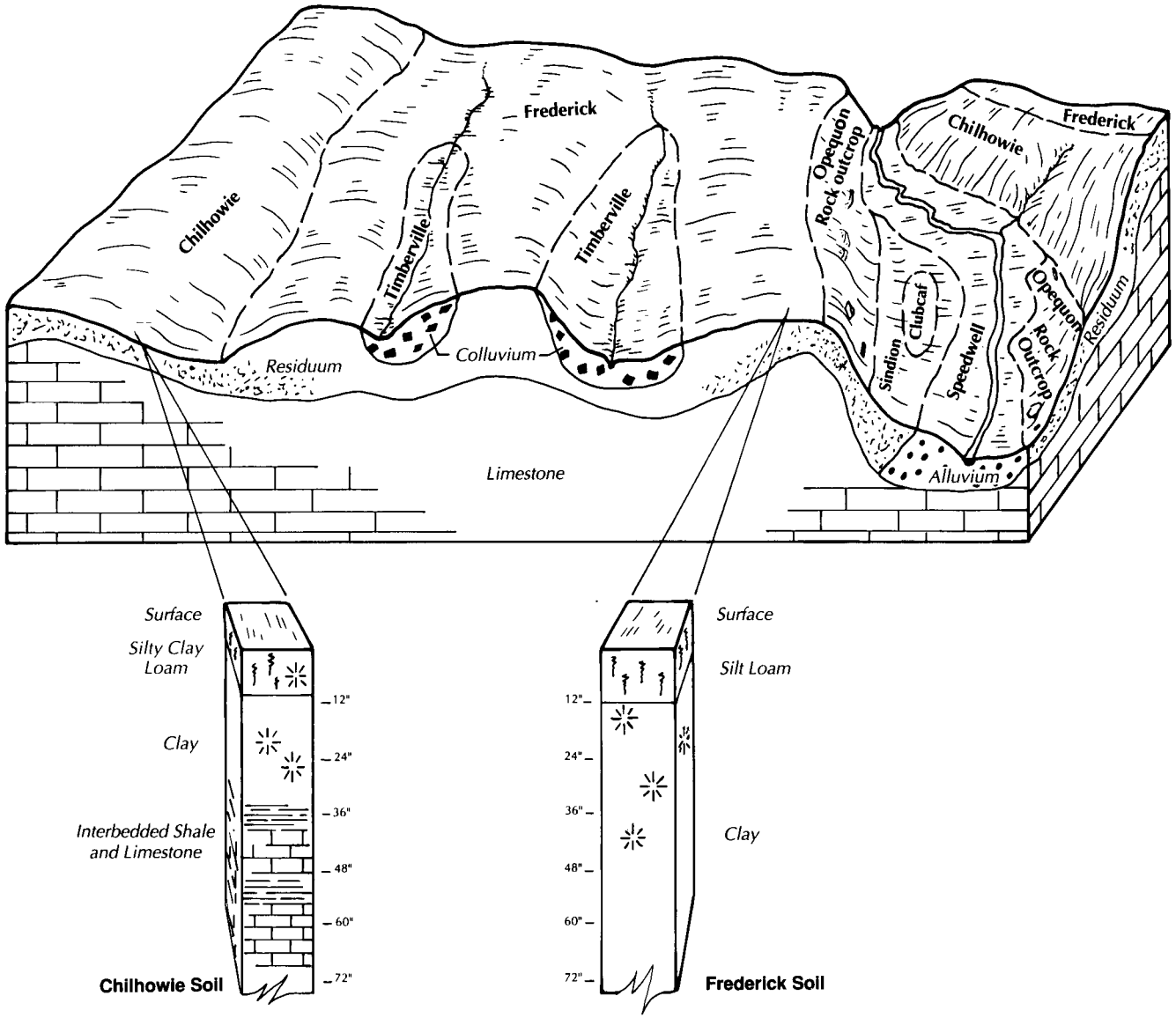

Figure 2.—Typical pattern of soils and parent material in the Frederick-Chilhowie general soil map unit.

They have a surface layer of silty clay loam and have a clayey subsoil. They are very rocky in some areas.

Of minor extent in this unit are the very deep, well drained Allegheny and Wheeling soils on terraces; the very deep, well drained Combs and Speedwell soils, the very deep, moderately well drained Sindion soils, and the very deep, poorly drained Clubcaf soils on flood plains; the moderately deep, well drained Sequoia soils on upland summits and side slopes; the shallow, well drained Opequon soils on adjacent upland side slopes; the very deep, well drained Tumbling soils on adjacent colluvial side slopes; and areas of Udorthents. Udorthents are generally in areas of residential and commercial development, where the soils have been disturbed by grading and construction.

The soils in this map unit are used mainly for urban development. A small area is used for hay or pasture. The slope and the areas of rock outcrop are limitations affecting most agricultural uses. The slope, the clayey subsoil, and the rock outcrop are limitations affecting most other uses.

Areas of Urban land and Areas of Soils Formed in Residuum of Shale, Siltstone, Sandstone, and Interbedded Limestone; on Uplands

3. Chiswell-Litz-Urban land

Areas of Urban land and gently sloping to very steep, moderately deep and shallow, well drained soils that have a loamy subsoil

The soils in this map unit are on dissected uplands. Slopes range from 2 to 50 percent. They are generally long and smooth and have deep, V-shaped drainageways.

This map unit makes up about 17 percent of the survey area. It is about 31 percent Chiswell soils, 20 percent Litz soils, 13 percent Urban land, and 36 percent soils of minor extent.

Chiswell soils are strongly sloping to very steep and are shallow. They have a surface layer of channery silt loam and a subsoil of very channery silt loam. Litz soils are gently sloping to very steep and are moderately deep. They have a surface layer of channery silt loam and a subsoil of very channery silt loam and silty clay loam. The areas of Urban land consist of parking lots, buildings, roads, and other impervious surfaces.

Of minor extent in this unit are the very deep, well drained Allegheny, Shottower, and Wheeling soils and the very deep, moderately well drained Cotaco soils on terraces; the very deep, well drained Combs, Derroc, and Speedwell soils, the very deep, moderately well drained Sindion soils, and the very deep, poorly drained Clubcaf soils on flood plains; the very deep, well drained Groseclose and Frederick soils on adjacent upland summits and side slopes; Thurmont soils on the lower adjacent colluvial benches and side slopes; and areas of Udorthents. Udorthents are generally in areas of residential and commercial development, where the soils have been disturbed by grading and construction.

The soils in this map unit are used mainly as woodland or for urban development. A small acreage is used for pasture, hay, or cultivated crops. The depth to bedrock and the slope are limitations affecting agricultural uses. The slope, the clayey subsoil, and the depth to bedrock are limitations affecting most other uses.

Soils Formed in Residuum or Colluvium Derived From Shale or Sandstone; on Uplands

4. Weikert-Dekalb-Berks

Areas of strongly sloping to very steep, shallow to moderately deep, well drained soils that have a loamy subsoil

These soils are on highly dissected uplands. Slopes range from 7 to 80 percent. They are generally long and smooth and have small, V-shaped drainageways. Rock outcrops of shale and sandstone are common in some areas.

This map unit makes up about 21 percent of the survey area. It is about 27 percent Weikert soils, 15 percent Dekalb soils, 7 percent Berks soils, and 51 percent soils of minor extent.

Weikert soils are strongly sloping to very steep and are shallow. They have a surface layer of channery silt loam and a subsoil of very channery silt loam. Dekalb soils are strongly sloping to very steep and are moderately deep. They have surface layer of channery sandy loam and a subsoil of very channery sandy loam. Berks soils are strongly sloping to very steep and are moderately deep. They have a surface layer of channery silt loam and a subsoil of channery and very channery silt loam.

Of minor extent in this unit are the moderately deep, well drained Gilpin and Sequoia soils on adjacent uplands; the very deep, well drained Macove, Shelocta, Spessard, and Tumbling soils on foot slopes; the very deep, well drained Derroc soils on small flood plains; and the deep, well drained Grimsley soils along drainageways.

The soils in this map unit are used mainly as woodland. They are poorly suited to cultivated crops. A few areas are used for pasture. The slope, the stony surface, the depth to bedrock, rock fragments in the subsoil, and the low available water capacity are limitations affecting most agricultural uses. The slope, the depth to bedrock, and the stony surface are limitations affecting most other uses.

5. Tumbling-Weikert-Berks

Areas of gently sloping to very steep, shallow, moderately deep and very deep, well drained soils that have a clayey and loamy subsoil

These soils are in the uplands and on foot slopes. Slopes range from 2 to 75 percent. They are generally short and smooth.

This map unit makes up about 7 percent of the survey area. It is about 36 percent Tumbling soils, 17 percent Weikert soils, 15 percent Berks soils, and 32 percent soils of minor extent.

Tumbling soils are very deep and are well drained. They are on gently sloping to steep foot slopes. They have a surface layer of loam and a subsoil of cobbly clay loam and cobbly clay. In some areas they have a very stony surface. Weikert soils are shallow and are well drained. They are on steep and very steep dissected uplands. They have a surface layer of channery silt loam and a subsoil of very channery silt

loam. Rock outcrops of shale and sandstone are common in some areas of these soils. Berks soils are moderately deep and are well drained. They are on strongly sloping to very steep uplands. They have a surface layer of channery silt loam and a subsoil of channery and very channery silt loam.

Of minor extent in this unit are the moderately deep, well drained Dekalb soils on adjacent, higher side slopes in the uplands; Gilpin and Sequoia soils on adjacent summits and side slopes; the deep, well drained Grimsley soils along drainageways; the very deep, well drained Laidig, Macove, and Shelocta soils on colluvial benches and foot slopes.

The soils in this map unit are used mainly as woodland or pasture. A moderate acreage is used for urban development, and a few areas are used for hay. The hazard of erosion, droughtiness, rockiness, gravelly surface, slope, clayey subsoil, and depth to bedrock are limitations affecting most agricultural uses. The slope, the clayey subsoil, and the depth to bedrock are limitations affecting most other uses.

6. Dekalb-Tumbling

Areas of gently sloping to very steep, moderately deep and very deep, well drained soils that have a loamy or clayey subsoil

These soils are on side slopes and foot slopes of the Read Mountain in the northeastern part on the survey area. Slopes range from 2 to 70 percent. They are generally long and smooth. Rock outcrops of sandstone are common in some areas.

This unit makes up about 2 percent of the survey area. It is about 44 percent Dekalb soils, 25 percent Tumbling soils, and 31 percent soils of minor extent.

Dekalb soils are strongly sloping to very steep and are moderately deep. They have a surface layer of channery sandy loam and a subsoil of very channery sandy loam. Tumbling soils are gently sloping to steep and are very deep. They have a surface layer of loam and have a clayey subsoil.

Of minor extent in this unit are the moderately deep, well drained Berks and Gilpin soils; the very deep, well drained Frederick and Groseclose soils and the shallow, well drained Weikert soils on lower adjacent side slopes in the uplands; and Laidig soils on lower colluvial foot slopes.

The soils in this map unit are used mainly as woodland. They are poorly suited to cultivated crops. A few areas on the lower foot slopes are used for pasture or as sites for homes. The slope, the depth to bedrock, the low available water capacity, and coarse fragments in the soil are limitations affecting most agricultural uses. The slope and the depth to bedrock are limitations affecting most other uses.

Areas of Urban land, Areas of Rock outcrop, and Areas of Soils Formed in Residuum of Gneiss, Granite, Schist, Sandstone, Quartzite, and Phyllite; on Uplands

7. Hayesville-Evard-Urban land

Areas of Urban land and gently sloping to very steep, very deep, well drained soils that have a clayey and loamy subsoil

This unit is in highly dissected upland areas. Slopes range from 2 to 60 percent. They are generally smooth and are medium or long.

This map unit makes about 20 percent of the survey area. It is about 46 percent Hayesville soils, 12 percent Evard soils, 8 percent Urban land, and 34 percent soils of minor extent.

Hayesville soils are gently sloping to steep and are very deep. They have a surface layer of fine sandy loam and have a clayey subsoil. In some areas they have a stony surface or areas of rock outcrop. Evard soils are strongly sloping to very steep and are very deep. They have a surface layer of fine sandy loam and a subsoil of clay loam. In some areas they commonly have an extremely stony surface and areas of rock outcrop. The areas of Urban land consist of parking lots, buildings, roads, and other impervious surfaces.

Of minor extent in this unit are the shallow, well drained Chiswell and Sylvatus soils, the moderately deep, well drained Dekalb, Peaks, and Litz soils, and the very deep Edneyville soils on adjacent side slopes in the uplands; the very deep, well drained Thurmont soils on colluvial foot slopes; the very deep, poorly drained Alderflats soils in upland depressions; the very deep, well drained Combs soils and the very deep, moderately well drained Sindion soils on flood plains; and areas of Udorthents. Udorthents are generally in areas of residential and commercial development, where the soils have been disturbed by grading and construction.

The soils in this map unit are used mainly as woodland or for urban development. Some areas are used for pasture, cultivated crops, and fruit orchards. The slope is the main limitation affecting most agricultural uses. The slope and the clayey subsoil are the main limitations affecting most other uses.

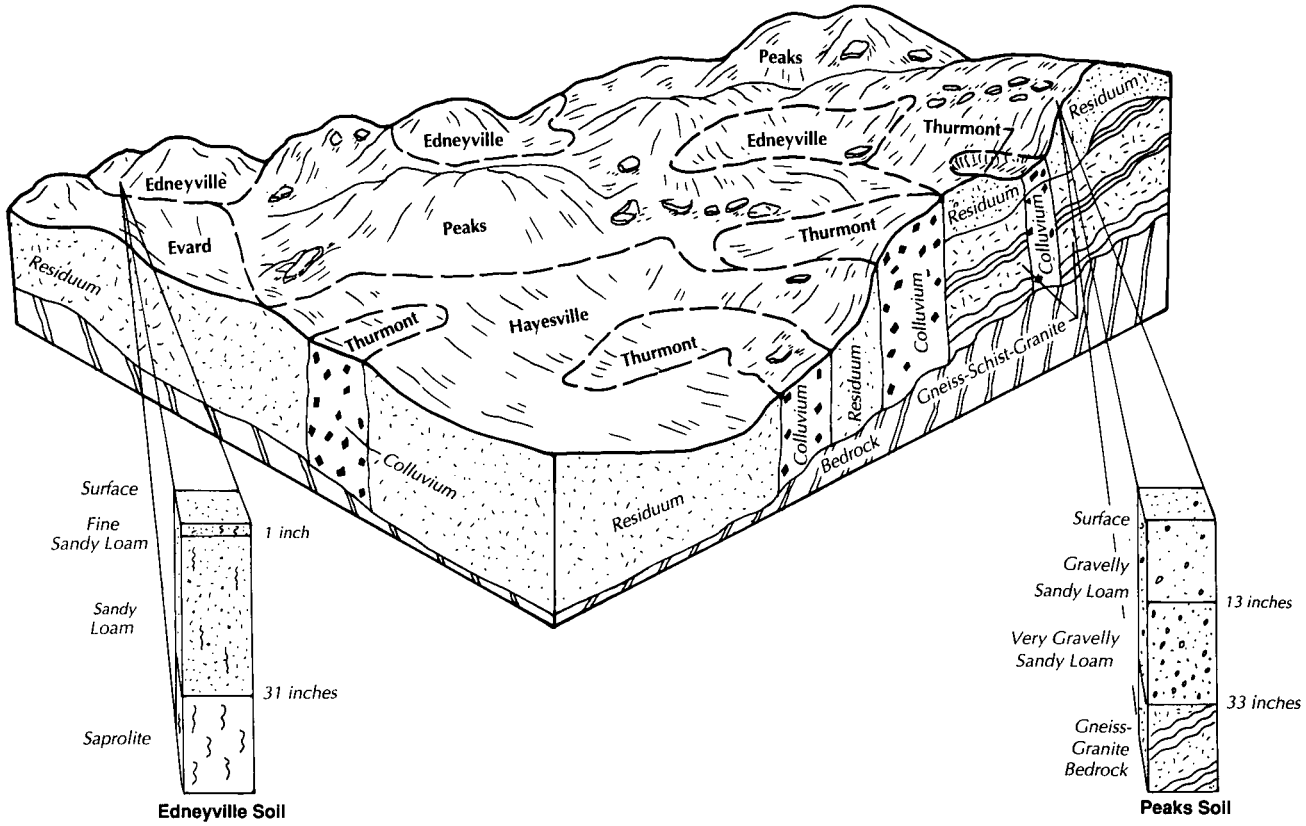

Figure 3.—Typical pattern of soils and parent material in the Edneyville-Peaks general soil map unit.

8. Edneyville-Peaks

Areas of gently sloping to very steep, very deep and moderately deep, well drained and somewhat excessively drained soils that have a loamy subsoil

These soils are on mountain summits, shoulders, and side slopes. Slopes range from 2 to 80 percent. They are long and smooth and are somewhat dissected. Rock outcrops and stones on the surface are common in some areas.

This map unit makes up about 9 percent of the survey area. It is about 45 percent Edneyville soils, 30 percent Peaks soils, and 25 percent soils of minor extent (fig. 3).

Edneyville soils are gently sloping to very steep and are very deep. They have a surface layer of fine sandy loam and have a loamy subsoil. Peaks soils are steep and very steep and are moderately deep. They have a surface layer of gravelly loam and a subsoil of very gravelly loam.

Of minor extent in this unit are the very deep, poorly drained Alderflats soils in upland depressions; the well drained Dekalb and Sylvatus soils on adjacent side slopes; the very deep, well drained Evard and Hayesville soils on lower adjacent side slopes; the very deep, moderately well drained Sindion soils on flood plains; and the well drained Thurmont soils on adjacent colluvial foot slopes.

The soils in this map unit are used mainly as woodland. A small acreage is used for fruit orchards, hay, or pasture. The moderately steep to very steep soils in this map unit are poorly suited to cultivated crops, but the gently sloping and strongly sloping soils are suited to crops. The slope and the depth to bedrock are limitations affecting most agricultural uses. The slope, the depth to bedrock, and the clayey subsoil are limitations affecting most other uses.

9. Dekalb-Sylvatus-Rock Outcrop

Areas of Rock outcrop and strongly sloping to very steep, shallow and moderately deep, well drained soils that have a loamy subsoil

This map unit is on mountain summits, shoulders,

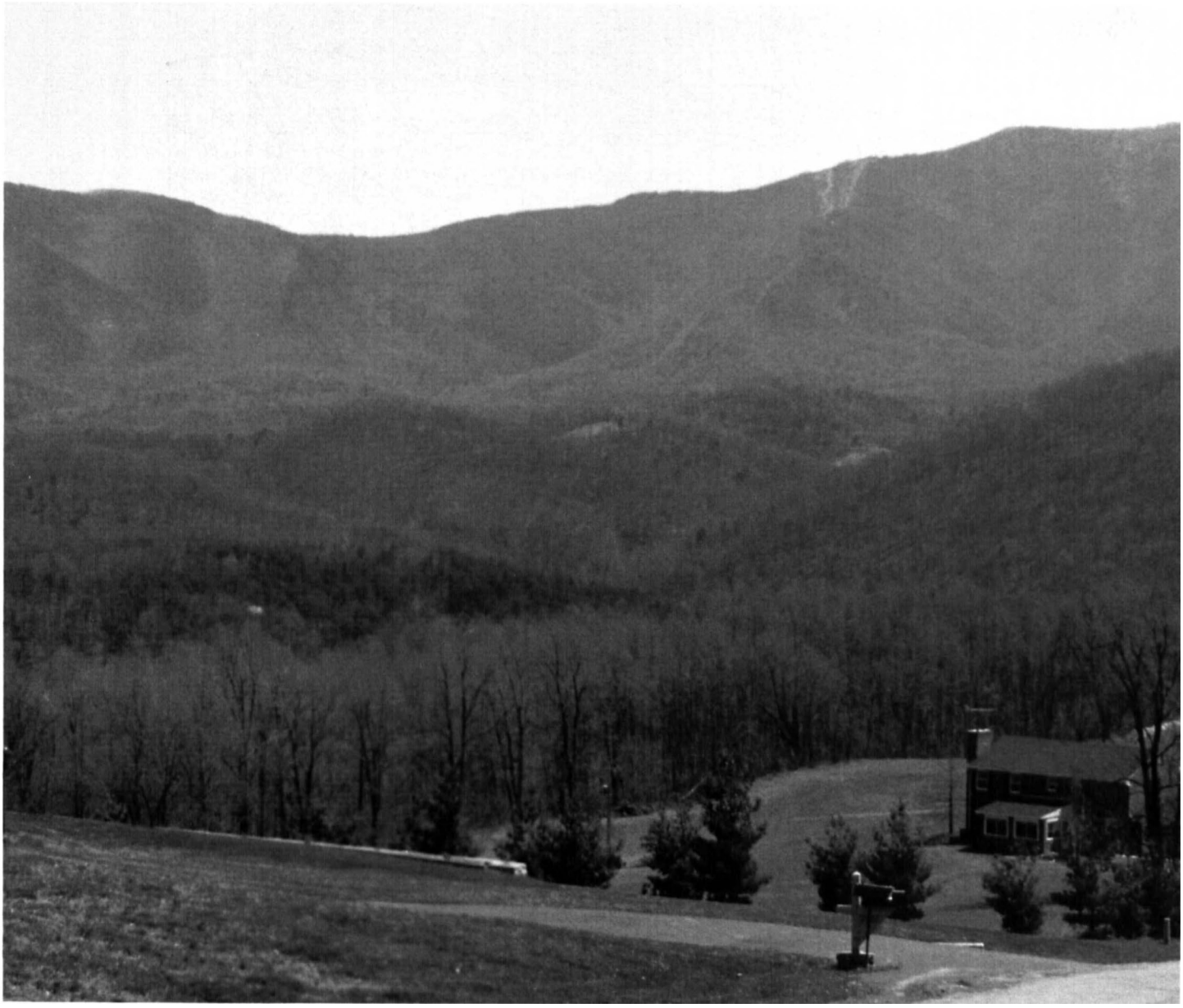

Figure 4.—An upland area of the Dekalb-Sylvatus-Rock outcrop general soil map unit in the southern part of Roanoke County.

and side slopes (fig. 4). Slopes range from 15 to 80 percent. The soils generally have medium to long, irregular slopes as a result of the Rock outcrop. Stones on the surface are common in most areas.

This map unit makes up about 5 percent of the survey area. It is about 45 percent Dekalb soils, 24 percent Sylvatus soils, 10 percent Rock outcrop, and 21 percent soils of minor extent.

Dekalb soils are moderately deep and are strongly sloping to very steep. They have a surface layer of channery very stony loam and a subsoil of very channery loam. The areas of Rock outcrop consist of exposures of sandstone bedrock that are generally less than 30 feet apart. Sylvatus soils are shallow and are steep and very steep. They have a surface layer of very gravelly silt loam and a subsoil of very gravelly loam.

Of minor extent in this unit are moderately deep to

very deep soils. These soils include the well drained Edneyville soils and the somewhat excessively drained Peaks soils on higher adjacent side slopes; the well drained Thurmont and Tumbling soils on adjacent colluvial side slopes and fans; and the well drained Grimsley soils along drainageways.

The soils in this map unit are used mainly as woodland. They are poorly suited to cultivated crops, hay, or pasture. The slope, the rock outcrop, the content of stones, and the droughtiness are limitations affecting most agricultural and other uses.

10. Edgemont

Areas of strongly sloping to very steep, very deep, well drained soils that have a loamy subsoil

These soils are on mountain summits, shoulders, and side slopes. Slopes range from 15 to 60 percent. They are generally long and smooth.

This map unit makes up about 4 percent of the survey area. It is about 80 percent Edgemont soils and 20 percent soils of minor extent.

Edgemont soils have a surface layer of channery loam and a subsoil of clay loam.

Of minor extent in this unit are the moderately deep, well drained Chiswell, Dekalb, Litz, and Peaks soils and the very deep, well drained Edneyville, Evard, and Hayesville soils on adjacent side slopes in the uplands; the very deep, well drained Thurmont soils on adjacent colluvial foot slopes; areas of Urban land; and areas of Udorthents. Urban land and Udorthents are generally in areas of residential and commercial development, where the soils have been disturbed by grading and construction.

The soils in this map unit are used mainly as woodland and as sites for homes. A small acreage is used as pasture. The slope is the main limitation affecting most agricultural and other uses.

Areas of Urban Land and Areas of Soils Formed in Alluvial Material; on Flood Plains

11. Speedwell-Urban land-Derroc

Areas of Urban land and very deep, nearly level, well drained soils that have a loamy subsoil

This unit is on nearly level flood plains. Individual areas are broad or are narrow and long.

This map unit makes up about 5 percent of the survey area. It is about 17 percent Speedwell soils, 16 percent Urban land, 13 percent Derroc soils, and 54 percent soils of minor extent.

Speedwell soils are on broad flood plains. They have a surface layer of loam and a subsoil of loam. The areas of Urban land consist of parking lots, buildings, roads, and other impervious surfaces. Derroc soils are on long, narrow flood plains. They have a surface layer of cobbly sandy loam and a subsoil of very cobbly sandy loam.

Of minor extent in this unit are the very deep, well drained Allegheny, Shottower, and Wheeling soils, the moderately well drained, very deep Cotaco and Zoar soils, and the poorly drained Purdy soils on adjacent stream terraces; the very deep, well drained Combs soils, the moderately well drained Sindion soils, and the poorly drained Clubcaf soils on flood plains; the moderately deep, well drained Berks and Litz soils and the shallow, well drained Chiswell and Weikert soils on adjacent side slopes in the uplands; the very deep, well drained Macove and Shelocta soils on colluvial foot slopes; and areas of Udorthents. Udorthents are generally in areas of residential and commercial development, where the soils have been disturbed by grading and construction.

The soils in this map unit are used mainly for pasture, hay, urban development, and some cultivated crops. A small acreage is used as woodland. The flooding and the coarse fragments on the surface are limitations affecting some agricultural uses. The flooding is a limitation affecting most other uses.

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 the heading "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 substratum, 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, Tumbling loam, 15 to 25 percent slopes, very stony, is a phase of the Tumbling series.

Some map units are made up of two or more major soils. These map units are called soil complexes. 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. Groseclose-Litz complex, 2 to 15 percent slopes, is an example.

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, quarries 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.

The suitability for cultivated crops, pasture grasses and legumes, building site development, septic tank absorption fields, and local roads and streets is rated in each detailed map unit description. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using the standard materials and methods typically required for that use. Good results can be expected.

Moderately suited.—The soils have limitations that make special planning, design, or maintenance necessary for the intended use.

Poorly suited.—The intended use is difficult or costly to initiate and maintain because of such limitations as steep slopes, a high water table, or flooding. Major soil reclamation, special design, or intensive management practices are needed.

Very poorly suited.—The intended use is very difficult or costly to initiate and maintain and generally should not be undertaken.

Soil Descriptions

1A—Alderflats silt loam, 0 to 4 percent slopes. This soil is very deep, nearly level, and poorly drained.

It is in upland depressions. Individual areas are long and irregular in shape. They range from about 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark grayish brown silt loam

Subsoil:
5 to 12 inches, olive gray silty clay loam that has strong brown mottles
12 to 24 inches, light olive gray silty clay loam that has yellowish red mottles
24 to 30 inches, gray and greenish gray silty clay loam that has yellowish red mottles

Substratum:
30 to 50 inches, greenish gray silty clay loam that has strong brown mottles
50 to 62 inches, greenish gray and olive gray loamy sand that has strong brown mottles

Included with this soil in mapping are the very deep, well drained Edneyville, Evard, Hayesville, and Thurmont soils. Edneyville, Evard, and Hayesville soils are on adjacent upland side slopes. Thurmont soils are on adjacent foot slopes. They formed in colluvium. Included soils make up 10 percent of the map unit.

Properties of the Alderflats soil—

Permeability: Slow
Available water capacity: High
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 18 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 0 to 12 inches

Most areas of this soil are used as pasture or woodland.

This soil is poorly suited to most cultivated crops. Crop production is limited by the seasonal wetness, which delays planting and harvesting.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes are management concerns. Deferring grazing, controlling weeds, using proper stocking rates, and applying fertilizer increase the production of feed and forage. Overgrazing or grazing when the soil is wet compacts the surface layer and damages the stand of grasses and legumes.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 437 board feet. Wetness is a limitation for forestry management practices or logging operations. An equipment limitation and the seedling mortality rate are management concerns. This soil is managed for eastern white pine and Norway spruce. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production.

The wetness and the slow permeability are limitations on sites for septic tank absorption fields. Seepage limits the use of this soil for sewage lagoons, and the wetness is a limitation on sites for sanitary landfills or for dwellings. A high potential for frost action, the wetness, and low strength are limitations on sites for local roads and streets. Areas of better suited soils should be selected for these uses.

The capability subclass is IVw.

2B—Allegheny loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on terraces along streams. Individual areas are long and narrow in shape. They range from 6 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches, dark yellowish brown loam

Subsoil:
8 to 25 inches, dark brown loam
25 to 37 inches, brown loam
37 to 43 inches, brown clay loam that has very dark grayish brown and grayish brown mottles

Substratum:
43 to 62 inches, dark yellowish brown loam that has dark brown and grayish brown mottles

Included with this soil in mapping are the very deep, moderately well drained Cotaco soils; the very deep, poorly drained Purdy soils; and the very deep, well drained Wheeling soils. Cotaco and Purdy soils are in depressions. Wheeling soils are on the adjacent lower terraces. Also included are some areas of soils that have a surface layer of gravelly loam. Included soils make up about 25 percent of the map unit.

Properties of the Allegheny soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Moderate

Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture.

This soil is well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to hay and pasture. Preventing overgrazing, deferring grazing, and using lime and fertilizer to offset the acidity and low natural fertility increase the production of feed and forage and help to control erosion.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 526 board feet. This soil has few limitations for forestry management practices or logging operations; however, plant competition is severe and the use of heavy equipment is moderately limited. This soil is managed for eastern white pine, black walnut, and yellow-poplar. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production.

The limitations that affect dwellings, septic tank absorption fields, and local roads and streets are slight.

The capability subclass is IIe.

2C—Allegheny loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on stream terraces. Individual areas are generally irregular in shape. They range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches, dark yellowish brown loam

Subsoil:
8 to 25 inches, dark brown loam
25 to 37 inches, brown loam
37 to 43 inches, brown clay loam that has very dark grayish brown and grayish brown mottles

Substratum:
43 to 62 inches, dark yellowish brown loam that has dark brown and grayish brown mottles

Included with this soil in mapping are the very deep, moderately well drained Cotaco soils and the very deep, well drained Wheeling soils. Cotaco soils are in depressions. Wheeling soils are on adjacent lower terraces. Also included are some areas of soils that have a surface layer of gravelly loam. Included soils make up about 25 percent of the map unit.

Properties of the Allegheny soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes increase the content of organic matter, maintain tilth, reduce the runoff rate, and help to control erosion.

This soil is moderately well suited to hay and pasture. Preventing overgrazing, deferring grazing, and using lime and fertilizer to offset the acidity and low natural fertility increase the production of feed and forage and help to control erosion. If the pasture is overgrazed, the runoff rate increases and erosion can become severe.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 526 board feet. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The slope limits the use of this soil for most other uses. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome this limitation on sites for dwellings. Placing the septic drain lines along the contour and grading help to overcome the slope on sites for septic tank absorption fields. Roads should be constructed on the contour.

The capability subclass is IIIe.

3C3—Chilhowie silty clay loam, 7 to 15 percent slopes, severely eroded. This soil is moderately deep, well drained, and strongly sloping. It is on convex, dissected side slopes in the uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 10 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown silty clay loam

Subsoil:
5 to 24 inches, yellowish brown clay

Substratum:
24 to 34 inches, yellowish brown silty clay loam

Bedrock:
34 inches, moderately hard, interbedded limestone and calcareous shale

Included with this soil in mapping are the very deep, well drained Frederick soils; the shallow, well drained Opequon soils; and the moderately deep, well drained Sequoia soils. Frederick and Opequon soils are in landscape positions similar to those of the Chilhowie soil. Sequoia soils are on adjacent upland side slopes. Also included are some areas of soils that have stones on the surface. Included soils make up about 25 percent of the map unit.

Properties of the Chilhowie soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Moderate in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for pasture or hay. Some areas are used as woodland.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. The production of crops is reduced by the low available water capacity, low fertility, a moderate rooting depth, and the firm, clayey subsoil. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. The low available water capacity and the low natural fertility reduce the production of crops. Proper stocking rates, pasture rotation, deferred grazing, and applications of fertilizer help to overcome the low natural fertility and maintain the production of feed and forage.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 500 board feet. This soil has few limitations for forestry management practices or logging operations. The clayey subsoil limits the use of heavy logging equipment during long periods of wetness. The seedling mortality rate and the windthrow hazard are also management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock and the slow permeability are limitations on sites for septic tank absorption fields. Areas of better suited soils should be selected. The slope and the shrink-swell potential limit the use of this soil for dwellings. The depth to bedrock is an additional limitation affecting dwellings with basements. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome these limitations. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope and the shrink-swell potential are limitations on sites for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by shrinking and swelling.

The capability subclass is IVe.

3D3—Chilhowie silty clay loam, 15 to 25 percent slopes, severely eroded. This soil is moderately deep, well drained, and moderately steep. It is on convex, dissected side slopes in the uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 10 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown silty clay loam

Subsoil:
5 to 24 inches, yellowish brown clay

Substratum:
24 to 34 inches, yellowish brown silty clay

Bedrock:
34 inches, moderately hard, interbedded limestone and calcareous shale

Included with this soil in mapping are the very deep, well drained Frederick soils; the shallow, well drained

Opequon soils; and the moderately deep, well drained Sequoia soils. Frederick and Opequon soils are in landscape positions similar to those of the Chilhowie soil. Sequoia soils are on adjacent upland side slopes. Also included are soils that have a very flaggy surface layer. Included soils make up about 20 percent of the map unit.

Properties of the Chilhowie soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Moderate in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for pasture or hay. Some areas are used as woodland.

This soil is not suited to cultivated crops. The erosion potential is a management concern. The production of crops is reduced by the low available water capacity, low fertility, a moderate rooting depth, and the firm, clayey subsoil. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is poorly suited to pasture and hay. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. The low available water capacity and the low natural fertility reduce the production of crops. Proper stocking rates, pasture rotation, deferred grazing, and applications of fertilizer help to overcome the low natural fertility and maintain the production of feed and forage.

The potential productivity for Virginia pine is high on north aspects and moderately high on south aspects. The estimated annual production of wood per acre is 500 board feet on north aspects and 349 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The slope and the clayey subsoil limit the use of heavy logging equipment. The windthrow hazard and the seedling mortality rate are also management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the slow permeability are limitations on sites for septic tank absorption fields. Areas of better suited soils should be selected. The slope and the shrink-swell potential limit the use of this soil for dwellings. The depth to bedrock is an additional limitation on sites for dwellings with basements. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome these limitations. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope and the shrink-swell potential are limitations on sites for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by shrinking and swelling.

The capability subclass is VIe.

3E3—Chilhowie silty clay loam, 25 to 60 percent slopes, severely eroded. This soil is moderately deep, well drained, and moderately steep and very steep. It is on convex, dissected side slopes in the uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 10 to 80 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown silty clay loam

Subsoil:
5 to 24 inches, yellowish brown clay

Substratum:
24 to 34 inches, yellowish brown silty clay

Bedrock:
34 inches, moderately hard, interbedded limestone and calcareous shale

Included with this soil in mapping are the very deep, well drained Frederick soils; the shallow, well drained Opequon soils; and the moderately deep, well drained Sequoia soils. Frederick and Opequon soils are in landscape positions similar to those of the Chilhowie soil. Sequoia soils are on adjacent upland side slopes. Also included are soils that have a very flaggy surface layer. Included soils make up about 30 percent of the map unit.

Properties of the Chilhowie soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High

Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Moderate in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture.

This soil is not suited to cultivated crops. The slope limits the safe use of tillage equipment. The erosion potential is a management concern. The production of crops is reduced by the low available water capacity, low fertility, a moderate rooting depth, and the firm, clayey subsoil. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is poorly suited to pasture and hay. The slope limits the safe use of machinery. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. The low available water capacity and the low natural fertility reduce the production of crops. Proper stocking rates, pasture rotation, deferred grazing, and applications of fertilizer help to overcome the low natural fertility and maintain the production of feed and forage.

The potential productivity for Virginia pine is high on north aspects and moderately high on south aspects. The estimated annual production of wood per acre is 500 board feet on north aspects and 349 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The slope and the clayey subsoil limit the use of heavy logging equipment. The windthrow hazard and the seedling mortality rate are also management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the slow permeability are limitations on sites for septic tank absorption fields. Areas of better suited soils should be selected. The slope and the shrink-swell potential limit the use of this soil for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope and the shrink-swell potential are limitations on sites for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by shrinking and swelling.

The capability subclass is VIIe.

4E—Chilhowie silty clay loam, 25 to 60 percent slopes, very rocky. This soil is moderately deep, well drained, and moderately steep and very steep. It is on dissected, convex uplands. Slopes are smooth and complex. Individual areas are elongated. They range from 10 to 120 acres in size. Areas of exposed bedrock range from 2 to 10 percent.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown silty clay loam

Subsoil:
5 to 24 inches, yellowish brown clay

Substratum:
24 to 34 inches, yellowish brown silty clay

Bedrock:
34 inches, moderately hard, interbedded limestone and calcareous shale

Included with this soil in mapping are the very deep, well drained Frederick soils; the shallow, well drained Opequon soils; and the moderately deep, well drained Sequoia soils. Frederick and Opequon soils are in landscape positions similar to those of the Chilhowie soil. Sequoia soils are in similar positions on adjacent shale uplands. Included areas make up about 15 percent of the map unit.

Properties of the Chilhowie soil—

Permeability: Slow
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Moderate in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The slope and the rock outcrop restrict the safe use of tillage equipment.

This soil is poorly suited to pasture and hay. The slope and the exposed bedrock restrict the safe use of

machinery. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. The low available water capacity and the low natural fertility reduce the production of crops. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage.

The potential productivity for Virginia pine is high on north aspects and moderately high on south aspects. The estimated annual production of wood per acre is 500 board feet on north aspects and 349 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The slope and the clayey subsoil limit the use of heavy logging equipment. The windthrow hazard and the seedling mortality rate are also management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the slow permeability are limitations on sites for septic tank absorption fields. Areas of better suited soils should be selected. The slope and the shrink-swell potential are limitations on sites for dwellings. The depth to bedrock is an additional limitation on sites for dwellings with basements. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome these limitations. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope and the shrink-swell potential limit the use of this soil for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by shrinking and swelling.

The capability subclass is VIIs.

5C—Chiswell-Litz complex, 7 to 15 percent slopes. This map unit consists of strongly sloping, well drained soils on upland side slopes and summits. The Chiswell soil is shallow, and the Litz soil is moderately deep. Individual areas are irregular in shape. They range from 6 to 40 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Chiswell soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Chiswell soil are as follows—

Surface layer:
0 to 2 inches, dark brown channery silt loam

Subsoil:
2 to 12 inches, reddish brown very channery silt loam

Bedrock:
12 inches, mottled reddish brown, brown, and brownish yellow soft shale

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the very deep, well drained Groseclose, Shottower, and Thurmont soils. Groseclose soils are on adjacent upland side slopes. Shottower soils are on adjacent high stream terraces. Thurmont soils are on adjacent concave side slopes and along drainageways. Included soils make up about 15 percent of the map unit.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland or

pasture. A small acreage is used for cultivated crops.

This map unit is poorly suited to cultivated crops. The erosion potential is a management concern. The production of crops is reduced by the low available water capacity, low fertility, the content of coarse fragments, and the shallow rooting depth in the Chiswell soil. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes can reduce the runoff rate and help to control erosion in cultivated areas. Crop residue left on the surface or incorporated into the plow layer helps to maintain tilth.

This map unit is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to maintain the pasture and control erosion. Because these soils are droughty during part of the year, planting drought-tolerant species such as lespedeza and fescue improves the quality of the stand.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 260 board feet on the Chiswell soil and 288 board feet on the Litz soil. This map unit has few limitations for forestry management practices or logging operations. The seedling mortality rate and the windthrow hazard are management concerns on the Chiswell soil. This map unit is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, replanting with faster growing trees, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock is a limitation on sites for septic tank absorption fields. Areas of better suited soils should be selected for this use. The slope and the depth to bedrock are limitations on sites for dwellings. Ripping or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the potential for frost action, and the depth to bedrock are limitations for local roads and streets. Roads should be constructed on the contour. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IVe.

5D—Chiswell-Litz complex, 15 to 25 percent slopes. This map unit consists of moderately steep, well drained soils on upland side slopes and summits. The Chiswell soil is shallow, and the Litz soil is moderately deep. Individual areas are irregular in shape. They range from 6 to 40 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Chiswell soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Chiswell soil are as follows—

Surface layer:
0 to 2 inches, dark brown channery silt loam

Subsoil:
2 to 12 inches, reddish brown very channery silt loam

Bedrock:
12 inches, mottled reddish brown, brown, and brownish yellow soft shale

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the very deep, well drained Groseclose, Shottower, and Thurmont soils. Groseclose soils are on adjacent upland side slopes. Shottower soils are on adjacent high stream terraces. Thurmont soils are on adjacent concave side slopes and along drainageways.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate

Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland or pasture. A small acreage is used for cultivated crops.

This map unit is poorly suited to cultivated crops. The erosion potential is a management concern. The production of crops is reduced by the low available water capacity, low fertility, the content of coarse fragments, and the shallow rooting depth in the Chiswell soil. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion in cultivated areas. Crop residue left on the surface or incorporated into the plow layer helps to maintain tilth.

This map unit is poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, the prevention of overgrazing, deferred grazing, and applications of fertilizer help to maintain the production of the pasture. If the pasture is overgrazed, the runoff rate increases and erosion can become severe. Because these soils are droughty during part of the year, planting drought-tolerant species such as lespedeza and fescue improves the quality of the stand.

The potential productivity for northern red oak on the Chiswell soil is high on north aspects and moderately high on south aspects. The potential productivity for northern red oak on the Litz soil is moderately high on both aspects. The estimated annual production of wood per acre on the Chiswell soil is 260 board feet on north aspects and 220 board feet on south aspects. The estimated annual production of wood per acre on the Litz soil is 288 board feet on both north and south aspects. This map unit has few limitations for forestry management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are management concerns. This soil is managed for eastern white pine and Virginia pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock is a limitation on sites for septic tank absorption fields. Areas of better suited soils should be selected for this use. The depth to bedrock is a limitation on sites for dwellings, and the slope is an additional limitation affecting dwellings without basements. Ripping or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the limitations. The slope, the potential for frost action, and the depth to bedrock are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is VIe.

5E—Chiswell-Litz complex, 25 to 50 percent slopes. This map unit consists of steep and very steep, well drained soils on side slopes in the uplands. The Chiswell soil is shallow, and the Litz soil is moderately deep. Individual areas are irregular in shape. They range from 10 to 120 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Chiswell soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Chiswell soil are as follows—

Surface layer:
0 to 2 inches, dark brown channery silt loam

Subsoil:
2 to 12 inches, reddish brown very channery silt loam

Bedrock:
12 inches, mottled reddish brown, brown, and brownish yellow soft shale

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the very deep, well drained Groseclose, Shottower, and Thurmont soils. Groseclose soils are on adjacent upland side slopes. Shottower soils are on adjacent high stream terraces. Thurmont soils are on adjacent concave side slopes and along drainageways.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. A small acreage is used as pasture.

This map unit is not suited to cultivated crops. The erosion potential is a management concern. The slope limits the safe use of tillage equipment. The production of crops is reduced by the low available water capacity, the content of coarse fragments, low fertility, and the shallow rooting depth in the Chiswell soil.

This map unit is poorly suited to pasture. The slope limits the safe use of machinery. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, the prevention of overgrazing, deferred grazing, and applications of fertilizer help to maintain the production of the pasture. If the pasture is overgrazed, the runoff rate increases and erosion can become severe. Because these soils are droughty during part of the year, planting drought-tolerant species such as lespedeza and fescue improves the quality of the stand.

The potential productivity for northern red oak on the Chiswell soil is high on north aspects and moderately high on south aspects. The potential productivity for northern red oak on the Litz soil is moderately high on both aspects. The estimated annual production of wood per acre on the Chiswell soil is 260 board feet on north aspects and 220 board feet on south aspects. The estimated annual production of wood per acre on the Litz soil is 288 board feet on both north and south aspects. The slope is the main limitation for forestry management practices or logging operations. It limits the use of heavy logging equipment. The erosion potential and the seedling mortality rate are also management concerns. This map unit is managed for eastern white pine and Virginia pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock is a limitation on sites for septic tank absorption fields. Areas of better suited soils should be selected for this use. The depth to bedrock is a limitation on sites for dwellings, and the slope is an additional limitation affecting dwellings with basements. Ripping or constructing dwellings above the bedrock and landscaping with fill material help the overcome the depth to bedrock. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the limitations. The slope, the potential for frost action, and the depth to bedrock are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is VIIe.

6C—Chiswell-Litz-Urban land complex, 2 to 15 percent slopes. This map unit consists of gently sloping and strongly sloping, well drained soils on upland side slopes and summits and areas of Urban land. The Chiswell soil is shallow, and the Litz soil is moderately deep. Individual areas are irregular in shape. They range from 6 to 100 acres in size. The soils and areas of Urban land are so intermingled that it was not practical to map them separately. This map unit is about 35 percent Chiswell soil, 25 percent Litz soil, 22 percent Urban land, and 18 percent other soils.

The typical sequence, depth, and composition of the layers of the Chiswell soil are as follows—

Surface layer:
0 to 2 inches, dark brown channery silt loam

Subsoil:
2 to 12 inches, reddish brown very channery silt loam

Bedrock:
12 inches, mottled reddish brown, brown, and brownish yellow soft shale

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

The Urban land consists of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Groseclose, Shottower, and Thurmont soils. Groseclose soils are in landscape positions similar to those of the Chiswell and Litz soils. Shottower soils are on adjacent high stream terraces. Thurmont soils are on concave side slopes and along drainageways.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

The depth to bedrock and the slope are limitations on sites for septic tank absorption fields. The slope can be overcome by placing septic drain lines along the contour or locating areas of better suited soils. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome these limitations. Ripping or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope, the depth to bedrock, and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

A capability subclass is not assigned.

6D—Chiswell-Litz-Urban land complex, 15 to 35 percent slopes. This map unit consists of gently sloping and strongly sloping, well drained soils on upland side slopes and areas of Urban land. The Chiswell soil is shallow, and the Litz soil is moderately deep. Individual areas are irregular in shape. They range from 6 to 100 acres in size. The soils and Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 35 percent Chiswell soil, 25 percent Litz soil, 22 percent Urban land, and 18 percent other soils.

The typical sequence, depth, and composition of the layers of the Chiswell soil are as follows—

Surface layer:
0 to 2 inches, dark brown channery silt loam

Subsoil:
2 to 12 inches, reddish brown very channery silt loam

Bedrock:
12 inches, mottled reddish brown, brown, and brownish yellow soft shale

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

The Urban land consists of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Groseclose, Shottower, and Thurmont soils. Groseclose soils are in landscape positions similar to those of the Chiswell and Litz soils. Shottower soils are on adjacent high stream terraces. Thurmont soils are on concave side slopes and along drainageways.

Properties of the Chiswell soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

The depth to bedrock and the slope are limitations on sites for septic tank absorption fields. The slope can be overcome by placing septic drain lines along the contour or locating areas of better suited soils. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome these limitations. Ripping or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope, the depth to bedrock, and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

A capability subclass is not assigned.

7A—Clubcaf silt loam, 0 to 2 percent slopes, occasionally flooded. This soil is nearly level, very deep, and poorly drained. It is on flood plains along streams and rivers. Individual areas are long and winding. They range from about 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, very dark grayish brown silt loam

Subsoil:
9 to 27 inches, very dark grayish brown silt loam that has strong brown mottles
27 to 37 inches, very dark grayish brown silt loam that has strong brown mottles

Substratum:
37 to 55 inches, gray silty clay loam that has yellowish brown and very dark gray mottles
55 to 62 inches, dark grayish brown gravelly sandy loam that has yellowish brown mottles

Included with this soil in mapping are the very deep, well drained Combs, Derroc, and Speedwell soils and the very deep, moderately well drained Sindion soils. Combs, Sindion, and Speedwell soils are on higher rises on the flood plain than the Clubcaf soil. Derroc soils are adjacent to the stream channel. Included soils make up about 25 percent of the map unit.

Properties of the Clubcaf soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 18 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: 0 to 18 inches
Flooding: Occasional

Most areas of this soil are used for cultivated crops or hay. Some small areas are used as pasture or woodland.

This soil is poorly suited to cultivated crops. The seasonal high water table reduces the production level and restricts harvesting operations. The flooding occasionally damages crops and limits the use of machinery.

This soil is poorly suited to pasture. The wetness and the flooding are limitations. Establishing and maintaining a mixture of grasses and legumes are management concerns. Deferring grazing, controlling weeds, using

proper stocking rates, and applying fertilizer increase the productivity of pastures.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 277 board feet. Flooding and the seasonal high water table are limitations for forestry management practices or logging operations. This soil is managed for eastern white pine. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production.

Flooding and wetness are limitations on sites for septic absorption fields and for dwellings. Areas of better suited soils should be selected for these uses. Flooding, the wetness, and the low strength are limitations for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. Providing a suitable subgrade or base material helps to prevent the damage caused by the low strength and wetness.

The capability subclass is IVw.

8A—Combs loam, 0 to 2 percent slopes, occasionally flooded. This soil is nearly level, very deep, and well drained. It is on flood plains along streams and rivers. Individual areas are long and winding. They range from about 10 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 18 inches, dark brown loam

Subsoil:
18 to 72 inches, dark yellowish brown loam

Included with this soil in mapping are the very deep, well drained Derroc, Speedwell, and Wheeling soils; the very deep, moderately well drained Sindion soils; and the very deep, poorly drained Clubcaf soils. Clubcaf, Derroc, and Sindion soils are in slight depressions and channel scours on the flood plain. Speedwell soils are in landscape positions similar to those of the Combs soil. Wheeling soils are on low terraces that are adjacent to streams and flood plains. Also included are soils that have a gravelly surface layer. Included soils make up 25 percent of the map unit.

Properties of the Combs soil—

Permeability: Moderate or moderately rapid
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 60 inches
Organic matter content: Moderate or high
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional

Most areas of this soil are used for pasture or hay (fig. 5). Some small areas are used for cultivated crops or woodland.

This soil is well suited to cultivated crops. The flooding occasionally interferes with harvesting or planting activities. Conservation tillage conserves moisture and helps to control erosion.

This soil is well suited to pasture. Deferred grazing, pasture rotation, proper stocking rates, and applications of fertilizer increase the productivity of pastures.

The potential productivity for yellow-poplar is very high. The estimated annual production of wood per acre is 721 board feet. Plant competition is a management concern. This soil is managed for eastern white pine, black walnut, and yellow-poplar. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production.

Flooding is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of better suited soils should be selected for these uses.

The capability subclass is I.

9B—Cotaco loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on low stream terraces and colluvial benches. Individual areas are long and wide. They range from 6 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown loam

Subsurface layer:
4 to 11 inches, dark yellowish brown loam

Subsoil:
11 to 17 inches, yellowish brown loam
17 to 26 inches, yellowish brown loam that has light olive brown, strong brown, and grayish brown mottles
26 to 50 inches, mottled light olive brown, grayish brown, strong brown, and yellowish brown loam

Substratum:
50 to 63 inches, mottled yellowish brown, grayish brown, light olive brown, and strong brown very gravelly loam

Figure 5.—A tall fescue and orchardgrass pasture in an area of Combs loam, 0 to 2 percent slopes, occasionally flooded, along the Roanoke River.

Included with this soil in mapping are the very deep, well drained Allegheny and Wheeling soils; the very deep, poorly drained Purdy soils; and the very deep, moderately well drained Zoar soils. Allegheny and Wheeling soils are on more convex slopes than the Cotaco soil. Purdy and Zoar soils are in slight depressions. Also included are some areas of soils that have a cobbly surface layer. Included soils make up about 25 percent of the map unit.

Properties of the Cotaco soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Moderate

Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 30 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture.

This soil is well suited to cultivated crops. The seasonal high water table can restrict or delay tillage and harvesting activities. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes increase the content of organic matter, maintain tilth, reduce the runoff rate, and help to control erosion.

This soil is well suited to hay and pasture. Preventing overgrazing, deferring grazing, and using lime and fertilizer to offset the acidity and low natural fertility increase the production of feed and forage and help to control erosion. If the pasture is overgrazed, the runoff rate increases and erosion can become severe. The seasonal high water table can restrict or delay haying operations or can reduce the production of crops.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 543 board feet. The seasonal high water table can limit the use of heavy logging equipment. This soil is managed for eastern white pine and yellow-poplar. Seeds and seedlings survive and grow well if competing vegetation is controlled.

Wetness is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of better suited soils or included areas of well drained soils should be selected for these uses.

The capability subclass is IIe.

9C—Cotaco loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and moderately well drained. It is on low stream terraces and colluvial benches. Individual areas are long and narrow. They range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown loam

Subsurface layer:
4 to 11 inches, dark yellowish brown loam

Subsoil:
11 to 17 inches, yellowish brown loam
17 to 26 inches, yellowish loam that has light olive brown, strong brown, and grayish brown mottles
26 to 50 inches, mottled light olive brown, grayish brown, strong brown, and yellowish brown loam

Substratum:
50 to 62 inches, mottled yellowish brown, grayish brown, light olive brown, and strong brown very gravelly loam

Included with this soil in mapping are the very deep, well drained Allegheny and Wheeling soils; the very deep, poorly drained Purdy soils; and the very deep, moderately well drained Zoar soils. Allegheny and Wheeling soils are on more convex slopes than the Cotaco soil. Purdy and Zoar soils are in slight depressions. Also included are some areas of soils that have a cobbly surface layer. Included soils make up about 20 percent of the map unit.

Properties of the Cotaco soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 30 inches
Flooding: None

Most areas of this soil are used for cultivated crops or pasture. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. The seasonal high water table can restrict or delay tillage and harvesting activities. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes increase the content of organic matter, maintain tilth, reduce the runoff rate, and help to control erosion.

This soil is well suited to hay and pasture. Preventing overgrazing, deferring grazing, and using lime and fertilizer to offset the acidity and low natural fertility increase the production of feed and forage and help to control erosion. If the pasture is overgrazed, the runoff rate increases and erosion can become severe. The seasonal high water table can restrict or delay haying operations or can reduce the production of crops.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 543 board feet. The seasonal high water table can limit the use of logging heavy equipment. This soil is managed for eastern white pine and yellow-poplar. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The wetness is a limitation on sites for septic tank absorption fields. Areas of better suited soils or included areas of well drained soils should be selected for this

use. The slope and the wetness are limitations on sites for dwellings. Land shaping and using special designs that conform to the natural shape of the land help to overcome the slope. The wetness can be overcome by installing foundation drains, sealing foundations, or locating included areas of better drained soils. The slope and the wetness are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by wetness.

The capability subclass is IIIe.

10D—Dekalb channery sandy loam, 15 to 35 percent slopes. This soil is moderately steep and steep, moderately deep, and well drained. It is on upland side slopes and summits. Slopes are rough and complex. They are 200 to 500 feet long. Individual areas are long and winding. They range from 15 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included with this soil in mapping are the well drained, moderately deep Berks soils; the well drained, shallow Sylvatus and Weikert soils; and the well drained, very deep Tumbling soils. Berks, Sylvatus, and Weikert soils are in landscape positions similar to those of the Dekalb soil. Tumbling soils are on lower colluvial foot slopes and side slopes. Also included are areas of rock outcrop, very stony soils, and soils that have slopes of less than 25 percent. Included areas make up about 20 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture or for homesite development.

This soil is not suited to cultivated crops. The erosion potential is a management concern. The rock fragments in the surface layer can damage tillage equipment and interfere with planting. The low available water capacity, the high acidity, the low natural fertility, and the moderate rooting depth reduce the production of crops.

This soil is poorly suited to pasture and hay. The low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the productivity and carrying capacity of pastures.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet on north aspects and 177 board feet on south aspects. The equipment limitation and seedling mortality resulting from the low available water capacity are management concerns. This soil is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock, the slope, and the rapid permeability are limitations on sites for septic tank absorption fields. Areas of deeper soils or areas that are not as steep should be selected for this use. The depth to bedrock and the slope are limitations on sites for dwellings. Constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Land shaping and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the large stones, and the depth to bedrock are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. The large stones should be removed during road construction in order to provide a suitable base. Blasting or designing the grades and locations of roads to avoid the removal of

bedrock help to overcome the depth to bedrock.

The capability subclass is VIe.

11C—Dekalb channery sandy loam, 7 to 15 percent slopes, very stony. This soil is strongly sloping, moderately deep, and well drained. It is on upland side slopes and summits. Slopes are rough and complex. They are about 200 to 700 feet long. Individual areas are long and winding. They range from 6 to 50 acres in size. Stones range from 1 foot to 1½ feet in diameter. They cover 0.1 to 3 percent of the surface.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included with this soil in mapping are the well drained, moderately deep Berks soils; the well drained, shallow Sylvatus and Weikert soils; and the well drained, very deep Tumbling soils. Berks, Sylvatus, and Weikert soils are in landscape positions similar to those of the Dekalb soil. Tumbling soils are on lower colluvial foot slopes and side slopes. Also included are areas of rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The stones on the surface make tillage very difficult or nearly impossible. The low available water capacity, the high acidity, the low natural fertility, and the moderate rooting depth reduce the production of crops.

This soil is poorly suited to pasture and hay. The stones on the surface restrict the use of machinery. The low available water capacity, the high acidity, and the low natural fertility reduce the production of crops. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the productivity and carrying capacity of pastures.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet. The survival and growth of seeds and seedlings are limited by the low available water capacity and the low natural fertility. This soil is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock and the rapid permeability are limitations on sites for septic tank absorption fields. Areas of deeper soils should be selected for this use. The depth to bedrock is a limitation on sites for dwellings. Locating areas of deeper soils or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope, the large stones, and the depth to bedrock are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. The large stones should be removed during road construction in order to provide a suitable base. Blasting or designing the grades and locations of roads to avoid the removal of bedrock help to overcome the depth to bedrock.

The capability subclass is VIs.

11D—Dekalb channery sandy loam, 15 to 35 percent slopes, very stony. This soil is strongly sloping, moderately deep, and well drained. It is on upland side slopes and summits. Slopes are rough and complex. They are about 200 to 700 feet long. Individual areas are long and winding. They range from 15 to 100 acres in size. Stones are 1 foot to 1½ feet in diameter. They cover 0.1 to 3 percent of the surface.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included with this soil in mapping are the well drained, moderately deep Berks soils; the well drained, shallow Sylvatus and Weikert soils; and the well drained, very deep Tumbling soils. Berks, Sylvatus, and Weikert soils are in landscape positions similar to those of the Dekalb soil. Tumbling soils are on lower colluvial foot slopes and side slopes. Also included are areas of rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The stones on the surface make tillage very difficult or nearly impossible. The low available water capacity, the high acidity, the low natural fertility, and the moderate rooting depth reduce the production of crops.

This soil is not suited to pasture and hay. The stones on the surface restrict the use of machinery and harvesting equipment. The low available water capacity, the high acidity, and the low natural fertility restrict the establishment and maintenance of a desirable mixture of grasses and legumes.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet on north aspects and 177 board feet on south aspects. The slope is a limitation for some forestry management practices or logging operations. The low available water capacity and the low natural fertility are limitations for the survival of seeds and seedlings and for the growth of trees. This soil is managed Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock, the slope, and the rapid permeability are limitations on sites for septic tank absorption fields. Areas of deeper soils or areas that are not as steep should be selected for this use. The depth to bedrock and the slope are limitations on sites for dwellings. Locating areas of deeper soils or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIs.

11E—Dekalb channery sandy loam, 35 to 60 percent slopes, very stony. This soil is steep and very steep, moderately deep, and well drained. It is commonly on upland side slopes. Slopes are rough and complex. They are about 200 to 700 feet long. Individual areas are long and winding. They range from 15 to 170 acres in size. Stones are 1 foot to 1½ feet in diameter. They cover 0.1 to 3 percent of the surface.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included with this soil in mapping are the well drained, moderately deep Berks soils; the well drained, shallow Sylvatus and Weikert soils; and the well drained, very deep Tumbling soils. Berks, Sylvatus, and Weikert soils are in landscape positions similar to those

of the Dekalb soil. Tumbling soils are on lower colluvial foot slopes and side slopes. Also included are areas of rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are used as woodland.

This soil is not suited to cultivated crops. The stones on the surface make the use of machinery for tillage operations impractical. The slope limits the safe use of machinery.

This soil is poorly suited to pasture and hay. The stones on the surface, the slope, the low available water capacity, the high acidity, and the low natural fertility restrict the establishment and maintenance of a desirable mixture of grasses and legumes. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the productivity and carrying capacity of pastures.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet on north aspects and 177 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are management concerns. This soil is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock, the slope, and the rapid permeability are limitations on sites for septic tank absorption fields. Areas of deeper soils or areas that are not as steep should be selected for this use. The depth to bedrock and the slope are limitations on sites for dwellings. Locating areas of deeper soils or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIs.

11F—Dekalb channery sandy loam, 60 to 80 percent slopes, very stony. This soil is steep and very steep, moderately deep, and well drained. It is commonly on side slopes in the uplands. Slopes are rough and complex. They are 200 to 700 feet long. Individual areas are long and winding. They range from 60 to 200 acres in size. Stones are 1 foot to 1½ feet in diameter. They cover 0.1 to 3 percent of the surface.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included with this soil in mapping are the well drained, moderately deep Berks soils and the well drained, shallow Sylvatus and Weikert soils. Berks, Sylvatus, and Weikert soils are in landscape positions similar to those of the Dekalb soil. Also included are areas of rock outcrop. Included areas make up about 15 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are used as woodland.

This soil is not suited to cultivated crops. The stones on the surface and the slope make tillage nearly impossible.

This soil is not suited to pasture and hay. The stones on the surface, the slope, the low available water

capacity, high acidity, and low natural fertility reduce the production of feed and forage. It is impractical to apply such pasture management practices as seeding, liming, fertilizing, or weed control to this soil.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet on north aspects and 177 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are management concerns. This soil is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock, the slope, and the rapid permeability are limitations on sites for septic tank absorption fields. Areas of deeper soils or areas that are not as steep should be selected for this use. The depth to bedrock and the slope are limitations on sites for dwellings. Locating areas of deeper soils or constructing dwellings above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIe.

12F—Dekalb-Rock outcrop complex, 25 to 80 percent slopes. This map unit consists of the steep and very steep, moderately deep, well drained Dekalb soil and areas of Rock outcrop. It is on upland side slopes and summits. Individual areas range from 15 to 200 acres in size. Slopes are rough and complex. The Dekalb soil and the Rock outcrop occur as areas so intermingled that it was not practical to map them separately. This map unit is about 55 percent Dekalb soil, 25 percent Rock outcrop, and 20 percent other soils. Areas of exposed bedrock cover 10 to 25 percent of the surface.

The typical sequence, depth, and composition of the layers of the Dekalb soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery sandy loam

Subsurface layer:
2 to 5 inches, brown channery sandy loam

Subsoil:
5 to 21 inches, yellowish brown very channery sandy loam

Substratum:
21 to 25 inches, yellowish brown very channery sandy loam

Bedrock:
25 inches, hard grayish brown sandstone bedrock

Included in mapping are the moderately deep, excessively drained Peaks soils and the shallow, well drained Sylvatus and Weikert soils. Peaks, Sylvatus, and Weikert soils are on side slopes in lower positions on the landscape than the Dekalb soil. Included soils make up about 15 percent of the map unit.

Properties of the Dekalb soil—

Permeability: Rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this map unit are used as woodland.

This map unit is not suited to cultivated crops. The rock outcrop and the slope make cultivation impractical.

This map unit is not suited to pasture and hay. The slope, the low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. It is impractical to apply such pasture management practices as seeding, liming, fertilizing, and weed control to areas of this map unit.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 190 board feet on north aspects and 177 board feet on south aspects. The slope, the Rock outcrop, the erosion potential, the equipment limitation, and the seedling mortality rate are management concerns. This soil is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock, the Rock outcrop, the rapid permeability, and the slope are limitations on sites for septic tank absorption fields. Using special designs that conform to the natural shape of the land and locating areas that are not as steep help to overcome the slope. Locating included areas of deeper soils, constructing dwellings above the bedrock, or blasting and landscaping with fill material help to overcome the depth to bedrock. The slope and the Rock outcrop are

limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Blasting or designing the grades and locations of roads to avoid the removal of bedrock help to overcome the depth to bedrock.

The capability subclass is VIIs.

13A—Derroc cobbly sandy loam, 0 to 4 percent slopes, occasionally flooded. This soil is nearly level, very deep, and well drained. It is on flood plains along major streams and rivers. Individual areas are long and winding. They range from about 10 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, very dark grayish brown cobbly sandy loam

Subsoil:
4 to 14 inches, dark brown cobbly sandy loam
14 to 31 inches, dark brown very cobbly sandy loam

Substratum:
31 to 65 inches, dark yellowish brown extremely cobbly loamy sand

Included with this soil in mapping are the very deep, well drained Allegheny, Combs, and Speedwell soils; the very deep, poorly drained Clubcaf soils; and the very deep, moderately well drained Sindion soils. Allegheny soils are on adjacent stream terraces. Combs and Speedwell soils are on the higher rises on the flood plain. Sindion and Clubcaf soils are in slight depressions. Included soils make up 25 percent of the map unit.

Properties of the Derroc soil—

Permeability: Moderately rapid or rapid in the subsoil, rapid or very rapid in the substratum
Available water capacity: Low
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional

Most areas of this soil are used for pasture or hay. Some areas are used as woodland. A small acreage is used for cultivated crops.

This soil is moderately well suited to cultivated crops. The flooding occasionally damages crops and limits the use of machinery. Cobbles in the surface layer can damage tillage equipment and interfere with planting. The low available water capacity is a management concern. Conservation tillage, cover crops, and a crop rotation that includes grasses and legumes increase the content of organic matter, conserve moisture, and help to control erosion.

This soil is moderately well suited to pasture and hay. The low available water capacity, the high acidity, and the low natural fertility are management concerns. Establishing and maintaining a mixture of grasses and legumes are management concerns. Deferring grazing, controlling weeds, using proper stocking rates, and applying fertilizer increase the productivity of pastures.

The potential productivity for eastern white pine is extremely high. The estimated annual production of wood per acre is 919 board feet. This soil has no limitations for forestry management practices or logging operations. It is managed for eastern white pine and yellow-poplar. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production.

Flooding, the rapid permeability, and the large stones are limitations on sites for septic tank absorption fields. The flooding and the large stones are limitations on sites for dwellings. Areas of better suited soils should be selected for these uses. The flooding and the large stones are limitations for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. The large stones should be removed in order to provide a suitable base for roads.

The capability subclass is IIIs.

14—Dumps. This miscellaneous area consists of open excavations that were filled with waste material and were later covered with soil material. Individual areas are irregular in shape. They range from 20 to 30 acres in size.

Some areas of Dumps do not have a vegetative cover. Other areas have been reclaimed and are currently used as sites for recreational parks. The characteristics of Dumps are so variable that onsite investigation is needed to determine the potential of an area for any use.

A capability subclass is not assigned.

15C—Edgemont channery sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on summits, shoulders, and side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are long and narrow or are irregular in shape. They range from 15 to 45 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsurface layer:
2 to 6 inches, pale brown channery sandy loam

Subsoil:
6 to 19 inches, light yellowish brown loam
19 to 27 inches, brownish yellow and reddish yellow loam
27 to 38 inches, strong brown clay loam that has brownish yellow and yellowish red mottles

Substratum:
38 to 49 inches, strong brown clay loam that has yellowish red and very pale brown mottles
49 to 62 inches, strong brown loam that has yellowish red and gray mottles

Included with this soil in mapping are the very deep, well drained Evard, Hayesville, and Thurmont soils. Evard and Hayesville soils are on adjacent upland side slopes. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Also included are soils that have stones on the surface and areas of rock outcrop. Included areas make up about 25 percent of the map unit.

Properties of the Edgemont soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour stripcropping, terraces, cover crops, grassed waterways, and a crop rotation that includes grasses and legumes are conservation practices that reduce the runoff rate, increase the water infiltration rate, help to control erosion, and increase the productivity of cultivated areas.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility are limitations for the establishment of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Conservation practices that increase feed and forage production include preventing overgrazing, cutting grasses and legumes for hay at the proper stage of growth, using proper stocking rates, and using a system of rotation grazing or deferred grazing.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 260 board feet. This soil has no significant limitations for forestry management practices or logging operations. It is managed for Virginia pine, eastern white pine, Scotch pine, and yellow-poplar. Selective cutting, thinning stands, and removing diseased or insect-infested trees increase the potential for timber production. Constructing logging roads on the contour helps to control erosion.

The slope and the moderate permeability are limitations on sites for septic tank absorption fields. Placing the septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

15D—Edgemont channery sandy loam, 15 to 35 percent slopes. This soil is moderately steep and steep, very deep, and well drained. It is on side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and are irregular in shape. They range from 15 to 80 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsurface layer:
2 to 6 inches, pale brown channery sandy loam

Subsoil:
6 to 19 inches, light yellowish brown loam
19 to 27 inches, brownish yellow and reddish yellow loam
27 to 38 inches, strong brown clay loam that has brownish yellow and yellowish red mottles

Substratum:
38 to 49 inches, strong brown clay loam that has yellowish red and very pale brown mottles

49 to 62 inches, strong brown loam that has yellowish red and gray mottles

Included with this soil in mapping are the moderately deep, well drained Dekalb soils; the moderately deep, excessively drained Peaks soils; and the very deep, well drained Evard, Hayesville, and Thurmont soils. Dekalb and Peaks soils are in positions on the landscape higher than those of the Edgemont soil. Evard and Hayesville soils are on adjacent upland side slopes. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Also included are soils that have stones on the surface and areas of rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Edgemont soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is not suited to cultivated crops. The erosion potential is high.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of a desirable mixture of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Conservation practices that increase feed and forage production include proper stocking rates and using a system of rotation grazing or deferred grazing.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 268 board feet on north aspects and 234 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and plant competition are management concerns on north aspects. This soil is managed for Virginia pine, eastern white pine, and yellow-poplar. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduce the runoff rate and help to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIe.

15E—Edgemont channery sandy loam, 35 to 60 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and wide or are irregular in shape. They range from 20 to about 80 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark gray channery sandy loam

Subsurface layer:
2 to 6 inches, pale brown channery sandy loam

Subsoil:
6 to 19 inches, yellowish brown loam
19 to 27 inches, brownish yellow and reddish yellow loam
27 to 38 inches, strong brown, brownish yellow, and yellowish red clay loam

Substratum:
38 to 49 inches, strong brown clay loam that has yellowish red and very pale brown mottles
49 to 62 inches, strong brown loam that has yellowish red and gray mottles

Included with this soil in mapping are the moderately deep, well drained Dekalb soils; the moderately deep, excessively drained Peaks soils; and the very deep, well drained Evard and Hayesville soils. Dekalb and Peaks soils are in positions on the landscape higher than those of the Edgemont soil. Evard and Hayesville soils are on adjacent upland side slopes. Also included are soils that have stones on the surface and areas that have boulders and rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Edgemont soil—

Permeability: Moderate or moderately rapid
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low

Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of tillage equipment.

This soil is poorly suited to pasture and hay. The slope, the high acidity, and the low natural fertility restrict the establishment of a desirable mixture of grasses and legumes. Applications of lime and fertilizer, deferred grazing, and proper stocking rates increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 268 board feet on north aspects and 234 board feet on south aspects. Management concerns include the erosion potential, the equipment limitation, and the seedling mortality rate on south aspects. This soil is managed for eastern white pine, Virginia pine, and Scotch pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIe.

16B—Edneyville fine sandy loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on summits and shoulders in the Blue Ridge. Slopes are smooth. Individual areas are generally long and narrow or are irregular in shape. They range from 16 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown fine sandy loam

Subsurface layer:
1 to 4 inches, yellowish brown sandy loam

Subsoil:
4 to 31 inches, yellowish brown sandy loam

Substratum:
31 to 62 inches, yellowish brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Evard and Thurmont soils and the moderately deep, excessively drained Peaks soils. Evard soils are in lower positions on mountain side slopes than the Edneyville soil. Peaks soils are in landscape positions similar to those of the Edneyville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Included areas make up about 20 percent of the map unit.

Properties of the Edneyville soil—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Slight
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for cultivated crops or pasture. A small acreage is used for orchards.

This soil is well suited to cultivated crops. The erosion potential is slight. Conservation tillage, contour stripcropping, cover crops, grassed waterways, and a crop rotation that includes grasses and legumes are conservation practices that reduce the runoff rate, increase the water infiltration rate, help to control erosion, and increase the productivity of cultivated areas.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of a desirable mixture of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Management practices that help to maintain the production of feed and forage include cutting grasses and legumes for hay at the proper stage of growth, proper stocking rates, rotation grazing, and deferred grazing.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has no significant limitations for forestry management practices or logging operations. It is managed for Scotch pine, eastern white pine, and yellow-poplar. Selective cutting, thinning stands, and removing diseased or insect-infested trees increase the potential for timber production.

The potential for frost action is a limitation for local

roads and streets. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIe.

16C—Edneyville fine sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on uplands in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and narrow or are irregular in shape. They range from 15 to 45 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown fine sandy loam

Subsurface layer:
1 to 4 inches, yellowish brown fine sandy loam

Subsoil:
4 to 31 inches, yellowish brown sandy loam

Substratum:
31 to 62 inches, yellowish brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Evard, Hayesville, and Thurmont soils and the moderately deep, excessively drained Peak soils. Evard and Hayesville soils are on side slopes in lower positions on the landscape than the Edneyville soil. Peaks soils are in landscape positions similar to those of the Edneyville soil. Thurmont soils are on adjacent colluvial side slopes and stream terraces. Also included are soils that have stones on the surface and small areas of granite rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Edneyville soil—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, stubble mulching, contour stripcropping, cover crops, grassed waterways, and a crop rotation that includes grasses and legumes are conservation practices that reduce the runoff rate, increase the water infiltration rate, help to control erosion, and increase the productivity of cultivated areas.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Cutting grasses and legumes at the proper stage of growth, proper stocking rates, rotation grazing, and deferred grazing increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has no limitations for forestry management practices or logging operations. It is managed for Scotch pine, eastern white pine, and yellow-poplar. Selective cutting, thinning stands, and removing diseased or insect-infested trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings. Placing septic drain lines along the contour, grading, land shaping, and designing dwellings so that they conform to the natural shape of the land help to overcome the slope. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IVe.

16D—Edneyville fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on uplands in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and irregular in shape. They range from 15 to 60 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown fine sandy loam

Subsurface layer:
1 to 4 inches, yellowish brown fine sandy loam

Subsoil:
4 to 31 inches, yellowish brown sandy loam

Substratum:
31 to 62 inches, yellowish brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Evard, Hayesville, and Thurmont soils and the moderately deep, excessively drained Peak soils. Evard and Hayesville soils are on side slopes in lower positions on the landscape than the Edneyville soil. Peaks soils are in landscape positions similar to those of the Edneyville soil. Thurmont soils are on adjacent colluvial side slopes and stream terraces. Also included are soils that have stones on the surface and small areas of granite rock outcrop. Included areas make up about 20 percent of the map unit.

Properties of the Edneyville soil—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour stripcropping, cover crops, grassed waterways, and a crop rotation that includes grasses and legumes are conservation practices that reduce the runoff rate, help to control erosion, and increase the productivity in cultivated areas.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Cutting grasses and legumes at the proper stage of growth, proper stocking rates, rotation grazing, and deferred grazing increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 280 board feet on north aspects and 250 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seedling mortality rate are management concerns. This soil is managed for Scotch pine, eastern white pine, and yellow-poplar. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIe.

16E—Edneyville fine sandy loam, 25 to 55 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on upland side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and wide or are irregular in shape. They range from 20 to about 100 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown fine sandy loam

Subsurface layer:
1 to 4 inches, yellowish brown fine sandy loam

Subsoil:
4 to 31 inches, yellowish brown sandy loam

Substratum:
31 to 62 inches, yellowish brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Evard soils and the moderately deep, excessively drained Peaks soils. Evard soils are on upland side slopes in lower positions on the landscape than the Edneyville soil. Peaks soils are in landscape positions similar to those of the Edneyville soil. Also included are soils that have stones on the surface and areas that have granite boulders and rock outcrop. Included areas make up to 20 percent of the map unit.

Properties of the Edneyville soil—

Permeability: Moderate
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is not suited to cultivated crops. The erosion potential is a management concern. The slope limits the use of tillage and harvesting equipment.

This soil is poorly suited to pasture and hay. The slope limits the safe operation of equipment. The high acidity and the low natural fertility restrict the establishment of grasses and legumes. Because of the physical properties of this soil, pasture management practices, such as seeding, applying lime and fertilizer, and controlling weeds, are impractical.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 280 board feet on north aspects and 250 board feet on south aspects. The slope is a limitation for some forestry management practices. The erosion potential and the seedling mortality rate on the south-facing slopes are management concerns. This soil is managed for Scotch pine, yellow-poplar, and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIe.

17C—Evard fine sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on summits, shoulders, and side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are generally long and narrow or are irregular in shape. They range from 6 to 35 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark brown fine sandy loam

Subsurface layer:
3 to 5 inches, yellowish brown fine sandy loam

Subsoil:
5 to 12 inches, strong brown sandy clay loam
12 to 31 inches, yellowish red sandy clay loam

Substratum:
31 to 44 inches, red, yellowish red, and very pale brown sandy clay loam
44 to 68 inches, strong brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Edneyville, Hayesville, and Thurmont soils. Edneyville soils are on adjacent side slopes in higher positions on the landscape than the Evard soil. Hayesville soils are in landscape positions similar to those of the Evard soil. Thurmont soils are on lower colluvial fans and foot slopes. Also included are soils that have stones on the surface. Included areas make up about 25 percent of the map unit.

Properties of the Evard soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

A moderate acreage of this map unit is used for cultivated crops, hay, and pasture. A small acreage is used for orchards. The remaining acreage is wooded.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Cutting grasses and legumes at the proper stage of growth, proper stocking rates, rotation grazing, and deferred grazing are conservation practices that help to maintain pastures in good condition.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 500 board feet. This soil has few limitations for forestry management practices or logging operations. It is managed for eastern white pine and yellow-poplar (fig. 6). Selective cutting, thinning stands, and removing diseased or insect-infested trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings. Placing septic drain lines along the contour, grading, land shaping, and using special designs that conform to the natural shape

Figure 6.—A Christmas tree plantation in an area of Evard fine sandy loam, 7 to 15 percent slopes. Edneyville soils and very stony Peaks soils are on higher mountain side slopes in the background.

of the land help to overcome the slope. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

17D—Evard fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas are long and irregular in shape. They range from 15 to 60 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark brown fine sandy loam

Subsurface layer:
3 to 5 inches, yellowish brown fine sandy loam

Subsoil:
5 to 12 inches, strong brown sandy clay loam

12 to 31 inches, yellowish red sandy clay loam

Substratum:
31 to 44 inches, red, yellowish red, and very pale brown sandy clay loam
44 to 68 inches, strong brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Edneyville and Hayesville soils and the moderately deep, excessively drained Peaks soils. Edneyville and Peaks soils are on adjacent side slopes in higher positions on the landscape than the Evard soil. Hayesville soils are in landscape positions similar to those of the Evard soil. Also included are soils that have stones on the surface. Included areas make up about 25 percent of the map unit.

Properties of the Evard soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture, hay, or orchards.

This soil is not suited to cultivated crops. The slope and the erosion potential are management concerns.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility restrict the establishment of grasses and legumes. Applications of lime and fertilizer reduce the acidity and increase the fertility. Cutting grasses and legumes at the proper stage of growth, proper stocking rates, rotation grazing, and deferred grazing maintain the production of feed and forage.

The potential productivity for yellow-poplar is high on north aspects and moderately high on south aspects. The estimated annual production of wood per acre is 500 board feet on north aspects and 480 board feet on south aspects. The slope is a limitation for some forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seeding mortality rate are management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIe.

17E—Evard fine sandy loam, 25 to 55 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on side slopes in the Blue Ridge. Slopes are smooth and complex. Individual areas of this soil are long and narrow or are irregular in shape. They range from 6 to 35 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark brown fine sandy loam

Subsurface layer:
3 to 5 inches, yellowish brown fine sandy loam

Subsoil:
5 to 12 inches, strong brown sandy clay loam
12 to 31 inches, yellowish red sandy clay loam

Substratum:
31 to 44 inches, red, yellowish red, and very pale brown sandy clay loam
44 to 68 inches, strong brown saprolite that crushes to sandy loam

Included with this soil in mapping are the very deep, well drained Edneyville, Hayesville, and Thurmont soils and the moderately deep, excessively drained Peaks soils. Edneyville and Peaks are on adjacent side slopes in higher positions on the landscape than the Evard soil. Hayesville soils are in landscape positions similar to those of the Evard soil. Thurmont soils are on lower concave foot slopes and stream terraces. Also included are areas of rock outcrop. Included areas make up about 25 percent of the map unit.

Properties of the Evard soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. Some areas are used for hay or pasture. A small acreage is used for orchards.

This soil is not suited for cultivated crops. The erosion potential is high. The slope limits the safe use of tillage equipment.

This soil is poorly suited to pasture and hay. The slope limits the safe use of safe use of machinery. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Applications of lime and fertilizer reduce the acidity and increase the fertility. Proper stocking rates help to maintain a desirable mixture of grasses and legumes. Rotation grazing and deferred grazing reduce erosion and maintain the production of feed and forage.

The potential productivity for yellow-poplar is high on north aspects and moderately high on south aspects. The estimated annual production of wood per acre is 500 board feet on north aspects and 480 board feet on south aspects. The slope is a limitation for some forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seedling mortality rate on south aspects are management concerns. This soil is managed for eastern white pine, yellow-poplar, and Scotch pine. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIe.

18B—Frederick silt loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are long and narrow or are irregular in shape. They range from 6 to 10 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Also included are soils that have a very gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 72 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for cultivated crops or pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and conserve moisture. The tilth is good. It can be maintained by incorporating organic matter into the soil.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, deferred grazing, and applications of lime and fertilizer increase the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 284 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of logging equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The permeability is a limitation on sites for septic tank absorption fields. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation on sites for dwellings. Reinforcing the footings

and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength and the shrink-swell potential are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome these limitations.

The capability subclass is IIe.

18C—Frederick silt loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are long and narrow or are irregular in shape. They range from 6 to 35 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Also included are soils that have a very gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for cultivated crops or pasture. Some areas are used as woodland.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion. The tilth is good. It can be maintained by incorporating organic matter into the soil.

This soil is well suited to pasture and hay (fig. 7). Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, deferred grazing, and applications of lime and fertilizer increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 284 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of logging equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets.

The capability subclass is IIIe.

18D—Frederick silt loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the

Figure 7.—A hay field in an area of Frederick silt loam, 7 to 15 percent slopes, in the Catawba Valley.

Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Also included are soils that have a very gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as pasture or woodland. Some areas are used for hay.

This soil is poorly suited to cultivated crops. The

erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion. The tilth is good. It can be maintained by incorporating organic matter into the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes are management concerns. Proper stocking rates, deferred grazing, and applications of lime and fertilizer increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 284 board feet on north aspects and 268 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The slope and the content of clay limit the use of equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and the shrink-swell potential.

The capability subclass is IVe.

19C—Frederick very gravelly silt loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are long and narrow or are irregular in shape. They range from 15 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown very gravelly silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for hay.

This soil is poorly suited to cultivated crops. The erosion potential is high. The gravel in the surface layer can damage tillage equipment and interfere with planting. Contour tillage, conservation tillage, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, pasture rotation, and deferred grazing help to control erosion and maintain the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 284 board feet. This soil has few limitations for forestry management practices or logging operations. The slope and the content of clay limit the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength and the shrink-swell potential are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential. Small stones in the surface layer are limitations on sites for lawns. Adding a layer of topsoil helps to overcome this limitation.

The capability subclass is IVs.

19D—Frederick very gravelly silt loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on upland side slopes. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 15 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown very gravelly silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for hay.

This soil is not suited to cultivated crops. The erosion potential is high. The gravel in the surface layer can damage tillage equipment and interfere with planting.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, pasture rotation, and deferred grazing help to control erosion and maintain the production of feed and forage.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 284 board feet on north aspects and 268 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The content of clay and the slope limit the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential. Small stones in the surface layer are limitations on sites for lawns. Adding a layer of topsoil helps to overcome this limitation.

The capability subclass is VIs.

19E—Frederick very gravelly silt loam, 25 to 40 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 6 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown very gravelly silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are used for woodland and pasture.

This soil is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of machinery. The gravel in the surface layer could damage tillage equipment and interfere with planting.

This soil is poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, pasture rotation, and deferred grazing help to control erosion and maintain the production of feed and forage.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 284 board feet on north aspects and 268 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The content of clay and the slope limit the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential. Small stones in the surface layer is a limitation on sites for lawns. Adding a layer of topsoil helps to overcome this limitation.

The capability subclass is VIIe.

20C—Frederick silt loam, 2 to 15 percent slopes, very rocky. This soil is gently sloping to strongly sloping, very deep, and well drained. It is on upland side slopes. Limestone outcrops make up about 2 to 10 percent of the surface area. Individual areas are irregular in shape. They range from 6 to 35 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Also included are soils that have a very gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High

Surface runoff: Rapid
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A few areas are used for hay.

This soil is not suited to cultivated crops. The rock outcrop interferes with the use of tillage equipment. In cultivated areas, conservation tillage and a crop rotation that includes grasses and legumes help to control runoff and erosion. Crop residue left on the surface or incorporated into the plow layer helps to maintain tilth and conserve moisture.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, rotation grazing, deferred grazing, and applications of lime and fertilizer increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 284 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay in the subsoil limits the use of equipment during periods of extreme wetness. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour helps to control erosion.

The permeability, the slope, and the rock outcrop are limitations on sites for septic tank absorption fields. Areas that contain rock outcrop should be avoided when installing septic drain lines. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The rock outcrop and the shrink-swell potential are limitations on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength, the shrink-swell potential, and the rock outcrop are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential. The rock outcrop can be overcome by blasting or by designing the grades and locations of roads to avoid the removal of bedrock.

The capability subclass is VIs.

20E—Frederick silt loam, 15 to 45 percent slopes, very rocky. This soil is moderately steep to very steep, very deep, and well drained. It is on upland side slopes. Limestone outcrops make up about 2 to 10 percent of the surface area. Individual areas are irregular in shape. They range from 6 to 200 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

Included with this soil in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Chilhowie and Opequon soils are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways. Also included are soils that have a very gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Very rapid
Soil reaction: Very strongly acid to moderately acid
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

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

This soil is not suited to cultivated crops. The rock outcrop and the slope interfere with tillage operations.

This soil is poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, rotation grazing, deferred grazing, and applications of lime and fertilizer

increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 284 board feet on north aspects and 268 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The slope and the rock outcrop limit the use of equipment. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the rock outcrop are limitations on sites for septic tank absorption fields. Areas that contain rock outcrop should be avoided when installing septic drain lines. Placing septic drain lines along the contour and grading help to overcome the slope. The rock outcrop, the slope, and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength, the shrink-swell potential, the slope, and the rock outcrop are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential. The rock outcrop can be overcome by blasting or by designing the grades and locations of roads to avoid the removal of bedrock.

The capability subclass is VIIe.

21C—Frederick-Urban land complex, 2 to 15 percent slopes. This map unit consists of the gently sloping and strongly sloping, very deep, and well drained Frederick soil and areas of Urban land. It is on upland summits and side slopes. Individual areas are about 6 to 90 acres in size. The Frederick soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Frederick soil, 35 percent Urban land, and 20 percent other soils.

The typical sequence, depth, and composition of the layers of the Frederick soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Also included are areas of Udorthents. Chilhowie and Opequon soils and Udorthents are landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength and the shrink-swell potential are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential.

A capability subclass is not assigned.

21D—Frederick-Urban land complex, 15 to 30 percent slopes. This map unit consists of the moderately steep and steep, very deep, and well drained Frederick soil and areas of Urban land. It is on upland side slopes. Individual areas range from about 10 to 90 acres in size. The Frederick soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Frederick soil, 35 percent Urban land, and 20 percent other soils.

The typical sequence, depth, and composition of the layers of the Frederick soil are as follows—

Surface layer:
0 to 12 inches, yellowish brown silt loam

Subsoil:
12 to 32 inches, yellowish red clay
32 to 72 inches, yellowish red clay that has reddish yellow mottles

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the well drained, moderately deep Chilhowie soils; the well drained, shallow Opequon soils; and the well drained, very deep Timberville soils. Also included are areas of Udorthents. Chilhowie and Opequon soils and Udorthents are in landscape positions similar to those of the Frederick soil. Timberville soils are at the heads of drainageways and along drainageways.

Properties of the Frederick soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 72 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

The slope is a limitation on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength and shrink-swell potential.

A capability subclass is not assigned.

22C—Gilpin loam, 7 to 15 percent slopes. This soil is strongly sloping, moderately deep, and well drained. It on convex, dissected uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 10 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, very dark grayish brown loam

Subsurface layer:
1 to 4 inches, brown loam

Subsoil:
4 to 11 inches, yellowish brown loam
11 to 18 inches, strong brown loam
18 to 29 inches, strong brown silty clay loam

Substratum:
29 to 39 inches, strong brown, brownish yellow, and pinkish gray gravelly silt loam

Bedrock:
39 inches, shale bedrock

Included with this soil in mapping are the well drained, moderately deep Berks and Sequoia soils and the well drained, shallow Weikert soils. Berks, Sequoia, and Weikert soils are in landscape positions similar to those of the Gilpin soil. Also included are soils that have stones on the surface. Included areas make up about 25 percent of the map unit.

Properties of the Gilpin soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A few small areas are used as pasture.

This soil is moderately well suited to cultivated crops. The low available water capacity and the high erosion potential are management concerns. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes help to maintain soil tilth, reduce the runoff rate, increase the water infiltration rate, control erosion, and increase the productivity.

This soil is well suited to pasture and hay. The low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and

forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the high acidity and the low natural fertility and increase the productivity and carrying capacity of the pasture.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 288 board feet. This soil has few limitations for most forestry management practices or logging operations. The plant competition is a management concern. This soil is managed for Virginia pine, Scotch pine, and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

Depth to bedrock is a limitation on sites for septic tank absorption fields. This limitation can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and using special designs that conform to the natural shape of the land help to overcome the slope. Ripping or building above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

22D—Gilpin loam, 15 to 25 percent slopes. This soil is moderately steep, moderately deep, and well drained. It on convex dissected uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 10 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, very dark grayish brown loam

Subsurface layer:
1 to 4 inches, brown loam

Subsoil:
4 to 11 inches, yellowish brown loam
11 to 18 inches, strong brown loam
18 to 29 inches, strong brown silty clay loam

Substratum:
29 to 39 inches, yellowish red, strong brown, brownish yellow, and pinkish gray gravelly silt loam

Bedrock:
39 inches, shale bedrock

Included with this soil in mapping are the well drained, moderately deep Berks and Sequoia soils and the well drained, shallow Weikert soils. Berks, Sequoia, and Weikert soils are in landscape positions similar to those of the Gilpin soil. Also included are small areas of soils that have stones on the surface. Included areas make up about 25 percent of the map unit.

Properties of the Gilpin soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is poorly suited to cultivated crops. The low available water capacity and the high erosion potential are management concerns. Conservation tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate, help to control erosion, and conserve moisture in cultivated areas.

This soil is moderately well suited to pasture and hay. The low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the high acidity and the low natural fertility and increase the productivity and carrying capacity of the pasture.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 288 board feet on the north-facing slopes and 265 board feet on the south-facing slopes. The equipment limitation, the seedling mortality rate, and the low available water capacity are management concerns. This soil is managed for Virginia pine, Scotch pine, and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock and the slope are limitations on sites for septic tank absorption fields. The depth to bedrock can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope is a limitation on sites for dwellings. Land shaping and using special designs that conform to the natural shape of the land help to overcome the slope. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is IVe.

23C—Grimsley cobbly loam, 8 to 15 percent slopes. This soil is strongly sloping, deep, and well drained. It is on upland colluvial fans and foot slopes. Slopes are smooth and are generally complex. Individual areas are elongated. They range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, very dark grayish brown cobbly loam

Subsoil:
4 to 9 inches, dark brown cobbly loam
9 to 21 inches, yellowish brown very cobbly loam
21 to 58 inches, strong brown very cobbly loam

Bedrock:
58 inches, shale

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Tumbling soils; and the well drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent uplands. Tumbling soils are in landscape positions similar to those of the Grimsley soil. Also included are soils that have a very stony surface and have slopes of less than 7 percent. Included areas make up about 25 percent of the map unit.

Properties of the Grimsley soil—

Permeability: Moderately rapid
Available water capacity: Low
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Erosion potential: Medium
Rooting depth: 40 to 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The erosion potential is a management concern. The cobbles and stones in the surface layer interfere with tillage operations.

This soil is poorly suited to pasture. The coarse fragments in the surface layer and the low available water capacity reduce the production of crops. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for yellow-poplar is moderately high. The estimated annual production of wood per acre is 500 board feet. This soil has few limitations for forestry management practices or logging operations. The plant competition is a management concern. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The depth to rock, the large stones, and the slope are limitations on sites for septic tank absorption fields. The depth to bedrock can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope and the large stones are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Included areas of deeper soils should be used for dwellings with basements. The slope and the large stones are limitations for local road and streets. Constructing roads on the contour helps to overcome the slope. The large stones should be removed during road construction in order to provide a suitable base for roads.

The capability subclass is VIs.

24C—Groseclose silt loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 6 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, dark brown silt loam

Subsoil:
9 to 18 inches, brown silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red and brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

Included with this soil in mapping are the well drained, moderately deep Chilhowie and Litz soils; the well drained, shallow Chiswell soils; and the well drained, very deep Shottower soils. Chiswell and Litz soils are in landscape positions similar to those of the Groseclose soil. Chilhowie soils are on adjacent upland side slopes. Shottower soils are on adjacent terraces. Also included are soils that have slopes of less than 7 percent. Included soils make up about 20 percent of the map unit.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for cultivated crops.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion. Applications of lime and fertilizer reduce the acidity and increase the fertility.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Practices that increase the productivity of pastures include proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 302 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay in the subsoil limits the use of harvesting equipment during periods of extreme wetness. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability is a limitation on sites for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The shrink-swell potential and the low strength are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome these limitations.

The capability subclass is IIIe.

24D—Groseclose silt loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 6 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, dark brown silt loam

Subsoil:
9 to 18 inches, brown silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

Included with this soil in mapping are the well drained, moderately deep Chilhowie and Litz soils; the well drained, shallow Chiswell soils; and the very deep, well drained Shottower soils. Litz and Chiswell soils are in landscape positions similar to those of the Groseclose soil. Chilhowie soils are on adjacent upland side slopes. Shottower soils are on adjacent terraces. Included areas make up about 20 percent of the map unit.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for woodland, pasture, or hay. A small acreage is used for cultivated crops.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, grassed waterways, contour stripcropping, and a crop rotation that includes grasses and legumes help to control runoff and erosion. Applications of lime and fertilizer decrease the acidity and increase the fertility.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Practices that increase the productivity of pastures include proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 302 board feet on north aspects and 280 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The content of clay in the subsoil and the slope limit the use of logging equipment during periods of extreme wetness. The plant competition and the seedling mortality rate on south-facing slopes are management concerns. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability and the slope are limitations on sites for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the shrink-swell potential, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome these limitations.

The capability subclass is IVe.

24E—Groseclose silt loam, 25 to 35 percent slopes. This soil is steep, very deep, and well drained. It is on uplands. Slopes are smooth and complex. Individual areas are irregular in shape. They range from 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, dark brown silt loam

Subsoil:
9 to 18 inches, brown silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

Included with this soil in mapping are the well drained, moderately deep Chilhowie and Litz soils; the well drained, shallow Chiswell soils; and the well drained, very deep Shottower soils. Litz and Chiswell soils are in landscape positions similar to those of the Groseclose soil. Chilhowie soils are on adjacent upland side slopes. Shottower soils are on adjacent terraces. Included soils make up about 25 percent of the map unit.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for woodland, pasture, or hay. A small acreage is used for homesite development.

This soil is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of tillage equipment.

This soil is poorly suited to pasture and hay. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Practices that increase the productivity of pastures include proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 302 board feet on north aspects and 280 board feet on south aspects. This soil has few

limitations for forestry management practices or logging operations. The content of clay in the subsoil and the slope limit the use of logging equipment during periods of extreme wetness. The plant competition and the seedling mortality rate on south aspects are management concerns. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability and the slope are limitations on sites for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the shrink-swell potential, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome these limitations.

The capability subclass is VIe.

25C—Groseclose-Litz complex, 2 to 15 percent slopes. This map unit consists of gently sloping and strongly sloping, well drained soils on upland side slopes and summits. Individual areas are irregular in shape. They range from 6 to 40 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Groseclose soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Groseclose soil are as follows—

Surface layer:
0 to 9 inches, dark brown gravelly silt loam

Subsoil:
9 to 18 inches, brown gravelly silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red and brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the well drained, shallow Chiswell soils and the well drained, very deep Shottower and Thurmont soils. Shottower soils are on high stream terraces. Chiswell soils are in landscape positions similar to those of the Groseclose and Litz soils. Thurmont soils are on concave side slopes and along drainageways. Also included are some areas of rock outcrop.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland or pasture. A small acreage is used for cultivated crops.

This map unit is moderately well suited to cultivated crops. The erosion potential is a management concern. The high acidity, the low natural fertility, and the high content of coarse fragments in the Litz soil reduce the production of crops. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion in cultivated

areas. Crop residue left on the surface or incorporated into the plow layer helps to conserve moisture.

This map unit is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to maintain the productivity of pastures and to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 302 board feet on the Groseclose soil and 288 board feet on the Litz soil. This map unit has few limitations for forestry management practices or logging operations. The seedling mortality rate is a management concern on the Litz soil. The content of clay in the subsoil limits the use of equipment on the Groseclose soil during periods of extreme wetness. This map unit is managed for eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability is a limitation for the use of the Groseclose soil as a site for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation for the use of the Groseclose soil as a site for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The shrink-swell potential and the low strength are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome these limitations.

The depth to bedrock is a limitation for the use of the Litz soil as a site for septic tank absorption fields. This limitation can be overcome by locating areas of better suited soils or locating included areas of deeper soils. The depth to bedrock is a limitation on sites for dwellings. The slope is an additional limitation on sites for dwellings without basements. Ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

25D—Groseclose-Litz complex, 15 to 25 percent slopes. This map unit consists of moderately steep, well drained soils on upland side slopes. Individual areas are irregular in shape. They range from 6 to 75 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Groseclose soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Groseclose soil are as follows—

Surface layer:
0 to 9 inches, dark brown gravelly silt loam

Subsoil:
9 to 18 inches, brown gravelly silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red and brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the well drained, shallow Chiswell soils and the well drained, very deep Shottower and Thurmont soils. Shottower soils are on high stream terraces. Chiswell soils are in landscape positions similar to those of the Groseclose and Litz soils. Thurmont soils are on concave side slopes and along drainageways. Also included are some areas of rock outcrop.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low

Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. Some areas are used as pasture.

This map unit is poorly suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, grassed waterways, cover crops, contour stripcropping, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion in cultivated areas.

This map unit is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major management concerns. Proper stocking rates, the prevention of overgrazing, deferred grazing, and applications of lime and fertilizer help to maintain the production of feed and forage. If the pasture is overgrazed, the runoff rate is high and erosion is severe.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre on the Groseclose soil is 302 board feet on north aspects and 280 board feet on south aspects. The estimated annual production of wood per acre on the Litz soil is 288 board feet on both north and south aspects. The slope is a limitation for some forestry management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are also management concerns. This map unit is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability and the slope are limitations for the use of the Groseclose soil as a site for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the shrink-swell potential, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome these limitations.

The depth to bedrock and the slope are limitations for the use of the Litz soil as a site for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or locating included areas of deeper soils. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help overcome the slope. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is IVe.

25E—Groseclose-Litz complex, 25 to 35 percent slopes. This map unit consists of steep, well drained soils on upland side slopes. Individual areas are irregular in shape. They range from 6 to 75 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Groseclose soil, 30 percent Litz soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Groseclose soil are as follows—

Surface layer:
0 to 9 inches, dark brown gravelly silt loam

Subsoil:
9 to 18 inches, brown gravelly silt loam
18 to 32 inches, brown silty clay loam
32 to 50 inches, yellowish red and brown silty clay

Substratum:
50 to 62 inches, yellowish red and brown silty clay loam

The typical sequence, depth, and composition of the layers of the Litz soil are as follows—

Surface layer:
0 to 5 inches, dark brown channery silt loam

Subsoil:
5 to 16 inches, brown very channery silt loam and strong brown silty clay loam

Substratum:
16 to 24 inches, strong brown very channery silt loam

Bedrock:
24 inches, hard gray and red shale

Included in mapping are the well drained, shallow Chiswell soils and the well drained, very deep Shottower and Thurmont soils. Shottower soils are on high stream terraces. Chiswell soils are in landscape positions similar to those of the Groseclose and Litz soils. Thurmont soils are on concave side slopes and along drainageways. Also included are some areas of rock outcrop.

Properties of the Groseclose soil—

Permeability: Slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, high in the subsoil
Depth to the seasonal high water table: More than 72 inches

Properties of the Litz soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. A small acreage is used as pasture.

This map unit is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of tillage equipment and machinery.

This map unit is poorly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are management concerns. Proper stocking rates, prevention of overgrazing, deferred grazing, and applications of lime and fertilizer help to maintain the production of feed and forage. If the pasture is overgrazed, the runoff rate is high and erosion is severe.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre on the Groseclose soil is 302 board feet on north aspects and 280 board feet on south aspects. The estimated annual production of wood per acre on the Litz soil is 288 board feet on both north and south aspects. The slope is the main limitation for some forestry management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are also management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The permeability and the slope are limitations for the use of the Groseclose soil as a site for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the shrink-swell potential, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome these limitations.

The depth to bedrock and the slope are limitations for the use of the Litz soil as a site for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIe.

26B—Hayesville fine sandy loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on uplands in the Blue Ridge. Individual areas are irregular in shape or are elongated. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are on adjacent mountain side slopes in higher positions on the landscape than the Hayesville soil. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Included areas make up about 20 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as pasture or hay. Some areas are used for cultivated crops or orchards.

This soil is well suited to cultivated crops. The erosion potential is a management concern. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate, increase the water infiltration rate, and help to control erosion in cultivated areas.

This soil is well suited to pasture and hay. Applications of lime and fertilizer reduce the acidity and increase the fertility. Establishing a desirable mixture of grasses and legumes is a management concern. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production. This soil is managed for yellow-poplar and eastern white pine.

The clayey subsoil is a limitation on sites for septic tank absorption fields. Excavating deeper and longer field lines increases the absorption area and minimizes the effects of the clayey subsoil. This soil has few limitations as a site for dwellings. The low strength and the potential for frost action are limitations for local roads and streets. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is IIe.

26C—Hayesville fine sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on summits and shoulders in the Blue Ridge. Individual areas are irregular in shape or are elongated. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Evard soils are in landscape positions similar to those of the Hayesville soil. Edneyville soils are on higher side slopes. Thurmont soils are on lower colluvial side slopes, foot slopes, and stream terraces. Included soils make up about 25 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches

Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as pasture. Some areas are used for cultivated crops or orchards.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate, help to control erosion, and increase the productivity of the soil.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of crops. Applications of lime and fertilizer reduce the acidity and increase the fertility. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage and reduce the erosion potential.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production. This soil is managed for yellow-poplar and eastern white pine. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the clayey subsoil are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the effects of the clayey subsoil. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the potential for frost action, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is IIIe.

26D—Hayesville fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on uplands in the Blue Ridge. Individual areas are elongated or are irregular in shape. They range from 6 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are on adjacent mountain side slopes in higher positions on the landscape than the Hayesville soil. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Included areas make up about 25 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as pasture or woodland. Some areas are used for hay or orchards.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is moderately well suited to pasture. Applications of lime and fertilizer reduce the acidity and increase the fertility. Establishing a desirable mixture of grasses and legumes is a management concern. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage and to control erosion.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the

seedling mortality rate are management concerns. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is IVe.

27C—Hayesville gravelly fine sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on upland side slopes and summits in the Blue Ridge. Individual areas are irregular in shape or are elongated. They range from 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown gravelly fine sandy loam

Subsurface layer:
4 to 8 inches, brown gravelly fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are on adjacent mountain side slopes in higher positions on the landscape than the Hayesville soil. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Included areas make up about 20 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for pasture, hay, or woodland. Some areas are used for cultivated crops or orchards.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. The coarse fragments in the surface layer interfere with tillage and seeding operations. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion in cultivated areas.

This soil is well suited to pasture and hay. Applications of lime and fertilizer reduce the acidity and increase the fertility. Establishing a desirable mixture of grasses and legumes is a management concern. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage and to control erosion.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. Thinning stands, selective cutting, and removing insect-infested or diseased trees increase the potential for timber production. This soil is managed for yellow-poplar and eastern white pine.

The slope and the clayey subsoil are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the effects of the clayey subsoil. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the potential for frost action, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is IVe.

27D—Hayesville gravelly fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on side slopes in the Blue Ridge. Individual areas are elongated or are irregular in shape. They range from 6 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown gravelly fine sandy loam

Subsurface layer:
4 to 8 inches, brown gravelly fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep Evard, Edneyville, and Thurmont soils. Evard soils are in landscape positions similar to those of the Hayesville soil. Edneyville soils are on higher side slopes. Thurmont soils are on lower colluvial side slopes and stream terraces. Also included are areas of soils that have stones and boulders on the surface and areas of rock outcrop. Included areas make up about 25 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. Some areas are used for pasture or orchards.

This soil is not suited to cultivated crops. The erosion potential is a management concern. Coarse fragments in the surface layer interfere with tillage and seeding operations.

This soil is moderately well suited to pasture. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and maintain the production of feed and forage.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seedling mortality rate are management concerns. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIe.

28E—Hayesville fine sandy loam, 25 to 50 percent slopes, very stony. This soil is steep and very steep, very deep, and well drained. It is on uplands in the Blue Ridge. Individual areas are irregular in shape. They range from 6 to 200 acres in size. Stones range from 10 to 24 inches in diameter. They are 3 to 25 feet apart.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are on adjacent mountain side slopes in higher positions on the landscape than the Hayesville soil. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces. Included areas make up about 25 percent of the map unit.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High

Surface runoff: High
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or orchards.

This soil is not suited to cultivated crops, hay, and pasture. The erosion potential is high. The slope and the surface stones limit the use of machinery.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 862 board feet. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seedling mortality rate are management concerns. This soil is managed for yellow-poplar and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope. The large stones should be removed during road construction in order to provide a suitable base for roads.

The capability subclass is VIIs.

29C—Hayesville-Urban land complex, 2 to 15 percent slopes. This map unit consists of the gently sloping and strongly sloping, very deep, well drained Hayesville soil and areas of Urban land. It is on summits and side slopes of the Blue Ridge. Individual areas range from about 6 to 40 acres in size. The Hayesville soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Hayesville soil, 30 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Hayesville soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are in adjacent positions on higher side slopes. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: High
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

A capability subclass is not assigned.

29D—Hayesville-Urban land complex, 15 to 30 percent slopes. This map unit consists of the moderately steep and steep, very deep, well drained Hayesville soil and areas of Urban land. It is on side slopes of the Blue Ridge. Individual areas range from about 6 to 40 acres in size. The Hayesville soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Hayesville soil, 30 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Hayesville soil are as follows—

Surface layer:
0 to 4 inches, dark brown fine sandy loam

Subsurface layer:
4 to 8 inches, brown fine sandy loam

Subsoil:
8 to 15 inches, strong brown loam
15 to 24 inches, yellowish red clay loam
24 to 43 inches, red clay
43 to 51 inches, red and yellowish red clay loam

Substratum:
51 to 61 inches, red, brownish yellow, and white sandy clay loam

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included with this soil in mapping are the very deep, well drained Evard, Edneyville, and Thurmont soils. Edneyville soils are on adjacent mountain side slopes in higher positions on the landscape than the Hayesville soil. Evard soils are in landscape positions similar to those of the Hayesville soil. Thurmont soils are on adjacent colluvial foot slopes and stream terraces.

Properties of the Hayesville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: High
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low to moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

A capability subclass is not assigned.

30C—Laidig fine sandy loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on colluvial fans and foot slopes and in concave heads of drainageways. Individual areas are long and winding or are rectangular in shape. They range from about 5 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, very dark grayish brown fine sandy loam

Subsurface layer:
6 to 13 inches, dark yellowish brown loam

Subsoil:
13 to 32 inches, yellowish brown loam
32 to 37 inches, yellowish brown, firm, brittle loam that has pale brown mottles
37 to 62 inches, yellowish brown, firm, brittle loam that has pale brown and dark brown mottles

Included with this soil in mapping are the well drained, moderately deep Berks, Dekalb, and Gilpin soils; the well drained, deep Grimsley soils; and the well drained, very deep Tumbling soils. Berks, Dekalb, and Gilpin soils are on adjacent uplands or on breaks of steeper slopes. Grimsley and Tumbling soils are in landscape positions similar to those of the Laidig soil. Also included are soils that are less than 30 inches deep over a fragipan. Included soils make up about 25 percent of the map unit.

Properties of the Laidig soil—

Permeability: Moderate above the fragipan, moderately slow or slow in the fragipan
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: Restricted by a fragipan at a depth of 30 to 50 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 30 to 48 inches in winter and early spring

Most areas of this soil are used as woodland. A small acreage is used for cultivated crops or pasture.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to hay and pasture. Overgrazing decreases the quality and quantity of forage and increases the runoff rate and the erosion potential. Deferred grazing and pasture rotation are management practices that increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of

wood per acre is 270 board feet. This soil has no limitations affecting forestry management practices or logging operations. It is managed for Virginia pine, yellow-poplar, and eastern white pine.

The slowly permeable subsoil and the seasonal high water table are limitations on sites for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of well drained soils. The slope and the seasonal high water table are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. If dwellings with basements are planned, the seasonal high water table can be overcome by installing foundation drains, sealing foundations, or locating included areas of better drained soils. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

30D—Laidig fine sandy loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on colluvial fans and foot slopes and in concave heads of drainageways. Individual areas are generally long and winding. They range from about 6 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, very dark grayish brown fine sandy loam

Subsurface layer:
6 to 13 inches, dark yellowish brown loam

Subsoil:
13 to 32 inches, yellowish brown loam
32 to 37 inches, yellowish brown, firm, brittle loam that has pale brown mottles
37 to 62 inches, yellowish brown, firm, brittle loam that has pale brown and dark brown mottles

Included with this soil in mapping are the well drained, moderately deep Berks, Dekalb, and Gilpin soils; the well drained, deep Grimsley soils; and the well drained, very deep Tumbling soils. Berks, Dekalb, and Gilpin soils are on adjacent uplands or on breaks of steeper slopes. Grimsley and Tumbling soils are in landscape positions similar to those of the Laidig soil. Also included are soils that are less than 30 inches deep over a fragipan. Included soils make up about 25 percent of the map unit.

Properties of the Laidig soil—

Permeability: Moderate above the fragipan, moderately slow or slow in the fragipan
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: Restricted by a fragipan at a depth of 30 to 50 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 30 to 48 inches in winter and early spring

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is moderately well suited to pasture and hay. Overgrazing reduces the quantity and quality of forage and increases the runoff rate and the erosion potential. Deferred grazing and pasture rotation are management practices that maintain the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 270 board feet on north aspects and 250 board feet on south aspects. This soil has few limitations for most forestry management practices or logging operations. It is managed for Virginia pine, yellow-poplar, and eastern white pine. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slowly permeable subsoil, the slope, and the seasonal high water table are limitations on sites for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of well drained soils. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is IVe.

31D—Laidig fine sandy loam, 15 to 25 percent slopes, very stony. This soil is moderately steep, very deep, and well drained. It is on colluvial fans, side slopes, and foot slopes. Stones are more than 10

inches in diameter. They are about 5 to 30 feet apart and cover 0.1 to 3 percent of the surface. Individual areas are oval or rectangular in shape. They range from about 5 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, very dark grayish brown fine sandy loam

Subsurface layer:
6 to 13 inches, dark yellowish brown fine sandy loam

Subsoil:
13 to 32 inches, yellowish brown loam
32 to 37 inches, yellowish brown, firm, brittle loam that has pale brown mottles
37 to 62 inches, yellowish brown, firm, brittle loam that has pale brown and dark brown mottles

Included with this soil in mapping are the well drained, moderately deep Berks and Dekalb soils; the well drained, deep Grimsley soils; and the well drained, very deep Tumbling soils. Berks and Dekalb soils are on adjacent uplands or on breaks of steeper slopes. Grimsley and Tumbling soils are in landscape positions similar to those of the Laidig soil. Also included are areas of soils that have fewer stones on the surface than the Laidig soil, areas of soils that have boulders on the surface, and areas of soils that are less than 30 inches deep over a fragipan. Included soils make up about 25 percent of the map unit.

Properties of the Laidig soil—

Permeability: Moderate above the fragipan, moderately slow or slow in the fragipan
Available water capacity: Low
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: Restricted by a fragipan at a depth of 30 to 50 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 30 to 48 inches in winter and early spring

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The stones on the surface and the slope make the use of machinery impractical for preparing seed beds and cultivating, spraying, or harvesting crops.

This soil is poorly suited to pasture and hay. The stones and the slope limit the use of machinery. Overgrazing reduces the quantity and quality of forage and increases the runoff rate and the erosion potential. Deferred grazing, pasture rotation, and proper stocking rates are management practices that increase the production of feed and forage and help to control erosion.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 270 board feet on north aspects and 250 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. It is managed for Virginia pine, yellow-poplar, and eastern white pine. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slowly permeable subsoil, the slope, and the seasonal high water table are limitations on sites for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of well drained soils. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIs.

32B—Macove gravelly silt loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on foot slopes and colluvial fans and benches. Individual areas are elongated. They range from 6 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, very dark grayish brown gravelly silt loam

Subsurface layer:
4 to 7 inches, yellowish brown gravelly silt loam

Subsoil:
7 to 15 inches, yellowish brown very gravelly silt loam
15 to 23 inches, brown very gravelly silt loam
23 to 36 inches, brown and yellowish red extremely gravelly loam
36 to 65 inches, brown and yellowish red extremely gravelly silt loam

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Shelocta soils; and the well

drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent upland side slopes in higher positions on the landscape than the Macove soil. Shelocta soils are on adjacent colluvial foot slopes. Included soils make up about 25 percent of the map unit.

Properties of the Macove soil—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for homesite development.

This soil is well suited to cultivated crops. The erosion potential is a management concern. The rock fragments in the surface layer can damage tillage equipment and hinder planting.

This soil is well suited to pasture and hay. The high acidity, the low natural fertility, and the high content of rock fragments in the surface layer reduce the production of feed and forage. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and maintain the production of feed and forage.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 520 board feet. This soil has no limitations for forestry management practices or logging operations. It is managed for eastern white pine, Virginia pine, and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The large stones are limitations on sites for septic tank absorption fields and dwellings and for local roads and streets. Excavating the large stones and backfilling with suitable material helps to overcome the limitation. The large stones should be removed during construction in order to provide a suitable base for foundations of dwellings or for roads.

The capability subclass is IIe.

32C—Macove gravelly silt loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on foot slopes and colluvial fans and benches. Individual areas are elongated. They range from 6 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, very dark grayish brown gravelly silt loam

Subsurface layer:
4 to 7 inches, yellowish brown gravelly silt loam

Subsoil:
7 to 15 inches, yellowish brown very gravelly silt loam
15 to 23 inches, brown very gravelly silt loam
23 to 36 inches, brown and yellowish red extremely gravelly loam
36 to 65 inches, brown and yellowish red extremely gravelly silt loam

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Shelocta soils; and the well drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent upland side slopes in higher positions on the landscape than the Macove soil. Shelocta soils are on adjacent colluvial foot slopes. Included soils make up about 25 percent of the map unit.

Properties of the Macove soil—

Permeability: Moderately rapid
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for homesite development.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Rock fragments in the surface layer can damage tillage equipment and hinder planting.

This soil is well suited to pasture and hay. The high acidity, the low natural fertility, and the high content of rock fragments in the surface layer reduce the production of feed and forage. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the

low natural fertility and maintain the production of feed and forage.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 520 board feet. This soil has no limitations for forestry management practices or logging operations. It is managed for eastern white pine, Virginia pine, and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The large stones are limitations on sites for septic tank absorption fields and dwellings and for local roads and streets. Excavating the large stones and backfilling with suitable material helps to overcome the limitation. The large stones should be removed during construction in order to provide a suitable base for foundations of dwellings or for roads.

The capability subclass is IIIe.

33E—Opequon-Rock outcrop complex, 15 to 35 percent slopes. This map unit consists of the strongly sloping to steep, shallow, well drained Opequon soil and outcrops of limestone bedrock. It is on upland side slopes. Individual areas are long and winding. They range from 10 to 35 acres in size. The Opequon soil and the Rock outcrop occur as areas so intermingled that it was not practical to map them separately. This map unit is about 55 percent Opequon soil, 25 percent Rock outcrop, and 20 percent other soils.

The typical sequence, depth, and composition of the layers of the Opequon soil are as follows—

Surface layer:
0 to 4 inches, dark brown silty clay loam

Subsoil:
4 to 17 inches, reddish brown clay

Bedrock:
17 inches, limestone

Included in mapping are the well drained, moderately deep Chilhowie soils and the well drained, very deep Frederick and Groseclose soils. Chilhowie, Frederick, and Groseclose soils are in landscape positions similar to those of the Opequon soil.

Properties of the Opequon soil—

Permeability: Moderately slow
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Erosion potential: High
Rooting depth: 12 to 20 inches
Organic matter content: Moderate
Shrink-swell potential: High
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. A few small areas have been cleared and are used as pasture.

This map unit is not suited to cultivated crops. The Rock outcrop and the slope make planting and harvesting crops impractical.

This map unit is poorly suited to pasture and hay. The slope and the Rock outcrop limit the use of machinery. The very firm, clayey subsoil, the shallow depth to bedrock, and the droughtiness during the growing season restrict the growth of some grasses and legumes. Grazing when the soil is too wet compacts the surface layer. Deferred grazing, proper stocking rates, pasture rotation, and applications of fertilizer and lime help to maintain the production of feed and forage and control erosion.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 204 board feet on north aspects and 188 board feet on south aspects. The slope and the Rock outcrop are limitations for forestry management practices or logging operations. The survival rate for seeds and seedlings is affected by droughtiness during the growing season. The windthrow hazard is severe because of the shallow rooting depth. The Rock outcrop and the slope limit the safe operation of heavy equipment. Cable operations or other alternative methods are required to harvest timber. This map unit is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The slope, the depth to bedrock, and the permeability are limitations on sites for septic tank absorption fields. Areas of better suited soils should be located for this use. The slope, the depth to bedrock, and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The depth to bedrock and the Rock outcrop can be overcome by locating included areas of deeper soils or by constructing above the bedrock and landscaping with fill material. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the depth to bedrock, the Rock outcrop, the shrink-swell potential, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. The Rock outcrop and the depth to bedrock can be overcome by blasting or by designing the grades

and locations of roads to avoid the removal of bedrock. Providing a suitable subgrade or base material helps to prevent the damage caused by shrinking and swelling or by low strength.

The capability subclass is VIIs.

34E—Peaks gravelly loam, 35 to 60 percent slopes, very stony. This soil is steep and very steep, moderately deep, and somewhat excessively drained. It is on upland side slopes in the Blue Ridge. Slopes are rough and complex and are about 200 to 500 feet long. Individual areas are wide and irregular. They range from 25 to 150 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown gravelly loam

Subsurface layer:
1 to 3 inches, yellowish brown gravelly loam

Subsoil:
3 to 13 inches, yellowish brown gravelly loam
13 to 24 inches, yellowish brown very gravelly loam

Substratum:
24 to 33 inches, yellowish brown very gravelly loam

Bedrock:
33 inches, moderately hard gneiss

Included with this soil in mapping are the well drained, moderately deep Dekalb soils; the well drained, very deep Edneyville, Evard, and Hayesville soils; and the well drained, shallow Sylvatus soils. Edneyville soils are in landscape positions similar to those of the Peaks soil. Dekalb and Sylvatus soils are on adjacent side slopes. Evard and Hayesville soils are on adjacent side slopes in lower positions on the landscape than the Peaks soil. Also included are areas of rock outcrop. Included areas make up about 25 percent of the map unit.

Properties of the Peaks soil—

Permeability: Rapid
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for pasture or apple orchards.

This soil is not suited to cultivated crops. The erosion potential is high. The slope and the surface stones limit the safe use of tillage equipment.

This soil is poorly suited to pasture and hay. The slope limits the safe operation of equipment. The low available water capacity, the high content of coarse fragments, the high acidity, and the low natural fertility restrict the establishment and maintenance of a desirable mixture of grasses and legumes. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the productivity and carrying capacity of the pasture.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 200 board feet on north aspects and 185 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The erosion potential is severe. The slope limits the use of equipment. Because of the low available water capacity, the seedling mortality rate is a management concern on south aspects. This soil is managed for eastern white pine and Virginia pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the permeability are limitations on sites for septic tank absorption fields. The slope and the depth to bedrock can be overcome by locating areas of better suited soils or included areas of deeper soils or soils that are not as steep. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. If dwellings with basements are planned, the depth to bedrock can be overcome by locating included areas of deeper soils. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIs.

34F—Peaks gravelly loam, 60 to 75 percent slopes, very stony. This soil is very steep, moderately deep, and somewhat excessively drained. It is on upland side slopes in the Blue Ridge. Slopes are rough and complex and are about 200 to 500 feet long. Individual areas are wide or are irregular in shape. They range from 25 to 200 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, dark brown gravelly loam

Subsurface layer:
1 to 3 inches, yellowish brown gravelly loam

Subsoil:
3 to 13 inches, yellowish brown gravelly loam
13 to 24 inches, yellowish brown very gravelly loam

Substratum:
24 to 33 inches, yellowish brown very gravelly loam

Bedrock:
33 inches, moderately hard gneiss

Included with this soil in mapping are the well drained, moderately deep Dekalb soils; the well drained, very deep Edneyville, Evard, and Hayesville soils; and the well drained, shallow Sylvatus soils. Edneyville soils are in landscape positions similar to those of the Peaks soil. Dekalb and Sylvatus soils are on adjacent side slopes. Evard and Hayesville soils are on adjacent side slopes in lower positions on the landscape than the Peaks soil. Also included are areas of rock outcrop. Included areas make up about 25 percent of the map unit.

Properties of the Peaks soil—

Permeability: Rapid
Available water capacity: Low
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The erosion potential is high. The slope and the surface stones limit the safe use of tillage equipment.

This soil is not suited to pasture and hay. The slope, the low available water capacity, the high content of coarse fragments, the high acidity, and the low natural fertility restrict the establishment of grasses and legumes. Because of the physical properties of this soil, pasture management practices, such as seeding, applying lime and fertilizer, and controlling weeds, are impractical.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre is 200 board feet on north aspects and 185 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The erosion potential is high. The slope limits the use of equipment. Because of the low available water capacity, the seedling mortality rate is a management concern on south aspects. This soil is managed for eastern white pine and Virginia pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the permeability are limitations on sites for septic tank absorption fields. The slope and the depth to bedrock can be overcome by locating areas of better suited soils, included areas of deeper soils, or included areas of soils that are not as steep. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. If dwellings with basements are planned, the depth to bedrock can be overcome by locating included areas of deeper soils. The slope is a limitation for local roads and streets. Constructing roads on the contour helps to overcome this limitation.

The capability subclass is VIIs.

35—Pits, quarries. This miscellaneous area consists of open excavations used for mining limestone and shale and piles of spoil from quarries. The materials mined from these areas are used for construction purposes. Individual areas are irregular in shape. They range from 6 to 70 acres in size. Most areas of pits have a nearly level floor or contain pools of water and have very steep side slopes.

Most areas of this unit do not have a vegetative cover, but some of the older areas have sparse stands of grasses, shrubs, and trees. The characteristics are so variable that onsite investigation is needed to determine the potential of an area for any use.

The capability subclass is VIIIs.

36A—Purdy silt loam, 0 to 4 percent slopes. This soil is deep, nearly level, and poorly drained. It is on broad low terraces. Slopes are smooth. Individual areas are irregular in shape. They range from 6 to 10 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 12 inches, grayish brown silt loam

Subsoil:
12 to 16 inches, gray silt loam
16 to 20 inches, gray silty clay loam
20 to 39 inches, gray silty clay

Substratum:
39 to 62 inches, gray silty clay loam

Included with this soil in mapping are the well drained, very deep Allegheny and Wheeling soils and the moderately well drained, very deep Cotaco and Zoar soils. Allegheny, Cotaco, and Zoar soils are in higher positions on the landscape than the Purdy soil. Wheeling soils are on terraces in lower positions on the landscape than the Purdy soil. Included areas make up about 15 percent of the map unit.

Properties of the Purdy soil—

Permeability: Very slow or slow
Available water capacity: High
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Moderate
Depth to the seasonal high water table: 0.5 inch to 12 inches

Areas of this soil are used for pasture and woodland.

Areas of this soil are poorly suited to cultivated crops. Crop production is limited by the seasonal wetness, which delays planting and harvesting. Yields can be increased by applications of lime and fertilizer.

This soil is moderately well suited to pasture and hay (fig. 8). The seasonal high water table reduces the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Deferring grazing during the wet periods prevents compaction of the surface layer.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 450 board feet. The seasonal high water table is a limitation for some forestry management practices or logging operations. The equipment limitation, the seedling mortality rate, and the windthrow hazard are management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The seasonal high water table and the permeability are limitations on sites for septic tank absorption fields. The seasonal high water table is a limitation on sites for dwellings. Areas of this soil should be avoided for this use. The seasonal high water table, the low strength, and the potential for frost action are limitations for local roads and streets. Raising the soil surface by land shaping and installing a drainage system during road construction help to overcome the seasonal high water table. Providing a suitable subgrade or base material helps to prevent the damage caused by low strength or frost action.

The capability subclass is IVw.

37B—Sequoia silt loam, 2 to 7 percent slopes. This soil is gently sloping, moderately deep, and well drained. It is on slightly convex upland summits and shoulders. Individual areas are slightly oval or elongated. They range from about 6 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown silt loam

Subsurface layer:
2 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 19 inches, yellowish red silty clay
19 to 26 inches, yellowish red, strong brown, and yellow gravelly silty clay

Substratum:
26 to 35 inches, yellowish red, strong brown, and yellow weathered shale bedrock that crushes to very gravelly silt loam

Bedrock:
35 inches, soft shale

Included with this soil in mapping are the well drained, moderately deep Berks and Chilhowie soils and the well drained, shallow Weikert soils. Berks, Chilhowie, and Weikert soils are in landscape positions similar to those of the Sequoia soil. Also included are some areas of soils that have a silty clay loam surface layer and some areas of very stony soils. Included soils make up about 25 percent of the map unit.

Properties of the Sequoia soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A few areas are used for pasture or cultivated crops.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. In

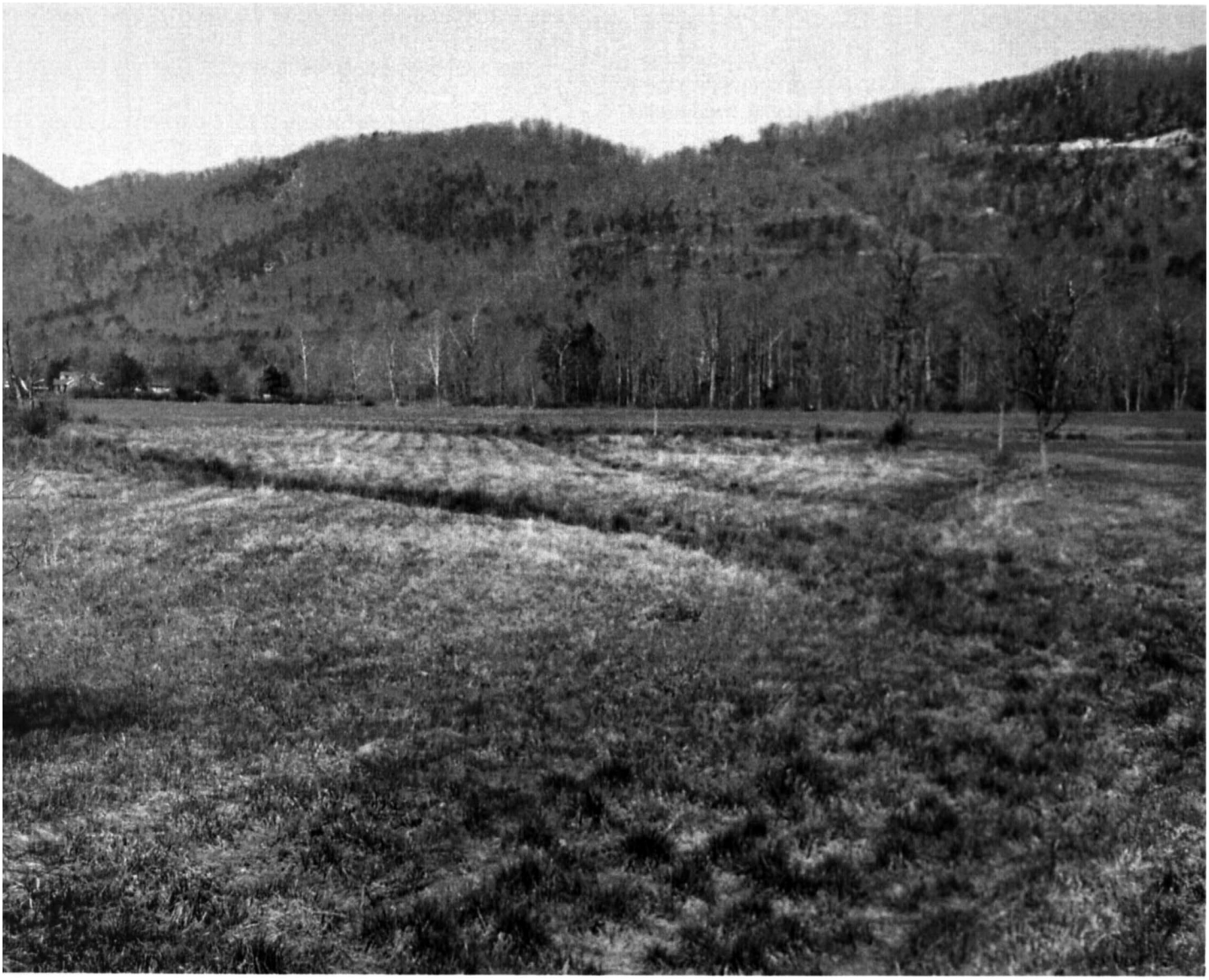

Figure 8.—A pastured area of Purdy silt loam, 0 to 4 percent slopes, and Cotaco loam, 2 to 7 percent slopes, in Mason Cove. The Purdy soil is in the depressions, and the Cotaco soil is on the higher rises.

cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and conserve moisture.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes are management concerns. Deferred grazing, pasture rotation, and proper stocking rates increase the production of feed and forage and help to control erosion.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 599 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay in the subsoil can restrict the use of heavy logging equipment during periods of extreme wetness. This soil is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock and the permeability are limitations on sites for septic tank absorption fields.

Areas of this soil should be avoided for this use. The shrink-swell potential and the depth to bedrock are limitations on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. If dwellings with basements are planned, ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The low strength is a limitation for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is IIIe.

37C—Sequoia silt loam, 7 to 15 percent slopes. This soil is strongly sloping, moderately deep, and well drained. It is on upland side slopes. Individual areas are slightly oval or elongated. They range from about 6 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown silt loam

Subsurface layer:
2 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 19 inches, yellowish red silty clay
19 to 26 inches, yellowish red, strong brown, and yellow gravelly silty clay

Substratum:
26 to 35 inches, yellowish red, strong brown, and yellow weathered shale bedrock that crushes to very gravelly silt loam

Bedrock:
35 inches, soft shale

Included with this soil in mapping are the well drained, moderately deep Berks and Chilhowie soils; the well drained, very deep Tumbling soils; and the well drained, shallow Weikert soils. Berks, Chilhowie, and Weikert soils are on adjacent upland side slopes. Tumbling soils are on adjacent colluvial foot slopes and benches. Included soils make up about 25 percent of the map unit.

Properties of the Sequoia soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderately low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

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

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. The rooting depth is also limited by the moderately deep bedrock.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes are management concerns. Proper stocking rates, deferred grazing, and pasture rotation help to maintain the production of feed and forage and control erosion.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 599 board feet. This soil has few limitations for forestry management practices or logging operations. The clayey subsoil limits the use of heavy logging equipment during periods of extreme wetness. This soil is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The depth to bedrock and the permeability are limitations on sites for septic tank absorption fields. Areas of this soil should be avoided for this use. The slope, the depth to bedrock, and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. If dwellings with basements are planned, ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength is a limitation for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is IVe.

37D—Sequoia silt loam, 15 to 25 percent slopes. This soil is moderately steep, moderately deep, and well drained. It is on upland side slopes. Individual areas are slightly oval or elongated. They range from about 6 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown silt loam

Subsurface layer:
2 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 19 inches, yellowish red silty clay
19 to 26 inches, yellowish red, strong brown, and yellow gravelly silty clay

Substratum:
26 to 35 inches, yellowish red, strong brown, and yellow weathered shale bedrock that crushes to very gravelly silt loam

Bedrock:
35 inches, soft shale

Included with this soil in mapping are the well drained, moderately deep Berks and Chilhowie soils; the well drained, very deep Tumbling soils; and the well drained, shallow Weikert soils. Berks, Chilhowie, and Weikert soils are on adjacent upland side slopes. Tumbling soils are on adjacent colluvial foot slopes and benches. Included soils make up about 25 percent of the map unit.

Properties of the Sequoia soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderately low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

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

This soil is not suited to cultivated crops. The main limitations are the droughtiness and the moderately steep slope. The erosion potential is high. The high acidity, the low natural fertility, and the moderate rooting depth reduce the production of crops.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes are management concerns. Proper stocking rates, deferred grazing, and pasture rotation help to maintain the production of feed and forage and control erosion.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 599 board feet on north aspects and 580 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The clayey subsoil limits the use of heavy logging equipment during periods of extreme wetness. The erosion potential and the seedling mortality rate, especially on south aspects, are management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the permeability are limitations on sites for septic tank absorption fields. Areas of this soil should be avoided for this use. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is VIe.

37E—Sequoia silt loam, 25 to 40 percent slopes. This soil is steep and very steep, moderately deep, and well drained. It is on upland side slopes. Individual areas are slightly oval or elongated. They range from about 6 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown silt loam

Subsurface layer:
2 to 6 inches, yellowish brown silt loam

Subsoil:
6 to 19 inches, yellowish red silty clay
19 to 26 inches, yellowish red, strong brown, and yellow gravelly silty clay

Substratum:
26 to 35 inches, yellowish red, strong brown, and yellow weathered shale bedrock that crushes to very gravelly silt loam

Bedrock:
35 inches, soft shale

Included with this soil in mapping are the well drained, moderately deep Berks and Chilhowie soils; the well drained, very deep Tumbling soils; and the well drained, shallow Weikert soils. Berks, Chilhowie, and Weikert soils are in landscape positions similar to those

of the Sequoia soil. Tumbling soils are on adjacent colluvial side slopes in the uplands. Also included are some areas of soils that have a silty clay loam surface layer and some areas of very stony soils. Included soils make up about 25 percent of the map unit.

Properties of the Sequoia soil—

Permeability: Moderately slow
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Moderately low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

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

This soil is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of tillage equipment. The low available water capacity reduces the production of crops.

This soil is poorly suited to hay and pasture. Overgrazing reduces the quantity and quality of forage produced and increases the runoff rate and erosion potential. Deferred grazing and other management practices increase the production of feed and forage and help to control erosion.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 599 board feet on north aspects and 580 board feet on south aspects. The slope limits forestry management practices or logging operations. Management concerns include the erosion potential; the seedling mortality rate, especially on south aspects; and the equipment limitation. This soil is managed for Virginia pine and eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads and skid trails on the contour reduces the runoff rate and helps to control erosion.

The slope, the depth to bedrock, and the permeability are limitations on sites for septic tank absorption fields. Areas of this soil should be avoided for this use. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is VIe.

38B—Shelocta silt loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on foot slopes and colluvial fans and benches. Individual areas are irregular in shape and are wide. They range from 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, dark brown silt loam

Subsoil:
6 to 24 inches, yellowish brown silt loam
24 to 32 inches, yellowish brown silt loam that has strong brown and light yellowish brown mottles
32 to 48 inches, strong brown silty clay loam that has light yellowish brown mottles

Substratum:
48 to 62 inches, mottled strong brown, yellowish red, and light yellowish brown channery silty clay loam

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Macove soils; and the well drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent upland side slopes. Macove soils are along drainageways or are in landscape positions similar to those of the Shelocta soil. Included soils make up about 20 percent of the map unit.

Properties of the Shelocta soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for cultivated crops.

This soil is well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a

crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and maintain the production of feed and forage.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 581 board feet. This soil has no limitations for forestry management practices or logging operations; however, plant competition is severe. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

This soil has few limitations for most other uses. The permeability is a limitation on sites for septic tank absorption fields. Excavating wider and longer drain field lines increases the absorption area and minimizes the permeability.

The capability subclass is IIe.

38C—Shelocta silt loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on foot slopes and colluvial fans and benches. Individual areas are elongated or slightly oval. They range from 10 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, dark brown silt loam

Subsoil:
6 to 24 inches, yellowish brown silt loam
24 to 32 inches, yellowish brown silt loam that has strong brown and light yellowish brown mottles
32 to 48 inches, strong brown silty clay loam that has light yellowish brown mottles

Substratum:
48 to 62 inches, mottled strong brown, yellowish red, and light yellowish brown channery silty clay loam

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Macove soils; and the well drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent upland side slopes. Macove soils are in landscape positions similar to those of the Shelocta soil and are along drainageways. Included soils make up about 20 percent of the map unit.

Properties of the Shelocta soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for cultivated crops.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and maintain the production of feed and forage.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 581 board feet. This soil has few limitations for forestry management practices or logging operations. The plant competition is severe, and the erosion hazard is moderate. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Excavating wider and longer drain field lines increases the absorption area and minimizes the permeability. Placing septic drain lines along the contour and grading help to overcome the slope. The slope is a limitation on sites for dwellings and local roads and streets. Land shaping, grading, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is IIIe.

38D—Shelocta silt loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on colluvial side slopes and foot slopes. Individual areas are elongated or are irregular in shape.

They range from 10 to 50 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 6 inches, dark brown silt loam

Subsoil:
6 to 24 inches, yellowish brown silt loam
24 to 32 inches, yellowish brown silt loam that has strong brown and light yellowish brown mottles
32 to 48 inches, strong brown silty clay loam that has light yellowish brown mottles

Substratum:
48 to 62 inches, mottled strong brown, yellowish red, and light yellowish brown channery silty clay loam

Included with this soil in mapping are the well drained, moderately deep Berks and Gilpin soils; the well drained, very deep Macove soils; and the well drained, shallow Weikert soils. Berks, Gilpin, and Weikert soils are on adjacent upland side slopes. Macove soils are in landscape positions similar to those of the Shelocta soil and are along drainageways. Included soils make up about 25 percent of the map unit.

Properties of the Shelocta soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are used for woodland and pasture.

This soil is not suited to cultivated crops. The erosion potential is high.

This soil is moderately well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, and deferred grazing help to maintain the production of feed and forage.

The potential productivity for yellow-poplar is high on the north and south aspects. The estimated annual production of wood per acre is 581 board feet on north aspects and 526 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the plant competition are management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIe.

39B—Shottower loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on high terraces. Individual areas are irregular in shape. They range from 6 to 10 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark brown loam

Subsurface layer:
10 to 18 inches, dark yellowish brown loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 62 inches, red clay that has light yellowish brown mottles

Included with this soil in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes. Included soils make up about 20 percent of the map unit.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low

Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for pasture or hay. Some areas are used for cultivated crops or woodland.

This soil is well suited to cultivated crops. The erosion potential is a management concern. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate, help to control erosion, and increase the productivity in cultivated areas.

This soil is well suited to pasture and hay. Applications of lime and fertilizer, establishing and maintaining a mixture of grasses and legumes, proper stocking rates, pasture rotation, and deferred grazing increase the production of feed and forage.

The potential productivity for eastern white pine is extremely high. The estimated annual production of wood per acre is 970 board feet. This soil has few limitations for forestry management practices or logging operations. The equipment limitation is moderate. The content of clay in the subsoil restricts the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The permeability is a limitation on sites for septic tank absorption fields. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The shrink-swell potential is a limitation on sites for dwellings. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength is a limitation for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is IIe.

39C—Shottower loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on high terraces. Individual areas are irregular in shape. They range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark brown loam

Subsurface layer:
10 to 18 inches, dark yellowish brown loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 42 inches, red clay that has light yellowish brown mottles

Included with this soil in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes. Included soils make up about 20 percent of the map unit.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used for pasture or hay. Some areas are used as woodland.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate, help to control erosion, and increase the productivity in cultivated areas.

This soil is well suited to pasture and hay. Applications of lime and fertilizer, establishing and maintaining a mixture of grasses and legumes, proper stocking rates, pasture rotation, and deferred grazing increase the production of feed and forage.

The potential productivity for eastern white pine is extremely high. The estimated annual production of wood per acre is 970 board feet. This soil has few limitations for forestry management practices or logging operations. The equipment limitation is moderate. The content of clay restricts the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic

drain lines along the contour and grading help to overcome the slope. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength is a limitation for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is IIIe.

40C—Shottower cobbly loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on high terraces. Individual areas are irregular in shape. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark brown cobbly loam

Subsurface layer:
10 to 18 inches, dark yellowish brown cobbly loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 62 inches, red clay that has light yellowish brown mottles

Included with this soil in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes. Included soils make up about 20 percent of the map unit.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. Cobbles in the surface layer can damage tillage equipment and interfere with planting. Contour tillage, minimum tillage, and a crop rotation that includes grasses and legumes reduce the runoff rate, help to control erosion, and increase the productivity in cultivated areas.

This soil is moderately well suited to pasture. Applications of lime and fertilizer, establishing and maintaining a mixture of grasses and legumes, proper stocking rates, pasture rotation, and deferred grazing increase the production of feed and forage.

The potential productivity for eastern white pine is extremely high. The estimated annual production of wood per acre is 970 board feet. This soil has few limitations for forestry management practices or logging operations. The equipment limitation is moderate. The content of clay restricts the use of heavy equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The slope, the low strength, and the shrink-swell potential are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by low strength or by shrinking and swelling.

The capability subclass is IVs.

40D—Shottower cobbly loam, 15 to 30 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on high terraces. Individual areas are irregular in shape. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark brown cobbly loam

Subsurface layer:
10 to 18 inches, dark yellowish brown cobbly loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 62 inches, red clay that has light yellowish brown mottles

Included with this soil in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes. Included soils make up about 20 percent of the map unit.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as pasture or woodland.

This soil is not suited to cultivated crops. The erosion potential is high. Cobbles in the surface layer can damage tillage equipment and interfere with planting.

This soil is moderately well suited to pasture and hay. Applications of lime and fertilizer, establishing and maintaining a mixture of grasses and legumes, proper stocking rates, pasture rotation, and deferred grazing increase the production of feed and forage.

The potential productivity for eastern white pine is extremely high. The estimated annual production of wood per acre is 970 board feet on north aspects and 920 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The equipment limitation and plant competition are management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIs.

41C—Shottower-Urban land complex, 4 to 15 percent slopes. This map unit consists of the gently sloping and strongly sloping, very deep, well drained Shottower soil and areas of Urban land. It is on high stream terraces. Individual areas range from about 10 to 100 acres in size. The Shottower soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 40 percent Shottower soil, 35 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Shottower soil are as follows—

Surface layer:
0 to 10 inches, dark brown loam

Subsurface layer:
10 to 18 inches, dark yellowish brown loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 62 inches, red clay that has light yellowish brown mottles

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes. Included soils make up about 20 percent of the map unit.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid

Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating wider and longer field lines increases the absorption area and minimizes the permeability. The slope and the shrink-swell potential are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Reinforcing the footings and foundations and backfilling with sandy material help to prevent the damage caused by shrinking and swelling. The low strength is a limitation on sites for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

A capability subclass is not assigned.

41D—Shottower-Urban land complex, 15 to 25 percent slopes. This map unit consists of the moderately steep, very deep, well drained Shottower soil and areas of Urban land. It is on high stream and river terraces. Individual areas range from about 10 to 100 acres. The Shottower soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 40 percent Shottower soil, 35 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Shottower soil are as follows—

Surface layer:
0 to 10 inches, dark brown loam

Subsurface layer:
10 to 18 inches, dark yellowish brown loam

Subsoil:
18 to 24 inches, yellowish red clay loam
24 to 34 inches, dark red clay loam that has yellowish red mottles
34 to 62 inches, red clay that has light yellowish brown mottles

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the well drained, very deep Allegheny and Groseclose soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. Allegheny soils are on terraces in lower positions on the landscape than the Shottower soil. Groseclose, Litz, and Chiswell soils are on adjacent upland side slopes.

Properties of the Shottower soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the surface layer, moderate in the subsoil
Depth to the seasonal high water table: More than 72 inches

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

A capability subclass is not assigned.

42A—Sindion loam, 0 to 2 percent slopes, occasionally flooded. This soil is nearly level, very deep, and moderately well drained. It is on flood plains. Individual areas are irregular in shape. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark brown loam

Subsoil:
10 to 16 inches, dark brown loam
16 to 27 inches, dark yellowish brown loam that has grayish brown and dark brown mottles
27 to 36 inches, grayish brown loam that has dark brown and yellowish red mottles

Substratum:
36 to 63 inches, grayish brown loam that has yellowish red and dark brown mottles

Included with this soil in mapping are the well drained, very deep Combs, Derroc, Wheeling, and Speedwell soils and the poorly drained, very deep Clubcaf soils. Combs and Speedwell soils are in slightly

higher positions on the landscape than the Sindion soil. Clubcaf and Derroc soils are in landscape positions similar to those of the Sindion soil. Wheeling soils are on low terraces adjacent to the flood plains. Also included are soils that are in landscape positions similar to those of the Sindion soil and have a dark surface layer less than 7 inches thick. Included soils make up about 25 percent of the map unit.

Properties of the Sindion soil—

Permeability: Moderate in the subsoil, moderate or moderately rapid in the substratum
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: 18 to 36 inches
Flooding: Occasional

Most areas of this soil are used for pasture or hay. A small acreage is used for cultivated crops or woodland.

This soil is well suited to cultivated crops. Flooding occasionally damages crops and limits the use of machinery. In cultivated areas, conservation tillage conserves moisture and reduces erosion.

This soil is well suited to pasture and hay. Preventing overgrazing, using proper stocking rates, and applying fertilizer increase the productivity and carrying capacity of pastures.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 550 board feet. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The flooding and the seasonal high water table are limitations on sites for septic tank absorption fields and dwellings. Areas of this soil should be avoided for these uses. The flooding and the potential for frost action are limitations for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIw.

43A—Speedwell loam, 0 to 2 percent slopes, occasionally flooded. This soil is very deep, nearly level, and well drained. It is on flood plains. Individual areas are long and winding or are irregular in shape. They range from about 10 to 75 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 17 inches, dark brown loam

Subsoil:
17 to 45 inches, dark brown loam

Substratum:
45 to 62 inches, brown loam

Included with this soil in mapping are the very deep, well drained Combs, Derroc, and Wheeling soils; the very deep, moderately well drained Sindion soils; and the very deep, poorly drained Clubcaf soils. Combs soils are in landscape positions similar to those of the Speedwell soil. Clubcaf, Derroc, and Sindion soils are in slight depressions and channel scours. Wheeling soils are on low terraces adjacent to the flood plains. Also included are soils that are in landscape positions similar to those of the Speedwell soil and have a dark surface layer less than 7 inches thick. Included soils make up about 25 percent of the map unit.

Properties of the Speedwell soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Slight
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional

Most areas of this soil are used for cultivated crops or hay. A small acreage is used as pasture or woodland.

This soil is well suited to cultivated crops. Flooding can damage crops and limit the use of machinery. Conservation tillage and cover crops help to control erosion and conserve moisture.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes, deferring grazing, controlling weeds, using proper stocking rates, and applying fertilizer increase the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 320 board feet. This soil is managed for eastern white pine, black walnut, and yellow-poplar.

The flooding is a limitation on sites for septic absorption fields and dwellings. Areas of this soil should be avoided for these uses. The flooding is also a limitation for local roads and streets. Land shaping

during road construction raises the soil surface and reduces the damage caused by flooding.

The capability subclass is I.

44A—Speedwell-Urban land complex, 0 to 2 percent slopes, occasionally flooded. This map unit consists of the nearly level, very deep, well drained Speedwell soil and areas of Urban land. It is on broad low terraces along rivers and streams. Individual areas range from about 10 to 30 acres in size. The Speedwell soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 40 percent Speedwell soil, 35 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Speedwell soil are as follows—

Surface layer:
0 to 17 inches, dark silt brown loam

Subsoil:
17 to 45 inches, dark brown loam

Substratrum:
45 to 62 inches, brown loam

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Allegheny, Derroc, and Wheeling soils; the very deep, moderately well drained Sindion soils; and the very deep, poorly drained Clubcaf soils. Allegheny and Wheeling soils are on terraces in higher positions on the landscape than the Speedwell soil. Clubcaf, Derroc, and Sindion soils are in slight depressions and channel scours. Also included are areas of soils that have a gravelly surface layer and areas of soils that are in landscape positions similar to those of the Speedwell soil and have a dark surface layer less than 7 inches thick.

Properties of the Speedwell soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Slight
Rooting depth: More than 60 inches
Organic matter content: Moderate
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional

The flooding is a limitation on sites for septic tank absorption fields and dwellings. Areas of this map unit should be avoided for these uses. The flooding also is a limitation for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding.

A capability subclass is not assigned.

45C—Spessard loamy sand, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on colluvial foot slopes and benches. Slopes are smooth and complex. Individual areas are commonly elongated or irregular in shape. They range from 10 to 30 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, very dark grayish brown loamy sand
9 to 13 inches, yellowish brown loamy sand

Subsoil:
13 to 20 inches, brownish yellow loamy sand
20 to 41 inches, brownish yellow and light yellowish brown loamy sand

Substratum:
41 to 62 inches, yellowish brown loamy sand

Included with this soil in mapping are the well drained, moderately deep Berks, Dekalb, and Gilpin soils; the well drained, very deep Laidig soils; and the well drained, shallow Weikert soils. Berks, Dekalb, Gilpin, and Weikert soils are on adjacent side slopes and shoulders and summits. Laidig soils are on adjacent colluvial foot slopes and benches. Included soils make up about 25 percent of the map unit.

Properties of the Spessard soil—

Permeability: Rapid to very rapid
Available water capacity: Low
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used for homesite development.

This soil is not suited to cultivated crops. The erosion potential is a management concern. The low available water capacity and the low fertility reduce the production of crops.

This soil is not suited to pasture and hay. The low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Because of the physical properties of this soil, pasture management practices, such as seeding, applying lime and fertilizer, and controlling weeds, are impractical.

The potential productivity for yellow-poplar is moderately high. The estimated annual production of wood per acre is 349 board feet. This soil has few limitations for forestry management practices or logging operations. The equipment limitation and the seedling mortality rate are management concerns. This soil is managed for Virginia pine and eastern white pine. Selective cutting, thinning stands, and removing diseased or insect-infested trees increase the potential for timber production.

The permeability and the slope are limitations on sites for septic tank absorption fields. Because this soil may not adequately filter effluent that can contaminate the ground water, it should be avoided for septic tank absorption fields. The slope is a limitation on sites for dwellings and for local roads and streets. Land shaping, grading, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIs.

45D—Spessard loamy sand, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on colluvial foot slopes. Slopes are smooth and complex. Individual areas are commonly elongated and irregular in shape. They range from 15 to 45 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, very dark grayish brown loamy sand
9 to 13 inches, yellowish brown loamy sand

Subsoil:
13 to 20 inches, brownish yellow loamy sand
20 to 41 inches, yellowish brown and light brownish yellow loamy sand

Substratum:
41 to 62 inches, yellowish brown loamy sand

Included in mapping are the well drained, moderately deep Berks, Dekalb, and Gilpin soils; the well drained, very deep Laidig soils; and the well drained, shallow Weikert soils. Berks, Dekalb, Gilpin, and Weikert soils are on adjacent side slopes. Laidig soils are on adjacent colluvial foot slopes and benches. Included soils make up about 25 percent of the map unit.

Properties of the Spessard soil—

Permeability: Rapid or very rapid
Available water capacity: Low
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The erosion potential is high. The low available water capacity and the low fertility reduce the production of crops.

This soil is not suited to pasture and hay. The high acidity, the low natural fertility, and the low available water capacity reduce the production of feed and forage. Because of the physical properties of this soil, pasture management practices, such as seeding, applying lime and fertilizer, and controlling weeds, are impractical.

The potential productivity for yellow-poplar is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 349 board feet on north aspects and 280 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The erosion potential, the equipment limitation, and the seedling mortality rate are management concerns. This soil is managed for Virginia pine and eastern white pine. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The slope and the permeability are limitations on sites for septic tank absorption fields. Because this soil may not adequately filter effluent that can contaminate the ground water, it should be avoided for septic tank absorption fields. The slope is a limitation on sites for dwellings and for local roads and streets. Land shaping, grading, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIs.

45E—Spessard loamy sand, 25 to 40 percent slopes. This soil is steep and very steep, very deep, and well drained. It is on colluvial foot slopes and side slopes. Slopes are smooth and complex. Individual areas are generally long and elongated or are irregular in shape. They range from 20 to about 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, very dark grayish brown loamy sand
9 to 13 inches, yellowish brown loamy sand

Subsoil:
13 to 20 inches, brownish yellow loamy sand
20 to 41 inches, brownish yellow and light yellowish brown loamy sand

Substratum:
41 to 62 inches, yellowish brown loamy sand

Included in mapping are the well drained, moderately deep Berks, Dekalb, and Gilpin soils; the well drained, very deep Laidig soils; and the well drained, shallow Weikert soils. Berks, Dekalb, Gilpin, and Weikert soils are on adjacent side slopes. Laidig soils are on adjacent colluvial foot slopes and benches. Included soils make up about 25 percent of the map unit.

Properties of the Spessard soil—

Permeability: Rapid or very rapid
Available water capacity: Low
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All of the areas of this soil are wooded.

This soil is not suited to cultivated crops. The slope limits the safe use of machinery for cultivating and harvesting crops.

This soil is not suited to pasture and hay. The slope, the low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Because of the physical properties of this soil, pasture management practices, such as seeding, applying lime and fertilizer, and controlling weeds, are impractical.

The potential productivity for yellow-poplar is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 349 board feet on north aspects and 280 board feet on south aspects. The management concerns include the erosion potential, the equipment limitation, and the seedling mortality rate on south-facing slopes. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The slope and the permeability are limitations on sites for septic tank absorption fields. Because this soil may not adequately filter effluent that can contaminate the ground water, it should be avoided for septic tank absorption fields. The slope is a limitation on sites for dwellings and for local roads and streets. Land shaping, grading, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIe.

46E—Sylvatus very channery silt loam, 35 to 55 percent slopes. This soil is steep to very steep, shallow, and well drained. It is on upland side slopes in the Blue Ridge. Slopes are smooth and complex and are dissected by drainageways. Individual areas are irregular in shape. They range from 25 to 200 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, very dark gray very channery silt loam

Subsurface layer:
1 to 4 inches, brown very channery silt loam

Subsoil:
4 to 10 inches, yellowish brown very channery silt loam

Substratum:
10 to 15 inches, yellowish brown extremely channery silt loam

Bedrock:
15 inches, yellowish brown phyllite

Included with this soil in mapping are the moderately deep, well drained Dekalb soils and the moderately deep, excessively drained Peaks soils. Dekalb and Peaks soils are on adjacent upland side slopes. Included soils make up about 25 percent of the unit.

Properties of the Sylvatus soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The erosion

potential is high. The slope limits the use of tillage equipment. The very low available water capacity, the high content of coarse fragments, the shallow rooting depth, the very strong or strong acidity, and the low natural fertility reduce the production of crops.

This soil is not suited to pasture and hay. The slope limits the safe use of machinery. The high content of coarse fragments, the very low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Applications of lime and fertilizer reduce the acidity and increase the fertility. Establishing and maintaining a mixture of grasses and legumes are management concerns.

The potential productivity for Virginia pine is moderately high. The estimated annual production of wood per acre is 280 board feet on north aspects and 230 board feet on south aspects. The slope is a limitation for most forestry management practices or logging operations. Management concerns include the erosion potential, the equipment limitation, and the seedling mortality rate, especially on south aspects. This soil is managed for eastern white pine and Virginia pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the depth to bedrock are limitations on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of this soil should be avoided for these uses.

The capability subclass is VIIe.

46F—Sylvatus very channery silt loam, 55 to 75 percent slopes. This soil is steep to very steep, shallow, and well drained. It is on upland side slopes in the Blue Ridge. Slopes are smooth and complex and are dissected by drainageways. Individual areas are irregular in shape. They range from 75 to 300 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 1 inch, very dark gray very channery silt loam

Subsurface layer:
1 to 4 inches, brown very channery silt loam

Subsoil:
4 to 10 inches, yellowish brown very channery silt loam

Substratum:
10 to 15 inches, yellowish brown extremely channery silt loam

Bedrock:
15 inches, yellowish brown phyllite

Included with this soil in mapping are the moderately deep, well drained Dekalb soils and the moderately deep, excessively drained Peaks soils. Dekalb and Peaks soils are on adjacent upland side slopes. Included soils make up about 25 percent of the unit.

Properties of the Sylvatus soil—

Permeability: Moderate
Available water capacity: Very low
Surface runoff: Very rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

All areas of this soil are wooded.

This soil is not suited to cultivated crops. The erosion potential is high. The slope limits the use of tillage equipment. The very low available water capacity, the content of coarse fragments, the shallow rooting depth, the very strong or strong acidity, and the low natural fertility reduce the production of crops.

This soil is not suited to pasture and hay. The slope limits the safe use of machinery. The high content of coarse fragments, the very low available water capacity, the high acidity, and the low natural fertility reduce the production of feed and forage. Applications of lime and fertilizer reduce the acidity and increase the fertility. Establishing and maintaining a mixture of grasses and legumes are management concerns.

The potential productivity for Virginia pine is moderately high. The estimated annual production of wood per acre is 280 board feet on north aspects and 230 board feet on south aspects. The slope is a limitation for most forestry management practices or logging operations. Management concerns include the erosion potential, the equipment limitation, and the seedling mortality rate, especially on south aspects. This soil is managed for eastern white pine and Virginia pine. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the depth to bedrock are limitations on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of this soil should be avoided for these uses.

The capability subclass is VIIe.

Figure 9.—Cabbage in an area of Thurmont sandy loam, 2 to 7 percent slopes, in the Bent Mountain area. Edneyville soils and very stony Peaks soils are on mountain side slopes in the background.

47B—Thurmont sandy loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on colluvial fans, foot slopes, and stream terraces. Slopes are smooth and are commonly complex. Individual areas range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown sandy loam

Subsurface layer:
5 to 10 inches, dark yellowish brown sandy loam

Subsoil:
10 to 21 inches, strong brown clay loam
21 to 37 inches, yellowish red clay loam
37 to 44 inches, yellowish red gravelly loam that has brown mottles

Substratum:
44 to 51 inches, yellowish red gravelly loam

51 to 62 inches, yellowish red very gravelly loam

Included with this soil in mapping are the well drained, very deep Edneyville, Evard, and Hayesville soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. All of these soils are on adjacent upland side slopes. Also included are areas of soils that have cobbles on the surface. Included soils make up about 20 percent of the map unit.

Properties of the Thurmont soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 50 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 48 to 72 inches

Most areas of this soil are used as pasture. Some areas are used for cultivated crops (fig. 9) or orchards. A small acreage is used as woodland.

This soil is well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage and a crop rotation that includes grasses and legumes reduce the runoff rate, increase the water infiltration rate, help to control erosion, and increase the productivity in cultivated areas.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility, increase the production of feed and forage, and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has few limitations for forestry management practices or logging operations; however, plant competition is a management concern. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The seasonal high water table and the permeability are limitations on sites for septic tank absorption fields. Placing septic tank absorption fields in higher areas on the landscape reduces the effects of the seasonal high water table. Excavating longer field lines increases the absorption area and minimizes the permeability. The seasonal high water table is a limitation on sites for dwellings with basements. If these dwellings are planned, the seasonal high water table can be overcome by installing foundation drains, sealing foundations, or locating included areas of better drained soils. The potential for frost action is a limitation for local roads and streets. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIe.

47C—Thurmont sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on colluvial fans, foot slopes, and stream terraces. Slopes are smooth and are commonly complex. Individual areas range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown loam
5 to 10 inches, dark yellowish brown loam

Subsoil:
10 to 21 inches, strong brown clay loam
21 to 37 inches, yellowish red clay loam
37 to 44 inches, yellowish red gravelly loam that has brown mottles

Substratum:
44 to 51 inches, yellowish red gravelly loam
51 to 62 inches, yellowish red very gravelly loam

Included with this soil in mapping are the well drained, very deep Edneyville, Evard, and Hayesville soils; the well drained, moderately deep Litz soils; and the well drained, shallow Chiswell soils. All of these soils are on adjacent upland side slopes. Also included are areas of soils that have cobbles on the surface. Included soils make up about 20 percent of the map unit.

Properties of the Thurmont soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 50 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: 48 to 72 inches

Most areas of this soil are used as pasture. Some areas are used as woodland. A small acreage is used for cultivated crops or orchards.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, and a crop rotation that includes grasses and legumes help to maintain soil tilth, reduce the runoff rate, increase the water infiltration rate, control erosion, and increase the productivity in cultivated areas.

This soil is well suited to pasture and hay. The high acidity and the low natural fertility reduce the production of feed and forage. Establishing and maintaining a desirable mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility, increase the production of feed and forage, and help to control erosion.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has few limitations for forestry management practices or logging operations; however, plant competition is a management concern. This soil is managed for eastern white pine, yellow-poplar, and black walnut. Thinning stands, selective cutting, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope, the seasonal high water table, and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Placing septic tank absorption fields in higher areas on the landscape reduces the effects of the seasonal high water table. Excavating longer field lines increases the absorption area and minimizes the permeability. The slope and the seasonal high water table are limitations on sites for dwellings with basements. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. If dwellings with basements are planned, the seasonal high water table can be overcome by installing foundation drains, sealing foundations, or locating included areas of better drained soils. The slope and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IIIe.

48B—Timberville silt loam, 2 to 7 percent slopes, occasionally flooded. This soil is gently sloping, very deep, and well drained. It is on narrow to moderately broad upland foot slopes and in drainageways in areas of limestone (fig. 10). Individual areas are long and winding. They range from about 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 11 inches, dark yellowish brown silt loam

Subsoil:
11 to 21 inches, dark yellowish brown silty clay loam
21 to 27 inches, yellowish brown silt clay loam
27 to 42 inches, yellowish brown silty clay that has strong brown and yellowish red mottles
42 to 48 inches, brownish yellow clay that has brown and yellowish red mottles
48 to 62 inches, mottled brownish yellow, yellowish red, and brown gravelly silty clay loam

Included with this soil in mapping are the moderately deep, well drained Chilhowie soils; the very deep, well drained Frederick and Groseclose soils; and the shallow, well drained Opequon soils. All of these soils are on adjacent uplands. Also included are some areas of soils that have slopes of more than 7 percent. Included soils make up about 20 percent of the map unit.

Properties of the Timberville soil—

Permeability: Moderate
Available water capacity: High
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low in the upper part, moderate in the lower part
Depth to the seasonal high water table: More than 72 inches
Flooding: Occasional for very brief periods between April and October because of runoff from higher adjacent areas

Most areas of this soil are used for cultivated crops or hay and pasture. Some areas are used as woodland.

This soil is well suited to cultivated crops. The erosion potential is a management concern. In cultivated areas, cover crops and a crop rotation that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to hay and pasture.

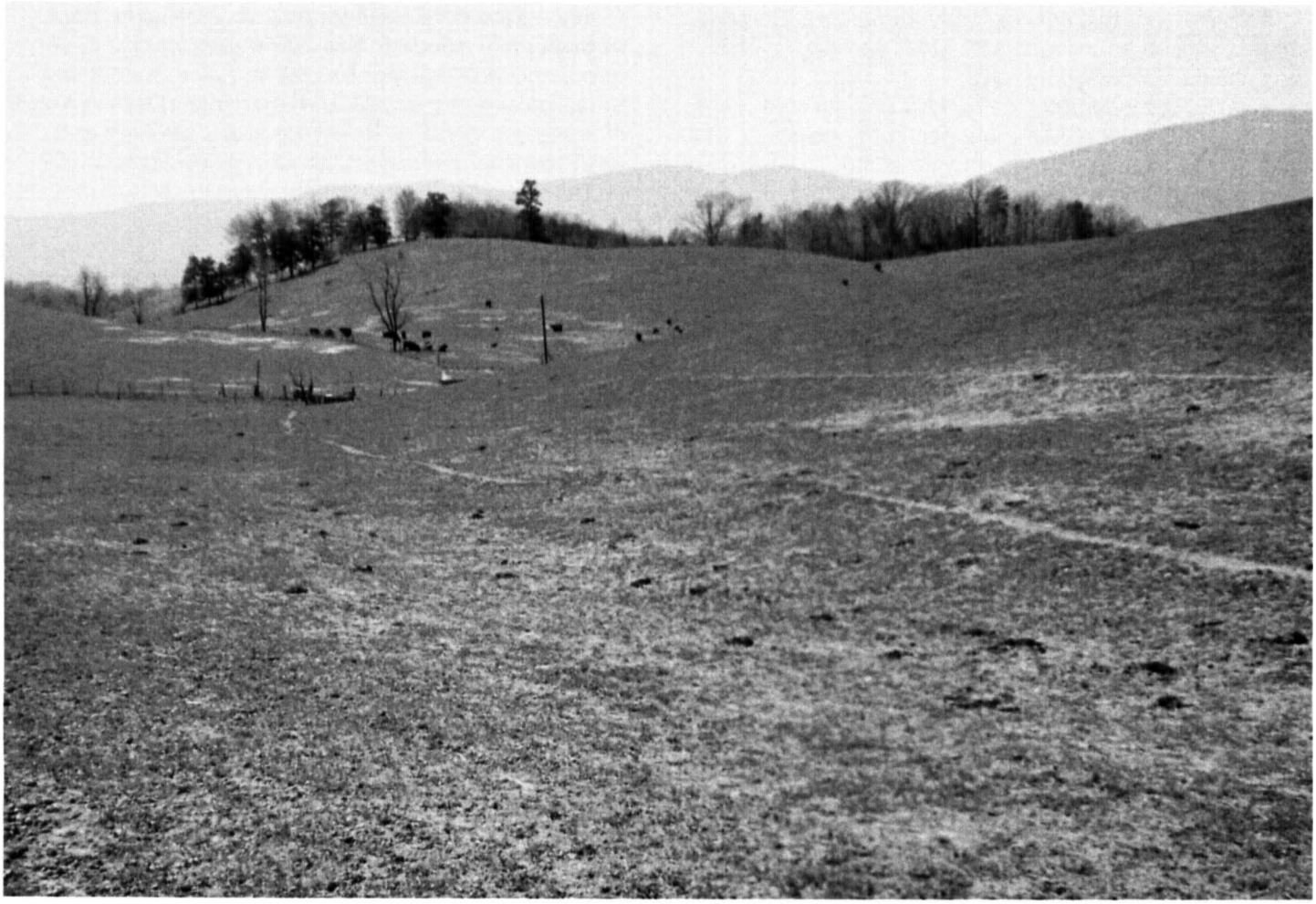

Figure 10.—An area of Timberville silt loam, 2 to 7 percent slopes, occasionally flooded. Frederick silt loam, 15 to 25 percent slopes, is on the adjacent side slopes.

Overgrazing reduces the quantity and quality of forage and increases the runoff rate and the erosion potential. Deferred grazing, establishing and maintaining a mixture of grasses and legumes, controlling weed growth, proper stocking rates, and applications of lime and fertilizer increase the production of feed and forage, reduce the runoff rate, and help to control erosion.

The potential productivity for yellow-poplar is moderately high. The estimated annual production of wood per acre is 500 board feet. This soil has no limitations for forestry management practices or logging operations; however, plant competition is a management concern. This soil is managed for black walnut, yellow-poplar, and eastern white pine.

The flooding is a limitation on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of this soil should be avoided for these uses.

The capability subclass is IIe.

49B—Tumbling loam, 2 to 7 percent slopes. This soil is gently sloping, very deep, and well drained. It is on upland foot slopes and colluvial fans and benches. Individual areas are long and winding or are slightly oval. They range from 10 to 25 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 2 inches, very dark grayish brown loam

Subsurface layer:

2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay that has red mottles
28 to 49 inches, yellowish red very cobbly clay that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay

Included with this soil in mapping are the very deep, well drained Grimsley and Frederick soils; the moderately deep, well drained Berks and Sequoia soils; and the shallow, well drained Weikert soils. Berks, Frederick, Sequoia, and Weikert soils are on adjacent uplands. Grimsley soils are along drainageways that are adjacent to the Tumbling soil. Also included are soils that have a cobbly surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. Some areas are used for hay.

This soil is well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is well suited to pasture and hay. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of heavy logging equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production.

The permeability is a limitation on sites for septic tank absorption fields. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. This soil has few limitations as a site for dwellings. The low strength and the potential for frost action are limitations for local roads and streets. Providing a suitable subgrade or base material helps to overcome these limitations.

The capability subclass is IIe.

49C—Tumbling loam, 7 to 15 percent slopes. This soil is strongly sloping, very deep, and well drained. It is on mountain foot slopes and colluvial fans and benches. Individual areas are long and winding or are slightly oval. They range from 10 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown loam

Subsurface layer:
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown gravelly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red gravelly clay loam that has red mottles
28 to 49 inches, yellowish red very gravelly clay loam that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay loam

Included with this soil in mapping are the moderately deep, well drained Berks and Sequoia soils; the very deep, well drained Frederick soils; and the shallow, well drained Weikert soils. All of these soils are on adjacent uplands. Also included are soils that have a cobbly surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for hay.

This soil is moderately well suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is well suited to pasture and hay. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

This soil is moderately well suited to pasture and hay. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of heavy logging equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the potential for frost action, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is IIIe.

49D—Tumbling loam, 15 to 25 percent slopes. This soil is moderately steep, very deep, and well drained. It is on upland foot slopes and colluvial fans. Individual areas are long and winding or are irregular in shape. They range from 10 to 45 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown loam

Subsurface layer:
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay that has red mottles
28 to 49 inches, yellowish red very cobbly clay that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay

Included with this soil in mapping are the moderately deep, well drained Berks and Sequoia soils; the very deep, well drained Frederick soils; and the shallow, well drained Weikert soils. All of these soils are on adjacent uplands. Also included are soils that have a stony surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland or pasture. A small acreage is used for hay.

This soil is poorly suited to cultivated crops. The erosion potential is a management concern. Conservation tillage, contour tillage, contour stripcropping, grassed waterways, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion.

This soil is moderately well suited to pasture and hay. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 280 board feet on north aspects and 204 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of heavy logging equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-

poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is IVe.

50C—Tumbling loam, 7 to 15 percent slopes, very stony. This soil is strongly sloping, very deep, and well drained. It is on upland foot slopes, side slopes, and colluvial fans. Individual areas are irregular in shape. They range from 10 to 75 acres in size. Stones are 1½ to 2 feet in diameter. They are 5 to 30 feet apart.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown loam

Subsurface layer:
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay that has red mottles
28 to 49 inches, yellowish red very cobbly clay that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay

Included with this soil in mapping are the moderately deep, well drained Berks and Sequoia soils and the shallow, well drained Weikert soils. All of these soils are on adjacent uplands. Also included are soils that have a stony surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The stones on the surface interfere with tillage and harvesting operations.

This soil is poorly well suited to pasture and hay. The stones on the surface restrict the use of machinery. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high. The estimated annual production of wood per acre is 280 board feet. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of heavy logging equipment during periods of extreme wetness. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The slope is a limitation on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. The slope, the potential for frost action, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is VIs.

50D—Tumbling loam, 15 to 25 percent slopes, very stony. This soil is moderately steep, very deep, and well drained. It is on upland foot slopes, side slopes, and colluvial fans. Individual areas are irregular in shape. They range from 10 to 100 acres in size. Stones are 1½ to 2 feet in diameter. They are 5 to 30 feet apart.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown loam
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay that has red mottles
28 to 49 inches, yellowish red very cobbly clay that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay

Included with this soil in mapping are the moderately deep, well drained Berks and Sequoia soils and the shallow, well drained Weikert soils. All of these soils are on adjacent uplands. Also included are soils that have a stony surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: High
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The stones on the surface interfere with tillage and harvesting operations.

This soil is poorly suited to pasture and hay. The stones on the surface restrict the use of machinery. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 280 board feet on north aspects and 204 board feet on south aspects. This soil has few limitations for forestry management practices or logging operations. The content of clay limits the use of heavy logging equipment during periods of extreme wetness. The erosion potential and plant competition are management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIs.

50E—Tumbling loam, 25 to 45 percent slopes, very stony. This soil is steep and very steep, very deep, and well drained. It is on upland foot slopes and side slopes. Individual areas are irregular in shape. They range from 15 to 100 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown loam

Subsurface layer:
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay that has red mottles
28 to 49 inches, yellowish red very cobbly clay that has red mottles
49 to 62 inches, mottled strong brown, red, dark red, and white clay

Included with this soil in mapping are the moderately deep, well drained Berks and Sequoia soils and the shallow, well drained Weikert soils. All of these soils are on adjacent uplands. Also included are soils that have a stony surface. Included soils make up about 20 percent of the map unit.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: High
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this soil are used as woodland. A small acreage is used as pasture.

This soil is not suited to cultivated crops. The stones

on the surface and the slope interfere with tillage and harvesting operations.

This soil is poorly suited to pasture and hay. The stones on the surface and the slope limit the safe use of machinery. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility and increase the production of feed and forage.

The potential productivity for northern red oak is moderately high on north aspects and moderate on south aspects. The estimated annual production of wood per acre is 280 board feet on north aspects and 204 board feet on south aspects. The slope is a limitation for forestry management practices or logging operations. The content of clay and the slope limit the use of heavy logging equipment during periods of extreme wetness. The erosion potential and plant competition are management concerns. This soil is managed for eastern white pine and yellow-poplar. Thinning stands, clearcutting, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope is a limitation on sites for septic tank absorption fields or dwellings and for local roads and streets. Placing septic drain lines along the contour, grading, land shaping, designing dwellings so that they conform to the natural shape of the land, and constructing roads on the contour help to overcome the slope.

The capability subclass is VIIe.

51C—Tumbling-Urban land complex, 2 to 15 percent slopes. This map unit consists of the gently sloping and strongly sloping, very deep, well drained Tumbling soil and areas of Urban land. It is on colluvial fans and on colluvial foot slopes. Individual areas range from about 6 to 60 acres in size. The Tumbling soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is about 40 percent Tumbling soil, 35 percent Urban land, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Tumbling soil are as follows—

Surface layer:
0 to 2 inches, grayish brown loam

Subsurface layer:
2 to 11 inches, brownish yellow loam

Subsoil:
11 to 15 inches, strong brown cobbly clay loam that has brownish yellow mottles
15 to 28 inches, yellowish red cobbly clay
28 to 49 inches, yellowish red very cobbly clay
49 to 62 inches, mottled strong brown, red, dark red, and white clay

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Frederick, Groseclose, and Laidig soils and the moderately deep, well drained Sequoia soils. Frederick, Groseclose, and Sequoia soils are on adjacent uplands or on breaks of steeper slopes. Laidig soils are in depressions. Also included are some areas of soils that have a stony surface layer.

Properties of the Tumbling soil—

Permeability: Moderate
Available water capacity: Moderate
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Erosion potential: High
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

The slope and the permeability are limitations on sites for septic tank absorption fields. Placing septic drain lines along the contour and grading help to overcome the slope. Excavating deeper and longer field lines increases the absorption area and minimizes the permeability. The slope is a limitation on sites for dwellings. The slope, the potential for frost action, and the low strength are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

A capability subclass is not assigned.

52—Udorthents-Urban land complex. This map unit consists of very shallow to very deep soils and areas of Urban land. The soils and Urban land occur as areas so intermingled that it was not practical to map them separately. Individual areas are generally along the major highways and in industrialized areas. They are long and narrow or rectangular in shape and range from about 5 to more than 200 acres in size. Slopes are 0 to 30 percent. This map unit is about 60 percent Udorthents, 25 percent Urban land, and 15 percent other soils.

Udorthents consist of material that has been graded,

cut and filled, or otherwise disturbed during the growth of urban areas and during highway construction. The exposed material is variable. It consists of loamy or clayey material or is shallow over limestone or shale bedrock. The loamy or clayey material is indicative of the soils in adjacent areas.

The areas of Urban land consist of asphalt, concrete, or other impervious surfaces. Examples of these areas include highways, shopping centers, and industrial parks.

Included in mapping are areas of the very deep, well drained Frederick, Groseclose, Hayesville, Tumbling, and Wheeling soils; the moderately deep, well drained Chilhowie and Litz soils; and the shallow, well drained Chiswell soils. These soils are in areas between highways and buildings.

The properties and characteristics of areas of this complex are so variable that onsite investigation is generally needed to determine the suitability for most uses.

A capability subclass is not assigned.

53—Urban land. This map unit consists of areas in which more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. Examples of these areas include parking lots, shopping centers, business centers, and industrial parks. Areas of Urban land are throughout the survey area, but the largest areas are in business districts and along main roads. They are generally rectangular or irregular in shape and range from 6 to 75 acres in size. Slopes range from 0 to 2 percent.

Included in mapping are areas of undisturbed soils and Udorthents. The undisturbed soils are mainly between streets and sidewalks and in yards. These soils are commonly the very deep, well drained Frederick, Groseclose, Hayesville, and Tumbling soils; the moderately deep, well drained Chilhowie and Litz soils; and the shallow, well drained Chiswell soils. Udorthents are in areas where the natural soils have been disturbed by grading, excavating, or filling. In many areas, several feet of miscellaneous fill has been placed over streams, poorly drained soils, or flood plains. These areas now contain roads, buildings, or other structures. Included areas make up about 20 percent of the map unit.

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

A capability subclass is not assigned.

54C—Weikert-Berks complex, 7 to 15 percent slopes. This map unit consists of strongly sloping, shallow and moderately deep, well drained soils on upland side slopes and summits. Individual areas are irregular in shape. They range from 6 to 50 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Weikert soil, 30 percent Berks soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Weikert soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery silt loam

Subsoil:
2 to 11 inches, yellowish brown very channery silt loam

Substratum:
11 to 17 inches, light yellowish brown extremely channery silt loam

Bedrock:
17 inches, shale

The typical sequence, depth, and composition of the layers of the Berks soil are as follows—

Surface layer:
0 to 4 inches, yellowish brown channery silt loam

Subsoil:
4 to 12 inches, brownish yellow channery silt loam
12 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Included in mapping are the well drained, moderately deep Dekalb, Gilpin, and Sequoia soils and the well drained, very deep Laidig, Shelocta, and Tumbling soils. Laidig, Shelocta, and Tumbling soils are on colluvial foot slopes and benches in higher positions adjacent to the map unit. Dekalb, Gilpin, and Sequoia soils are adjacent to the map unit in the uplands. Included soils make up about 35 percent of the map unit.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Medium
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low

Depth to the seasonal high water table: More than 72 inches

Properties of the Berks soil—

Permeability: Moderate in the subsoil, moderately rapid in the substratum
Available water capacity: Very low
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. A small acreage is used as pasture.

This map unit is poorly suited to cultivated crops. The low available water capacity, the low content of organic matter, the high acidity, and the low natural fertility are management concerns. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes reduce the runoff rate and help to control erosion in cultivated areas. Crop residue should be left on the surface or incorporated into the plow layer.

This map unit is poorly suited to pasture and hay. The available water capacity is low. Establishing and maintaining a mixture of grasses and legumes are management concerns. Proper stocking rates, pasture rotation, deferred grazing, and applications of lime and fertilizer help to overcome the acidity and the low natural fertility, increase the production of feed and forage, and help to control erosion.

The potential productivity for Virginia pine is high. The estimated annual production of wood per acre is 500 board feet for the Weikert soil and 595 board feet for the Berks soil. This map unit has few limitations for woodland management practices or logging operations. The seedling mortality rate is a management concern. This map unit is managed for Virginia pine, eastern white pine, and Scotch pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the depth to bedrock are limitations on sites for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope, the depth to bedrock, and the potential for frost action are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope. Ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action.

The capability subclass is IVe.

54E—Weikert-Berks complex, 15 to 45 percent slopes. This map unit consists of moderately steep to very steep, shallow and moderately deep, well drained soils on upland side slopes. Individual areas are irregular in shape. They range from 6 to 250 acres in size. The soils occur as areas so intermingled that it was not practical to map them separately. This map unit is about 45 percent Weikert soil, 30 percent Berks soil, and 25 percent other soils.

The typical sequence, depth, and composition of the layers of the Weikert soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery silt loam

Subsoil:
2 to 11 inches, yellowish brown very channery silt loam

Substratum:
11 to 17 inches, light yellowish brown extremely channery silt loam

Bedrock:
17 inches, shale

The typical sequence, depth, and composition of the layers of the Berks soil are as follows—

Surface layer:
0 to 4 inches, yellowish brown channery silt loam

Subsoil:
4 to 12 inches, brownish yellow channery silt loam
12 to 19 inches, yellowish brown very channery silt loam

Substratum:
19 to 27 inches, yellowish brown extremely channery silt loam

Bedrock:
27 inches, shale

Included in mapping are the well drained, moderately deep Dekalb, Gilpin, and Sequoia soils and the well drained, very deep Laidig, Shelocta, and Tumbling soils.

Laidig, Shelocta, and Tumbling soils are on colluvial foot slopes and benches in higher positions adjacent to the map unit. Dekalb, Gilpin, and Sequoia soils are adjacent to the map unit in the uplands. Included soils make up about 25 percent of the map unit.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Properties of the Berks soil—

Permeability: Moderate in the subsoil, moderately rapid in the substratum
Available water capacity: Very low
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Erosion potential: High
Rooting depth: 20 to 40 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland. A small acreage is used as pasture.

This map unit is not suited to cultivated crops. The erosion potential is high. The slope limits the safe use of machinery for cultivating and harvesting crops. The low available water capacity, the low content of organic matter, the high acidity, and the low natural fertility are management concerns.

Most areas of this map unit are not suited to pasture. Establishing and maintaining a mixture of grasses and legumes are management concerns. Proper stocking rates, the prevention of overgrazing, deferred grazing, and applications of lime and fertilizer help to maintain the productivity of pastures. If the pasture is overgrazed, the runoff rate increases and erosion can become severe.

The potential productivity for Virginia pine on the Weikert soil is high on north aspects and moderately high on south aspects. The potential productivity for Virginia pine on the Berks soil is high on both north and south aspects. The estimated annual production of wood per acre on the Weikert soil is 500 board feet on north aspects and 410 board feet on south aspects. The estimated annual production of wood per acre on the Berks soil is 595 board feet on north aspects and 500 board feet on south aspects. The slope is the main limitation for woodland management practices or logging operations. The equipment limitation, the erosion potential, and the seedling mortality rate are management concerns. This map unit is managed for Virginia pine, Scotch pine, and eastern white pine. Thinning stands, clearcutting, replanting with a faster growing species, and removing insect-infested or diseased trees increase the potential for timber production. Constructing logging roads on the contour reduces the runoff rate and helps to control erosion.

The slope and the depth to bedrock are limitations on sites for septic tank absorption fields. These limitations can be overcome by locating areas of better suited soils or included areas of deeper soils. The slope and the depth to bedrock are limitations on sites for dwellings. Land shaping and grading and using special designs that conform to the natural shape of the land help to overcome the slope. Ripping or constructing above the bedrock and landscaping with fill material help to overcome the depth to bedrock. The slope and the depth to bedrock are limitations for local roads and streets. Constructing roads on the contour helps to overcome the slope.

The capability subclass is VIIe.

55F—Weikert-Rock outcrop complex, 45 to 70 percent slopes. This map unit consists of the very steep, shallow, well drained Weikert soil and areas of Rock outcrop. It is on side slopes along drainageways and streams. Individual areas are irregular in shape. They range from about 10 to 500 acres in size. The Weikert soil and the Rock outcrop occur as areas so intermingled that it was not practical to map them separately. This map unit is about 65 percent Weikert soil, 15 percent Rock outcrop, and 20 percent other soils.

The typical sequence, depth, and composition of the layers of the Weikert soil are as follows—

Surface layer:
0 to 2 inches, very dark grayish brown channery silt loam

Subsoil:
2 to 11 inches, yellowish brown very channery silt loam

Substratum:
11 to 17 inches, light yellowish brown extremely channery silt loam

Bedrock:
17 inches, shale

Included in mapping are the moderately deep, well

drained Berks, Dekalb, and Gilpin soils. These soils are in landscape positions similar to those of the Weikert soil. Included soils make up about 20 percent of the map unit.

Properties of the Weikert soil—

Permeability: Moderately rapid
Available water capacity: Very low
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Erosion potential: High
Rooting depth: 10 to 20 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches

Most areas of this map unit are used as woodland.

This map unit is unsuited to cultivated crops. The slope and the Rock outcrop limit the safe use of machinery. The available water capacity, the low content of organic matter, the high acidity, and the low natural fertility reduce the production of crops.

This map unit is not suited to pasture or hay. The slope and the Rock outcrop limit the safe use of equipment.

The potential productivity for northern red oak is moderate. The estimated annual production of wood per acre on the Weikert soil is 500 board feet on north aspects and 410 board feet on south aspects. The Rock outcrop and the slope limit the safe operation of heavy equipment. Cable operations or other alternative methods are required to harvest timber. The seedling mortality rate and the windthrow hazard are management concerns. Areas of this map unit are managed for Virginia pine, Scotch pine, and eastern white pine.

The slope, the Rock outcrop, and the depth to bedrock are limitations on sites for septic tank absorption fields and dwellings and for local roads and streets. Areas of this map unit should be avoided for these uses.

The capability subclass is VIIs.

56A—Wheeling loam, 0 to 2 percent slopes, rarely flooded. This soil is deep, nearly level, and well drained. It is on broad low terraces. Slopes are smooth. Individual areas are irregular in shape. They range from 6 to 15 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown loam

Subsurface layer:
5 to 12 inches, dark brown loam

Subsoil:
12 to 39 inches, strong brown loam
39 to 55 inches, dark yellowish brown and dark brown loam
55 to 71 inches, dark brown fine sandy loam

Substratum:
71 to 75 inches, dark yellowish brown sand and gravel

Included with this soil in mapping are the very deep, well drained Allegheny, Combs, and Speedwell soils and the very deep, moderately well drained Cotaco, Sindion, and Zoar soils. Allegheny, Cotaco, and Zoar soils are on terraces in higher positions on the landscape than the Wheeling soil. Speedwell, Sindion, and Combs soils are on flood plains. Also included are soils that have a gravelly surface layer. Included areas make up about 20 percent of the map unit.

Properties of the Wheeling soil—

Permeability: Moderate in the subsoil, rapid in the substratum
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Low
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Rare

Most areas of this soil are used for cultivated crops or for pasture and hay. A small acreage is used as woodland.

This soil is well suited to cultivated crops. The erosion potential is low. Minimum tillage, cover crops, and a crop rotation that includes grasses and legumes increase the content of organic matter, maintain tilth, and conserve moisture in cultivated areas.

This soil is well suited to pasture and hay. The prevention of overgrazing, the control of weeds and brush, and applications of lime and fertilizer help to overcome the acidity, increase the natural fertility, and increase the production of feed and forage.

The potential productivity for yellow-poplar is high. The estimated annual production of wood per acre is 510 board feet. Thinning tree stands maximizes the production of timber.

The flooding and the rapidly permeable substratum are limitations on sites for septic absorption fields, and

the flooding is a limitation on sites for dwellings. Areas of this soil should be avoided for these uses. The flooding, the potential for frost action, and the low strength are limitations for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is I.

56B—Wheeling loam, 2 to 7 percent slopes, rarely flooded. This soil is gently sloping, very deep, and well drained. It is on broad low terraces. Slopes are smooth. Individual areas are irregular in shape. They range from 6 to 20 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark brown loam

Subsurface layer:
5 to 12 inches, dark brown loam

Subsoil:
12 to 39 inches, strong brown loam
39 to 55 inches, dark yellowish brown and dark brown loam
55 to 71 inches, dark brown very fine sandy loam

Substratum:
71 to 75 inches, dark yellowish brown sand and gravel

Included with this soil in mapping are the very deep, well drained Allegheny, Combs, and Speedwell soils and the very deep, moderately well drained Sindion soils. Allegheny soils are on terraces in higher positions on the landscape than the Wheeling soil. Combs, Sindion, and Speedwell soils are on flood plains. Also included are a few areas of soils that have a gravelly surface layer. Included areas make up about 25 percent of the map unit.

Properties of the Wheeling soil—

Permeability: Moderate in the subsoil, rapid in the substratum
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 60 inches
Flooding: Rare

Most areas of this soil are used for cultivated crops or for pasture and hay. A small acreage is used as woodland.

This soil is well suited to cultivated crops. The erosion potential is moderate. In cultivated areas, conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to pasture. The prevention of overgrazing and applications of lime and fertilizer help to overcome the acidity, increase the fertility, maintain the production of feed and forage, and help to control erosion.

The potential productivity for yellow-poplar is high. Seeds and seedlings survive and grow well if competing vegetation is controlled. The estimated annual production of wood per acre is 510 board feet.

The flooding and the permeability in the substratum are limitations on sites for septic absorption fields, and the flooding is a limitation on sites for dwellings. Areas of this soil should be avoided for these uses. The flooding, the potential for frost action, and the low strength are limitation for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

The capability subclass is IIe.

57A—Wheeling-Urban land complex, 0 to 2 percent slopes, rarely flooded. This map unit consists of the nearly level, very deep, well drained Wheeling soil and areas of Urban land. It is on broad low terraces along rivers and streams. Individual areas range from about 10 to 30 acres in size. The Wheeling soil and the Urban land occur as areas so intermingled that it was not practical to map them separately. This map unit is abou 40 percent Wheeling soil, 25 percent Urban land, and 35 percent other soils.

The typical sequence, depth, and composition of the layers of the Wheeling soil are as follows—

Surface layer:
0 to 5 inches, dark silt brown loam

Subsurface layer:
5 to 12 inches, dark brown silt loam

Subsoil:
12 to 39 inches, strong brown loam
39 to 55 inches, dark yellowish brown and dark brown loam
55 to 71 inches, dark brown fine sandy loam

Substratum:
71 to 75 inches, dark yellowish brown sand and gravel

The areas of Urban land consist of asphalt, concrete, buildings, or other impervious surfaces. The original soil has been so altered or obscured that classification of the soil is not feasible.

Included in mapping are the very deep, well drained Allegheny, Combs, and Speedwell soils and the very deep, moderately well drained Cotaco, Sindion, and Zoar soils. Allegheny soils are on terraces in higher positions on the landscape than the Wheeling soil. Cotaco soils are in depressions. Combs, Sindion, and Speedwell soils are on adjacent flood plains. Also included are areas of soils that have a gravelly surface layer.

Properties of the Wheeling soil—

Permeability: Moderate in the subsoil, rapid in the substratum
Available water capacity: Moderate
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Erosion potential: Slight
Rooting depth: More than 60 inches
Organic matter content: Low
Shrink-swell potential: Low
Depth to the seasonal high water table: More than 72 inches
Flooding: Rare

The flooding and the permeability in the substratum are limitations on sites for septic tank absorption fields. The flooding, the low strength, and the potential for frost action are limitations for local roads and streets. Land shaping during road construction raises the soil surface and reduces the damage caused by flooding. Providing a suitable subgrade or base material helps to prevent the damage caused by frost action or low strength.

A capability subclass is not assigned.

58B—Zoar silt loam, 2 to 7 percent slopes. This soil is nearly level and gently sloping, very deep, and moderately well drained. It is on slightly concave stream terraces along streams. Individual areas range from long and winding to oval in shape and are parallel to the adjacent streams. They range from about 6 to 40 acres in size.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches, very dark grayish brown silt loam

Subsoil:
8 to 12 inches, brown silty clay loam that has yellowish brown mottles
12 to 18 inches, yellowish brown silty clay loam that has grayish brown and yellowish red mottles
18 to 31 inches, yellowish brown silty clay that has gray mottles

Substratum:
31 to 39 inches, gray silty clay loam that has yellowish brown and strong brown mottles
39 to 62 inches, gray silty clay loam that has strong brown mottles

Included with this soil in mapping are the very deep, well drained Allegheny soils; the very deep, moderately well drained Cotaco soils; and the very deep, poorly drained Purdy soils. Allegheny soils are on stream terraces in slightly higher positions on the landscape than the Zoar soil. Cotaco soils are in landscape positions similar to those of the Zoar soil. Purdy soils are in depressions. Included soils make up about 25 percent of the map unit.

Properties of the Zoar soil—

Permeability: Slow or moderately slow
Available water capacity: Moderate
Surface runoff: Low
Depth to bedrock: More than 60 inches
Erosion potential: Medium
Rooting depth: More than 60 inches
Shrink-swell potential: Low
Organic matter content: Low
Depth to the seasonal high water table: 18 to 30 inches

Most areas of this soil are used for pasture and hay. A small acreage is used for cultivated crops or woodland.

This soil is moderately well suited to cultivated crops. The seasonal high water table can restrict or delay tillage or the harvesting of cultivated crops. The erosion potential is a management concern. Conservation tillage, cover crops, a crop rotation that includes grasses and legumes, and crop residue management improve soil tilth, increase the content of organic matter in the surface layer, reduce crusting, increase the water infiltration rate, and help to control erosion.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes are management concerns. Deferred grazing, controlling weeds, proper stocking rates, and applications of lime and fertilizer are management practices that increase the production of feed and forage and help to control erosion. Grazing during wet periods often cuts and compacts the surface layer, thereby reducing yields and increasing the erosion potential.

The potential productivity for eastern white pine is very high. The estimated annual production of wood per acre is 723 feet. The seasonal high water table can limit the use of heavy logging equipment during prolonged wet periods. This soil is managed for eastern white pine, Virginia pine, and yellow-poplar. Seeds and seedlings survive and grow well if competing vegetation is controlled.

The seasonal high water table and the permeability in the subsoil are limitations on sites for septic tank absorption fields. The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings. These limitations can be overcome by locating areas of better suited soils or included areas of well drained soils. The low strength is a limitation on sites for local roads and streets. Providing a suitable subgrade or base material helps to overcome the low strength.

The capability subclass is IIe.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

The survey area has a limited acreage of prime farmland. About 6,485 acres, or 3.3 percent of the total acreage, meets the soil requirements of prime farmland. Scattered areas of this land are throughout the survey area, but the largest areas are mainly along the flood plains and terraces of the Roanoke River and its main tributaries. Most areas of prime farmland are used for pasture, hay, and cultivated crops such as corn, corn silage, and small grain.

The survey area contains the independent cities of Roanoke and Salem. Urban sprawl has encompassed a large part of the survey area because of the rapid growth that occurred in the late 1970's and the 1980's. The urban growth resulted in the loss of some prime farmland to industrial, commercial, residential, and recreational uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland 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. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

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 to prevent 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 behavioral 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 recreational 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

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 Natural Resources 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 the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1987, approximately 27,259 acres in the survey area was used for crops and pasture. Of this, about 9,000 acres was used for crops and about 18,259 was used for pasture. Of the acreage used for cropland, about 5,500 acres was used for hay; about 1,800 acres was used in a cropping system that includes corn silage, small grain, and grasses; and about 2,000 acres was used for apple and peach orchards.

Although the climate and many of the soils in the survey area are suited to the cultivated crops commonly grown, erosion is a hazard. Controlling erosion is a major management concern. Most areas of cropland have slopes of more than 2 percent. The soils in these areas are subject to erosion. Conservation practices include conservation tillage, stripcropping, crop rotation, cover crops in the winter, and grassed waterways. No-till planting is the most common conservation tillage practice.

The natural fertility of most soils in the survey area is low to medium. Reaction is generally extremely acid to slightly acid. The fertility of the soils on flood plains, such as Combs, Sindion, and Speedwell soils, is generally higher that that of soils on terraces and in the uplands. In most areas of cropland, repeated applications of lime and fertilizer have altered the natural fertility and acidity of the soils.

Organic matter is the major source of nitrogen in soil. It also helps the soil retain plant nutrients and water and helps to prevent soil crusting and compacting. Most of the soils in areas of cropland have a surface layer of loam, silt loam, fine sandy loam, or sandy loam. Except

for the Combs, Sindion, and Speedwell soils, most of the soils in the survey area have a low content of organic matter. Although it is difficult to significantly increase the content of organic matter, the levels can be maintained by applying manure, using cover crops, and incorporating crop residue into the surface layer.

Tilth is an important factor for the emergence of seedlings and the infiltration of water. Soils that have good tilth generally have a granular structure and are porous. Adding organic matter to the soils helps to maintain good tilth.

The available water capacity is low or very low in some of the soils in the survey area. Examples of these soils include Derroc, Litz, and Spessard soils. Adding organic matter helps to improve the available water capacity.

Slope, stoniness, and depth to bedrock limit many areas to uses that are less extensive, such as hay and pasture. A grass-clover mixture is the primary type of hay grown, although the total acreage planted to alfalfa has been increasing significantly. Many of the deep, well drained, gently sloping and strongly sloping soils, such as Evard, Frederick, Hayesville, Shottower, and Tumbling soils, are well suited to alfalfa if they are properly limed and fertilized.

Grasses that are used for hay are mainly orchardgrass and fescue. Pastures consist of predominantly cool-season grasses, such as bluegrass, orchardgrass, and fescue. Pastures that are not easily accessible to farm machinery are used for native grasses. Native grasses include warm-season varieties, such as broom sedge and bluestem.

Some landowners use fields for both pasture and hay. The most widely used method is to stockpile fescue for winter grazing. One or two cuttings are taken in the spring of the year, additional nitrogen is applied in August, and cattle are allowed to graze the accumulated growth during the winter. Another less used practice is to take a first cutting of orchardgrass and allow the cattle to graze the regrowth in the late spring.

The main specialty crops are apples and peaches, which are grown in the eastern part of Roanoke County. This area offers a better combination of soils, relief, and climate than the western part of the county for the production of apples and peaches. Other specialty crops include Christmas trees, strawberries, nursery plants, and truck crops. Specialty crops are becoming increasing poplar as part-time farmers develop small-scale, profitable enterprises.

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 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 Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

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 few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

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

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of the map units in the survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

About 115,000 acres, or about 59 percent of the survey area, is used as woodland (fig. 11). About 2,900 acres in the Jefferson National Forest is not in the survey area. Virgin forest once covered most of the survey area, but a large percentage of the land suitable for cultivation has been cleared of trees. The remaining woodland is not practical for farming because the soils are too steep, stony, remote, or shallow to farm in an economic manner. All of the woodland supports second-growth hardwoods, Virginia pine, and shortleaf pine. If the woodland is properly managed, most areas will produce high-quality trees.

The largest acreage of woodland is in general soil map units 4, 7, 8, 9, and 10, which are described in the section "General Soil Map Units." In areas in the uplands, the most common trees are chestnut oak, white oak, black oak, hickory, yellow-poplar, Virginia pine, and pitch pine. Black walnut and eastern red cedar are in upland limestone areas. In areas on bottom land and terraces, the most common trees are maple, yellow-poplar, white pine, and sycamore. Some small areas throughout the survey area have been harvested and then planted to white pine.

Table 7 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. The table lists 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, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*, snowpack. 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, F, and N.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that

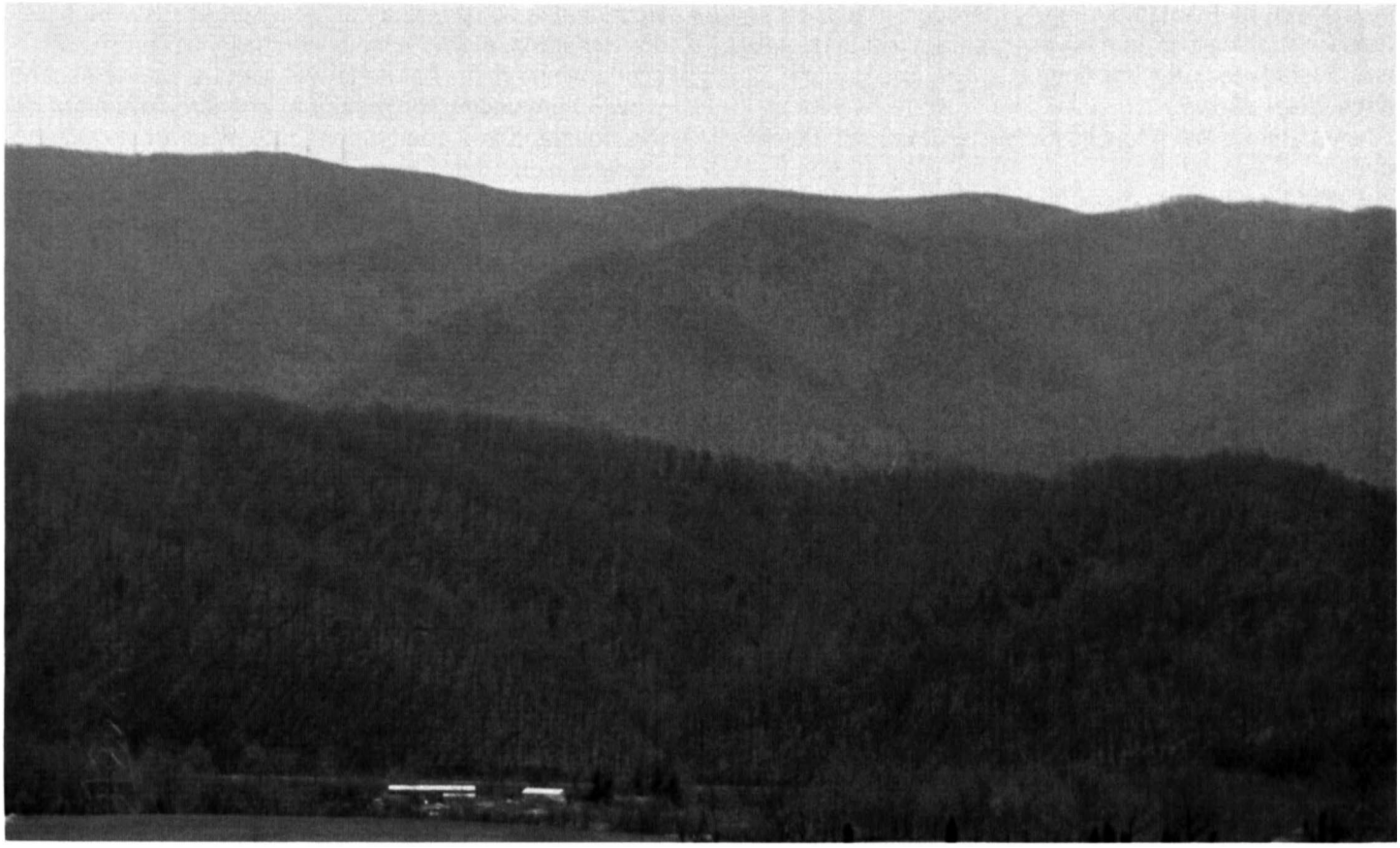

Figure 11.—Sylvatus very channery silt loam, 35 to 55 percent slopes, Chiswell-Litz complex, 15 to 25 percent slopes, and Chiswell-Litz complex, 25 to 50 percent slopes, on low mountain side slopes. Areas of these soils are well suited to use as woodland and wildlife habitat.

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.

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 under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep

enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition 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 regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site 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. Commonly grown 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, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Recreation

Because the survey area does not contain a large area of navigable water, fishing is the main water activity. The Roanoke River and its main tributaries, from the city of Salem to Bedford County, are stocked with trout annually. Some people also fish on privately owned ponds. Boating and canoeing are available nearby on the Smith Mountain Reservoir in Bedford and Franklin Counties and on the James River in Botetourt County.

Other outdoor recreational activities that are available in the survey area include hiking, picnicking, golfing, tennis, and sight-seeing. The Appalachian Trail is in the northern and northwestern parts of Roanoke County. Other trails are in the nearby Jefferson National Forest.

The survey area has six 18-hole golf courses and several public and private tennis courts. The Blue Ridge Parkway is in the eastern part of Roanoke County. It offers many picturesque views of the Roanoke Valley area.

Dixie Caverns are located in the southern part of Roanoke County, just off of U.S. Interstate 81.

No public camping areas are in the survey area, although many of the soils, especially in general soil map units 1, 3, and 7, are well suited to this use.

The soils of the survey area are rated in table 8 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 sewer lines. 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 recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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

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 9, 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 flooding. 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, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. 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 flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, broom sedge, 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, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, 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, fir, cedar, and juniper.

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, wild millet, wildrice, saltgrass, 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, waterfowl feeding areas, 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. Wildlife attracted to these areas include bobwhite quail, pheasant, 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 wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

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, mink, and beaver.

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. Ratings are given for 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 should 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 or 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 kinds 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 evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and 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 10 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 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. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, 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 or 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 11 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 11 also shows the suitability of the soils for use as daily cover for landfill. 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.

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 11 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 resulting from rapid permeability in 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 should be considered.

The ratings in table 11 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 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 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 the 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 12 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 to 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, a 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 a 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 have a water table at a depth of less than 1 foot. These soils 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. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, 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 high 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 13 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 and embankments, dikes, and levees. 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, irrigation, 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.

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 the potential for 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, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control 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 soil blowing 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 soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts and 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 to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 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 the heading "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. "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 *(1)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

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.

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 15 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, 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 and septic tank absorption fields.

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 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 15, 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 in 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 16 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 infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist 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 a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 16, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information 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 little or no horizon development.

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 estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16. Only

saturated zones within a depth of about 6 feet are indicated.

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. 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.

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 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 results in a severe hazard of corrosion. 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 *(4)*. 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 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven 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 Ultisol.

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 Aquult (*Aqu*, meaning water, plus *ult*, from Ultisol).

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 Ochraquults (*Ochr*, meaning pale, plus *aquult*, the suborder of the Ultisols 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 *Typic* identifies the subgroup that typifies the great group. An example is Typic Ochraquults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, 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 clayey, mixed, nonacid, mesic Typic Ochraquults.

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" *(3)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(4)*. 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."

Alderflats Series

Soils of the Alderflats series are very deep and are poorly drained. They formed in alluvium in upland depressions. They are derived from crystalline rocks in

the Blue Ridge. Slopes range from 0 to 4 percent.

Alderflats soils are commonly near Edneyville, Evard, Hayesville, and Thurmont soils. These nearby soils are better drained than the Alderflats soils.

Typical pedon of Alderflats silt loam, 0 to 4 percent slopes, 0.4 mile south of the intersection of U.S. Highway 221 and Virginia Highway 711, about 200 feet west of Virginia Highway 711, in Bent Mountain:

Ap—0 to 5 inches; dark grayish brown (2.5Y 4/2) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine and very fine roots; moderately acid; clear smooth boundary.

Btg1—5 to 12 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine roots; few fine thin discontinuous clay films on the inside of faces of peds; strongly acid; gradual smooth boundary.

Btg2—12 to 24 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky and slightly plastic; common medium discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg3—24 to 30 inches; gray (5Y 6/1) and greenish gray (5GY 6/1) silty clay loam; common medium prominent yellowish red (5YR 5/8) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; common medium discontinuous clay films on faces of peds; moderately acid; clear smooth boundary.

Cg1—30 to 50 inches; greenish gray (5GY 6/1) silty clay loam; few medium prominent strong brown (7.5YR 5/8) mottles; massive; friable, slightly sticky and nonplastic; moderately acid; clear smooth boundary.

2Cg2—50 to 62 inches; gray (5GY 6/1) and olive gray (5Y 5/2) loamy sand; many coarse prominent strong brown (7.5YR 5/8) mottles; massive; friable, nonsticky and nonplastic; slightly acid.

The thickness of the solum ranges from 24 to 40 inches. The content of fine quartz gravel ranges from 0 to 5 percent in the B and C horizons. In unlimed areas, reaction ranges from strongly acid to slightly acid.

The Ap horizon has hue of 2.5Y or 5Y or is neutral in hue. It has value of 2 to 4 and chroma of 0 to 2. It is silt loam.

The Btg horizon has hue of 5Y to 5GY or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is silty clay loam, silty clay, or clay loam.

The Cg horizon has hue of 5Y to 5B or is neutral in hue. It has value of 5 to 7 and chroma of 0 to 2. It is sandy loam, loamy sand, or loamy fine sand.

Allegheny Series

Soils of the Allegheny series are very deep and are well drained. They formed in old alluvial material derived from sandstone, shale, and siltstone. They are on stream terraces in the Roanoke Valley. Slopes range from 2 to 15 percent.

Allegheny soils are commonly near Cotaco, Purdy, Shottower, Wheeling, and Zoar soils. Cotaco, Purdy, and Zoar soils are wetter than the Allegheny soils. Shottower soils have more clay in the subsoil than the Allegheny soils, and Wheeling soils have a higher base saturation.

Typical pedon of Allegheny loam, 2 to 7 percent slopes, 4 miles east of the intersection of Virginia Highways 646 and 612, about 200 feet south of the Roanoke River:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; friable, nonsticky and nonplastic; common very fine roots; strongly acid; abrupt smooth boundary.

BE—8 to 16 inches; dark brown (7.5YR 4/4) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few fine and very fine roots; strongly acid; clear smooth boundary.

Bt1—16 to 25 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; very few fine roots; few thin discontinuous clay films; strongly acid; clear smooth boundary.

Bt2—25 to 37 inches; brown (7.5YR 5/4) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; moderately acid; common medium very dark grayish brown (10YR 3/2) stains on faces of peds; common moderately thick discontinuous clay films; strongly acid; clear smooth boundary.

BC—37 to 43 inches; brown (7.5YR 5/4) clay loam; common medium prominent very dark grayish brown (10YR 3/2) and few fine prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; strongly acid; gradual smooth boundary.

C—43 to 62 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct dark brown (7.5YR 4/4) and few fine distinct grayish brown (10YR 5/2) mottles; massive; firm, slightly sticky and slightly plastic; strongly acid.

The thickness of the solum ranges from 30 to 60

inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 15 percent in the A and B horizons. The content of gravel and cobblestones ranges from 0 to 35 percent in the C horizon. In unlimed areas, reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 5. It is loam.

The BE horizon has hue of 7.5YR or 10YR. It ranges from sandy loam to silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is clay loam, sandy clay loam, loam, or silt loam. Some pedons are mottled in shades of red, yellow, brown, and gray below the upper 24 inches of the argillic horizon.

The BC horizon has hue of 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is loam, fine sandy loam, sandy clay loam, or clay loam in the fine-earth fraction.

Berks Series

Soils of the Berks series are moderately deep and are well drained. They formed in residuum derived from shale, siltstone, and sandstone. They are on uplands. Slopes range from 7 to 45 percent.

Berks soils are commonly near Dekalb, Gilpin, Grimsley, Laidig, Sequoia, Shelocta, Spessard, Tumbling, and Weikert soils. Dekalb soils have less clay in the B horizon than the Berks soils. Gilpin, Laidig, Sequoia, and Tumbling soils have fewer coarse fragments in the subsoil than the Berks soils. Laidig, Grimsley, and Tumbling soils are deeper over bedrock than the Berks soils, and Weikert soils are not as deep over bedrock.

Typical pedon of Berks channery silt loam, in an area of Weikert-Berks complex, 7 to 15 percent slopes; 0.15 mile north of the intersection of Virginia Highway 311 and County Road 1709:

A—0 to 4 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and few medium roots; 20 percent rock fragments; strongly acid; clear smooth boundary.

Bw1—4 to 12 inches; brownish yellow (10YR 6/6) channery silt loam; moderate fine and medium angular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; few fine discontinuous pores; 20 percent rock fragments; strongly acid; clear smooth boundary.

Bw2—12 to 19 inches; yellowish brown (10YR 5/8) very channery silt loam; moderate fine angular blocky structure; friable, nonsticky and nonplastic; few fine and medium roots; few fine discontinuous pores; 40 percent rock fragments; very strongly acid; clear smooth boundary.

C—19 to 27 inches; yellowish brown (10YR 5/8) extremely channery silt loam; moderate fine angular blocky structure; friable, nonsticky and nonplastic; few fine and medium roots; 75 percent rock fragments; strongly acid; abrupt wavy boundary.

R—27 inches; acid shale bedrock.

The thickness of the solum ranges from 12 to 35 inches. The depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from 10 to 50 percent in the A horizon, from 15 to 75 percent in the B horizons, and from 35 to 90 percent in the C horizon. Reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam in the fine-earth fraction.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is silt loam, loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is silt loam or loam in the fine-earth fraction.

The bedrock is shale or fine-grained sandstone.

Chilhowie Series

Soils of the Chilhowie series are moderately deep and are well drained. They formed in residuum derived from interbedded limestone and calcareous shale. They are on uplands in limestone valleys. Slopes range from 7 to 60 percent.

Chilhowie soils are commonly near Frederick, Groseclose, Opequon, and Sequoia soils. Frederick and Groseclose soils are deeper over bedrock than the Chilhowie soils, and Opequon soils are not as deep over bedrock. Sequoia soils are deeper over hard bedrock than the Chilhowie soils.

Typical pedon of Chilhowie silty clay loam, 7 to 15 percent slopes, severely eroded, about 25 feet north of Virginia Highway 623 and 0.4 mile east-northeast of the intersection of Virginia Highways 623 and 118:

Ap—0 to 5 inches; dark brown (10YR 4/3) silty clay loam; moderate fine granular structure; friable, nonsticky and slightly plastic; common fine and very fine roots; neutral; clear wavy boundary.

Bt1—5 to 12 inches; yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine and very fine roots; many distinct thin continuous clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2—12 to 24 inches; yellowish brown (10YR 5/6) clay; moderate medium and fine subangular blocky structure; firm, sticky and plastic; few medium roots; many thin continuous clay films on faces of peds; slightly acid; gradual smooth boundary.
C—24 to 34 inches; yellowish brown (10YR 5/6) silty clay loam; massive; firm, slightly sticky and slightly plastic; neutral; clear wavy boundary.
R—34 inches; moderately hard interbedded limestone and calcareous shale bedrock.

The thickness of the solum ranges from 10 to 25 inches. The depth to bedrock ranges from 20 to 40 inches. The content of limestone and shale rock fragments ranges from 0 to 15 percent in the A and B horizons and from 25 to 80 percent in the C horizon. Reaction ranges from slightly acid to mildly alkaline in the solum and from neutral to moderately alkaline in the substratum.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is silty clay loam.

The B horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay or clay in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is silty clay or clay in the fine-earth fraction.

The bedrock is interbedded limestone and calcareous shale.

Chiswell Series

Soils of the Chiswell series are shallow and are well drained. They formed in material weathered from shale, siltstone, and fine-grained sandstone. They are on uplands. Slopes range from 2 to 50 percent.

Chiswell soils are near Groseclose, Litz, Shottower, and Thurmont soils. These nearby soils are deeper over bedrock than the Chiswell soils.

Typical pedon of Chiswell channery silt loam, in an area of Chiswell-Litz complex, 25 to 50 percent slopes; about 0.2 mile northwest of the junction of County Roads 1662 (McVitty Road) and 1663 (Cave Spring Road), 200 feet north of County Road 1662:

A—0 to 2 inches; dark brown (7.5YR 4/2) channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and common medium and coarse roots; 25 percent rock fragments; very strongly acid; abrupt smooth boundary.
Bw—2 to 12 inches; reddish brown (5YR 4/4) very channery silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; 55 percent rock fragments; very strongly acid; clear smooth boundary.
Cr—12 inches; reddish brown (5YR 5/3), brown (7.5YR 5/4), and brownish yellow (10YR 6/8) soft shale.

The thickness of the solum ranges from 5 to 19 inches. The depth to soft or weathered bedrock ranges from 10 to 20 inches. The content of shale, siltstone, or fine-grained sandstone fragments ranges from 5 to 40 percent in the A horizon, from 20 to 80 percent in the Bw horizon, and from 45 to 90 percent in the C horizon. In unlimed areas, reaction ranges from extremely acid to moderately acid.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 5. It is silt loam in the fine-earth fraction.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam, loam, silty clay loam, or clay loam in the fine-earth fraction.

The C horizon, if it occurs, has hue of 5YR to 5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam, loam, silty clay loam, or clay loam in the fine-earth fraction.

Clubcaf Series

Soils of the Clubcaf series are very deep and are poorly drained. They formed in alluvium on the flood plains of rivers and streams. Slopes range from 0 to 2 percent.

Clubcaf soils are commonly near Combs, Derroc, Sindion, and Speedwell soils. These nearby soils are better drained than the Clubcaf soils.

Typical pedon of Clubcaf silt loam, 0 to 2 percent slopes, occasionally flooded, about 150 feet south of Virginia Highway 785, about 3.75 miles west of the intersection of Virginia Highways 311 and 785:

Ap—0 to 9 inches; very dark brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable, slightly sticky and nonplastic; few fine roots; neutral; gradual smooth boundary.
Bg1—9 to 27 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; common fine prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; neutral; gradual smooth boundary.
Bg2—27 to 37 inches; very dark gray (10YR 3/2) silt loam; common medium prominent strong brown (7.5YR 4/6) mottles; moderate coarse subangular blocky structure; friable, slightly sticky and nonplastic; neutral; clear smooth boundary.
Cg1—37 to 55 inches; gray (10YR 5/1) silty clay loam;

many medium distinct yellowish brown and very dark gray (10YR 4/1) mottles; massive; friable, slightly sticky and slightly plastic; mildly alkaline; clear smooth boundary.

Cg2—55 to 62 inches; dark grayish brown (10YR 4/2) channery sandy loam; many coarse distinct yellowish brown (10YR 5/6) mottles; massive; friable, nonsticky and nonplastic; 20 percent gravel; mildly alkaline.

The thickness of the solum ranges from 30 to 60 inches. The content of rock fragments, which are mainly gravel-sized, ranges from 0 to 5 percent in the Ap and Bg horizons and from 0 to 30 percent in the C horizon. Reaction ranges from moderately acid to mildly alkaline.

The Ap horizon has hue of 10YR to 5Y, value of 2 or 3, and chroma of 2 or 3. It is silt loam.

The B horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. It is silt loam, loam, or silty clay loam.

The C horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 2 to 7 and chroma of 0 to 4. It is silt loam, loam, clay loam, sandy loam, or loamy sand in the fine-earth fraction.

Combs Series

Soils of the Combs series are very deep and are well drained. They formed in alluvium on the flood plains of rivers and streams. Slopes range from 0 to 2 percent.

Combs soils are commonly near Clubcaf, Derroc, Sindion, and Speedwell soils. Clubcaf and Sindion soils are wetter than the Combs soils. Derroc soils have more coarse fragments in the subsoil than the Combs soils, and Speedwell soils have more clay in the subsoil.

Typical pedon of Combs loam, 0 to 2 percent slopes, occasionally flooded, about 1.4 miles southwest of the intersection of U.S. Highway 11 and alternate U.S. Highway 11, about 1.4 mile east of the intersection of U.S. Highway 11 and Virginia Highway 112:

Ap—0 to 18 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; weak fine granular structure; friable, slightly sticky and nonplastic; many fine and medium roots; neutral; clear smooth boundary.

Bw1—18 to 40 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular structure; friable, slightly sticky and nonplastic; few fine roots; neutral; gradual smooth boundary.

Bw2—40 to 72 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few very fine roots; neutral.

The thickness of the solum is more than 40 inches, and the thickness of the mollic epipedon is 10 to 24 inches. Reaction ranges from moderately acid to neutral throughout the profile. The content of coarse fragments is as much as 15 percent.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. It is loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 4 to 8. It is loam, fine sandy loam, or sandy loam.

The C horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, or sandy loam.

Cotaco Series

Soils of the Cotaco series are very deep and are moderately well drained. They formed in alluvial and colluvial material derived from sandstone, shale, and siltstone. They are on low stream terraces and colluvial benches. Slopes range from 2 to 15 percent.

Cotaco soils are commonly near Allegheny, Purdy, Wheeling, and Zoar soils. Allegheny and Wheeling soils are better drained than the Cotaco soils. Purdy soils are wetter than the Cotaco soils. Purdy and Zoar soils have more clay in the subsoil than the Cotaco soils.

Typical pedon of Cotaco loam, 2 to 7 percent slopes, about 200 feet east of U.S. Highways 460 and 11, about 0.15 mile southwest of the intersection of Virginia Highway 777 and U.S. Highways 460 and 11:

Ap1—0 to 4 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine and very fine roots; 2 percent gravel; strongly acid; clear smooth boundary.

Ap2—4 to 11 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many fine and common very fine roots; 2 percent gravel; strongly acid; abrupt smooth boundary.

BA—11 to 17 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few fine and very fine roots; 2 percent gravel; strongly acid; clear smooth boundary.

Bt1—17 to 26 inches; yellowish brown (10YR 5/6) loam; common medium distinct strong brown (7.5YR 5/6) and common fine prominent light olive brown (2.5Y 5/4) and grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few very fine roots; few fine discontinuous clay films on faces of peds; 5 percent gravel; strongly acid; gradual smooth boundary.

Bt2—26 to 44 inches; mottled light olive brown (2.5Y 5/4), grayish brown (2.5Y 5/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) loam;

moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few very fine roots; few fine discontinuous clay films on faces of peds and inside peds; 5 percent gravel; strongly acid; gradual smooth boundary.

BC—44 to 50 inches; mottled light olive brown (2.5Y 5/4), grayish brown (2.5Y 5/4), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; 10 percent gravel; very strongly acid; clear smooth boundary.

C—50 to 63 inches; mottled yellowish brown (10YR 5/6), grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/4), strong brown (7.5YR 5/6) very gravelly loam; massive; friable, nonsticky and nonplastic; 40 percent gravel; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 2 to 30 percent in the solum and from 2 to 50 percent in the C horizons. In unlimed areas, reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam in the fine-earth fraction.

The BA horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, or clay loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, or clay loam in the fine-earth fraction. It is mottled in shades of brown, red, and gray.

The BC horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, loam, silt loam, or clay loam in the fine-earth fraction. It is mottled in shades of brown, red, and gray.

The C horizon has hue of 7.5YR to 2.5Y or is neutral in hue. It has value of 4 to 8 and chroma of 0 to 8. It is loam, clay loam, or fine sandy loam in the fine-earth fraction.

Dekalb Series

Soils of the Dekalb series are moderately deep and are well drained. They formed in residuum derived from sandstone. They are on upland side slopes and summits. Slopes range from 7 to 80 percent.

Dekalb soils are near Berks, Spessard, Sylvatus, Tumbling, and Weikert soils. Berks, Sylvatus, and Weikert soils have less sand in the solum than the Dekalb soils. Spessard and Tumbling soils are deeper over bedrock and have fewer coarse fragments in the subsoil than the Dekalb soils. Spessard soils have less clay in the subsoil than the Dekalb soils, and Tumbling soils have more clay in the subsoil.

Typical pedon of Dekalb channery sandy loam, in an area of Dekalb-Rock outcrop complex, 25 to 80 percent slopes; about 0.2 mile northwest of the intersection of Virginia Highways 655 and 311, about 50 yards north of Virginia Highway 311:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; 20 percent rock fragments; extremely acid; abrupt smooth boundary.

E—2 to 5 inches; brown (10YR 5/3) channery sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine roots; 25 percent rock fragments; very strongly acid; clear smooth boundary.

Bw—5 to 21 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; 45 percent rock fragments; very strongly acid; clear wavy boundary.

C—21 to 25 inches; yellowish brown (10YR 5/6) very channery sandy loam; massive; friable, nonsticky and nonplastic; common fine roots; 60 percent rock fragments; very strongly acid; abrupt wavy boundary.

R—25 inches; hard, grayish brown sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges from 15 to 50 percent in the A horizon and from 40 to 70 percent in the B and C horizons. Reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. It is sandy loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

Derroc Series

Soils of the Derroc series are very deep and are well drained. They formed in moderately textured and coarse textured alluvium. They are on flood plains. Slopes range from 0 to 4 percent.

Derroc soils are commonly near Clubcaf, Combs, Sindion, and Speedwell soils. These nearby soils have fewer coarse fragments in the subsoil than the Derroc soils. Clubcaf, Sindion, and Speedwell soils have more clay in the subsoil than the Derroc soils.

Typical pedon of Derroc cobbly sandy loam, 0 to 4 percent slopes, occasionally flooded, about 0.5 mile north and 100 feet east of the intersection of Virginia Highways 612 and 639:

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) cobbly sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and very fine roots; 20 percent cobbles and 5 percent gravel; moderately acid; abrupt smooth boundary.

Bw1—4 to 14 inches; dark brown (7.5YR 4/4) cobbly sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many fine and common very fine roots; 25 percent cobbles and 10 percent gravel; slightly acid; clear smooth boundary.

Bw2—14 to 31 inches; dark brown (7.5YR 4/4) very cobbly sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few very fine roots; 40 percent cobbles and 15 percent gravel; slightly acid; abrupt smooth boundary.

2C—31 to 65 inches; dark yellowish brown (10YR 4/4) extremely cobbly loamy sand; massive; very friable, nonsticky and nonplastic; 65 percent cobbles and 10 percent gravel; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments of gravel and cobbles ranges from 5 to 60 percent in the A horizon and from 35 to 70 percent in the B and C horizons. Reaction is moderately acid or slightly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is sandy loam in the fine-earth fraction.

The B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy loam or loam in the fine-earth fraction.

The C or 2C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It is loamy sand or sandy loam in the fine-earth fraction.

Edgemont Series

Soils of the Edgemont series are very deep and are well drained. They formed in residuum weathered from quartzite in the Blue Ridge. Slopes range from 7 to 60 percent.

Edgemont soils are commonly near Edneyville, Evard, Hayesville, and Peaks soils. Edneyville soils have less clay in the subsoil than the Edgemont soils. Evard and Hayesville soils contain mica flakes in the subsoil. Hayesville soils are redder and have more clay in the subsoil than the Edgemont soils. Peaks soils have more coarse fragments in the subsoil than the Edgemont soils and are not as deep over bedrock.

Typical pedon of Edgemont channery sandy loam, 15 to 35 percent slopes, about 75 yards east of the end of Virginia Highway 850:

A—0 to 2 inches; very dark gray (10YR 3/1) channery sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine common coarse and few medium roots; 30 percent channers; extremely acid; abrupt smooth boundary.

E—2 to 6 inches; pale brown (10YR 5/3) channery sandy loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; many fine common coarse and few medium roots; 20 percent channers; very strongly acid; clear smooth boundary.

BE—6 to 19 inches; light yellowish brown (10YR 6/4) loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and few coarse roots; 10 percent channers; very strongly acid; clear smooth boundary.

Bt1—19 to 27 inches; brownish yellow (10YR 6/6) and reddish yellow (7.5YR 6/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine discontinuous clay films on faces of peds; 5 percent channers; strongly acid; gradual smooth boundary.

Bt2—27 to 38 inches; strong brown (7.5YR 5/6) clay loam; many medium distinct brownish yellow (10YR 6/6) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; common fine discontinuous clay films on faces of peds; 5 percent channers; strongly acid; clear smooth boundary.

C1—38 to 49 inches; strong brown (7.5YR 5/6) clay loam; many medium prominent yellowish red (5YR 5/8) and very pale brown (10YR 7/4) mottles; massive; firm, sticky and plastic; few fine roots; strongly acid; gradual smooth boundary.

C2—49 to 62 inches; strong brown (7.5YR 5/8) loam; many medium prominent gray (10YR 7/2) and many medium distinct yellowish red (5YR 5/8) mottles; massive; firm, sticky and plastic; few fine roots; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments of quartzite and quartz ranges from 0 to 35 percent in the A horizon and from 0

to 20 percent in the B and C horizons. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 4. It is sandy loam in the fine-earth fraction.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 4. It is sandy loam in the fine-earth fraction.

The BE horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 2 to 8. It is loam, clay loam, or sandy loam.

Edneyville Series

Soils of the Edneyville series are very deep and are well drained. They formed in loamy material weathered from granite and gneiss. They are on upland summits and side slopes in the Blue Ridge. Slopes range from 2 to 55 percent.

Edneyville soils are commonly near Alderflats, Edgemont, Evard, Hayesville, Peaks, and Thurmont soils. Alderflats soils are wetter than the Edneyville soils. Edgemont, Evard, Hayesville, and Thurmont soils have more clay in the subsoil than the Edneyville soils, and Peaks soils are not as deep over bedrock.

Typical pedon of Edneyville fine sandy loam, 25 to 55 percent slopes, about 1 mile west of the intersection of Virginia Highways 692 and 689, about 0.5 mile south of Virginia Highway 692:

O—1 inch to 0; very dark gray (10YR 3/1) decomposed leaves and twigs.

A—0 to 1 inch; dark brown (10YR 4/3) fine sandy loam; very weak fine granular structure; very friable, nonsticky and nonplastic; many fine and few medium roots; very strongly acid; abrupt smooth boundary.

AB—1 to 4 inches; yellowish brown (10YR 5/4) fine sandy loam; very weak fine granular structure; very friable, nonsticky and nonplastic; common fine and few medium roots; few fine flakes of mica; 5 percent gravel; very strongly acid; clear smooth boundary.

Bw1—4 to 11 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; few fine flakes of mica; 5 percent gravel; very strongly acid; gradual smooth boundary.

Bw2—11 to 20 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; many fine flakes of mica; 5 percent gravel; very strongly acid; clear smooth boundary.

Bw3—20 to 31 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few fine and coarse roots; many fine flakes of mica; 5 percent gravel; very strongly acid; clear wavy boundary.

C—31 to 62 inches; yellowish brown (10YR 5/6) saprolite that crushes to sandy loam.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 15 percent throughout the profile. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is sandy loam.

The AB horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is fine sandy loam, sandy loam, or loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It is fine sandy loam, sandy loam, or loam.

The C horizon is brown, yellow, or gray saprolite that crushes to fine sandy loam, sandy loam, or loam.

Evard Series

Soils of the Evard series are very deep and are well drained. They formed in loamy material weathered from granite, gneiss, and schist. They are on upland side slopes and summits in the Blue Ridge. Slopes range from 7 to 55 percent.

Evard soils are commonly near Alderflats, Edneyville, Hayesville, Peaks, and Thurmont soils. Alderflats soils are wetter than the Evard soils. Peaks soils are not as deep over bedrock. Edneyville soils have less clay in the subsoil than the Evard soils, and Hayesville soils have more clay and are redder in the subsoil. Thurmont soils have a thicker solum than the Evard soils.

Typical pedon of Evard fine sandy loam, 25 to 55 percent slopes, about 1 mile west of the intersection of Virginia Highways 686 and 692, about 200 feet south of Virginia Highway 686:

O—2 inches to 0; loose leaf litter and twigs.

A—0 to 3 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; 2 percent gravel; very strongly acid; abrupt smooth boundary.

BE—3 to 5 inches; yellowish brown (10YR 5/6) fine

sandy loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and few medium roots; very strongly acid; clear smooth boundary.

Bt1—5 to 12 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; many fine and medium roots; common fine discontinuous pores; few faint discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—12 to 31 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common fine and few medium roots; common fine discontinuous pores; common distinct discontinuous clay films on faces of peds; few flakes of mica; very strongly acid; clear wavy boundary.

C1—31 to 44 inches; red (2.5YR 4/6), yellowish red (5YR 4/6), and very pale brown (10YR 7/4) sandy clay loam; massive; friable, sticky and slightly plastic; few fine roots; common fine discontinuous pores; many flakes of mica; very strongly acid; clear wavy boundary.

C2—44 to 68 inches; strong brown (7.5YR 5/8) saprolite that crushes to sandy loam; massive rock structure; friable; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. It is fine sandy loam.

The BE horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 4 to 8. It is clay loam or sandy clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 8, and chroma of 4 to 8. It is sandy loam, fine sandy loam, or loamy sand. Some pedons are mottled in shades of white, brown, and red.

Frederick Series

Soils of the Frederick series are very deep and are well drained. They formed in residuum derived from dolomitic limestone. They are in gently sloping to steep areas in the uplands. Slopes range from 2 to 35 percent.

Frederick soils are commonly near Chilhowie, Opequon, and Timberville soils. Chilhowie and Opequon soils are not as deep over bedrock as the Frederick soils, and Timberville soils have less clay in the subsoil.

Typical pedon of Frederick silt loam, 7 to 15 percent slopes, about 0.5 mile northwest of the intersection of Virginia Highways 624 and 697, near the Ridges in Roanoke County:

Ap—0 to 12 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine roots; moderately acid; abrupt smooth boundary.

Bt1—12 to 32 inches; yellowish red (5YR 5/8) clay; common medium distinct pink (7.5YR 7/4) mottles; moderate medium subangular structure; firm, sticky and plastic; common fine roots; many distinct clay films on faces of peds; strongly acid; diffuse smooth boundary.

Bt2—32 to 62 inches; yellowish red (5YR 5/8) clay; common medium distinct reddish yellow (7.5YR 6/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; many distinct clay films on faces of peds; strongly acid; diffuse smooth boundary.

Bt3—62 to 72 inches; yellowish red (5YR 5/8) clay; many medium distinct reddish yellow (7.5YR 6/6) mottles; coarse medium subangular blocky structure; firm, sticky and plastic; many distinct clay films on faces of peds; strongly acid.

The thickness of the solum is more than 60 inches. The depth to bedrock is more than 72 inches. The content of rock fragments, which are mostly chert, ranges from 0 to 30 percent in the A horizons and from 0 to 50 percent below that depth. Reaction ranges from very strongly acid to moderately acid.

The Ap horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. The A horizon, if it occurs, has hue of 7.5YR to 10YR, value of 3 or 4, and chroma of 1 to 4. It is silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay in the upper part and silty clay or clay in the lower part. Some parts are mottled in shades of red, yellow, brown, and gray.

Gilpin Series

Soils of the Gilpin series are moderately deep and are well drained. They formed in residuum weathered from shale, siltstone, and sandstone. They are in strongly sloping to steep areas in the uplands. Slopes range from 7 to 35 percent.

Gilpin soils are commonly near Berks, Macove, Shelocta, Tumbling, and Weikert soils. Berks, Dekalb, and Weikert soils have less clay in the subsoil than the Gilpin soils. Macove, Shelocta, and Tumbling soils are

deeper over bedrock than the Gilpin soils.

Typical pedon of Gilpin loam, 15 to 25 percent slopes, about 0.3 mile north of Virgina Highway 912, about 0.5 mile northeast of the intersection of Virginia Highways 912 and 311:

A—0 to 1 inch; very dark grayish brown (10YR 3/2) loam; weak very fine granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent sandstone gravel; very strongly acid; abrupt smooth boundary.

E—1 to 4 inches; brown (10YR 5/3) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent sandstone gravel; strongly acid; clear smooth boundary.

BE—4 to 11 inches; yellowish brown (10YR 5/6) loam; moderate medium and fine subangular blocky structure; friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 2 percent sandstone gravel; very strongly acid; clear smooth boundary.

Bt1—11 to 18 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; firm, nonsticky and nonplastic; few very fine, fine, and medium roots; few fine discontinuous clay films on faces of peds; 5 percent shale fragments; very strongly acid; gradual smooth boundary.

Bt2—18 to 29 inches; strong brown (7.5YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; common fine discontinuous clay films on faces of peds; 10 percent shale fragments; strongly acid; clear smooth boundary.

C—29 to 39 inches; mottled strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), and pinkish gray (10YR 6/2) channery silt loam; massive; firm; few fine roots; 30 percent soft shale; strongly acid; abrupt wavy boundary.

R—39 inches; soft shale bedrock.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock is 20 to 40 inches. The content of coarse fragments of shale, siltstone, and sandstone ranges from 5 to 30 inches in the A and B horizons and from 30 to 65 percent in the C horizon. In unlimed areas, reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Some pedons have an Ap horizon that has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. The A horizon is loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. It is loam or silt loam in the fine-earth fraction.

The BE horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6. It is silt loam, loam, or silty clay loam.

Grimsley Series

Soils of the Grimsley series are deep and are well drained. They formed in colluvial deposits derived from sandstone and shale. They are on side slopes and benches. Slopes range from 7 to 15 percent.

Grimsley soils are commonly near Berks, Gilpin, Tumbling, and Weikert soils. Berks, Gilpin, and Weikert soils are not as deep over bedrock as the Grimsley soils. Tumbling soils are deeper over bedrock and have fewer coarse fragments in the solum than the Grimsley soils.

Typical pedon of Grimsley cobbly loam, 8 to 15 percent slopes, about 300 yards north of Virginia Highway 698; about 0.5 mile northwest of the intersection of Virginia Highways 311, 698, and 779.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) cobbly loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine and common medium roots; 25 percent cobbles; strongly acid; clear smooth boundary.

E—4 to 9 inches; dark brown (10YR 4/3) cobbly loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; 30 percent cobbles; strongly acid; clear wavy boundary.

Bt1—9 to 21 inches; yellowish brown (10YR 5/6) very cobbly loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and few medium roots; few fine faint discontinuous clay films on faces of peds; 40 percent cobbles; strongly acid; clear wavy boundary.

Bt2—21 to 32 inches; strong brown (7.5YR 5/8) very cobbly loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and common medium roots; common fine faint discontinuous clay films on faces of peds; 40 percent gravel; strongly acid; clear wavy boundary.

BC—32 to 58 inches; strong brown (7.5YR 5/6) very cobbly loam; weak coarse subangular blocky structure; friable, slightly sticky and nonplastic; 40 percent gravel; very strongly acid; clear smooth boundary.

R—58 inches; shale bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. The content of rock fragments ranges from 15 to 50 percent in the A horizons and from 35 to 60 percent in the B and C horizons. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2. It is loam or sandy loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay in the fine-earth fraction.

The C horizon, if it occurs, has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay in the fine-earth fraction.

The bedrock is shale.

Groseclose Series

Soils of the Groseclose series are very deep and are well drained. They formed in material weathered from limestone, shale, and siltstone. They are in gently sloping to steep areas in the uplands. Slopes range from 2 to 45 percent.

Groseclose soils are commonly near Chilhowie, Chiswell, and Litz soils. These nearby soils are not as deep over bedrock as the Groseclose soils.

Typical pedon of Groseclose silt loam, 7 to 15 percent slopes, about 0.1 mile east of the intersection of Red Barn Lane and Stony Ridge in Little Tree subdivision, about 50 feet northwest of Red Barn Lane:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; many fine and very fine roots; 10 percent coarse fragments; strongly acid; clear smooth boundary.

Bt1—9 to 18 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and very fine and few medium roots; few fine discontinuous clay films on faces of peds; 5 percent coarse fragments; strongly acid; clear smooth boundary.

Bt2—18 to 32 inches; brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and very fine roots; many fine continuous clay films on faces of peds; 5 percent weathered shale; strongly acid; clear smooth boundary.

Bt3—32 to 50 inches; yellowish red (5YR 4/6) and brown (7.5YR 5/4) silty clay; friable, sticky and slightly plastic; few very fine roots; many thin continuous clay films on faces of peds; 10 percent weathered shale; strongly acid; clear smooth boundary.

C—50 to 62 inches; yellowish red (5YR 4/6) and brown (7.5YR 5/4) silty clay loam; massive; friable, sticky and slightly plastic; few very fine roots; 20 percent weathered shale; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 30 percent in the A horizons and from 0 to 15 percent in the Bt and C horizons. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam, clay, silty clay, or silty clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is clay, silty clay, silty clay loam, or clay loam.

Hayesville Series

Soils of the Hayesville series are very deep and are well drained. They formed in residuum derived from granite, gneiss, and schist. They are in gently sloping to very steep upland areas in the Blue Ridge. Slopes range from 2 to 50 percent.

Hayesville soils are commonly near Alderflats, Edgemont, Edneyville, Evard, Peaks, and Thurmont soils. Alderflats are wetter than the Hayesville soils. Edgemont, Edneyville, Evard, and Peaks soils are not as red and have less clay in the subsoil than the Hayesville soils. Peaks soils are not as deep over bedrock as the Hayesville soils. Thurmont soils have a thicker solum than the Hayesville soils.

Typical pedon of Hayesville fine sandy loam, 25 to 50 percent slopes, very stony, about 0.4 mile west of the intersection of Virginia Highways 686 and 692, about 0.3 mile on Meadow Creek Drive and 250 feet south of a cul-de-sac, in a wooded area on the side of the mountain:

A—0 to 4 inches; dark brown (10YR 3/3) fine sandy loam; moderate fine granular structure; friable, nonsticky and nonplastic; many fine and medium and common coarse roots; moderately acid; abrupt smooth boundary.

E—4 to 8 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; many fine,

common medium, and few coarse roots; strongly acid; clear smooth boundary.
BE—8 to 15 inches; strong brown (7.5YR 4/6) loam; moderate fine and medium subangular blocky structure; firm, slightly sticky and nonplastic; common fine and medium roots; many fine discontinuous pores; very strongly acid; clear wavy boundary.
Bt1—15 to 24 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and few medium roots; many fine discontinuous pores; few faint discontinuous clay films on faces of peds; few flakes of mica; very strongly acid; clear wavy boundary.
Bt2—24 to 43 inches; red (2.5YR 4/6) clay; moderate coarse subangular blocky structure; firm, slightly sticky and plastic; common fine and few medium roots; common fine discontinuous pores; many distinct discontinuous clay films on faces of peds; few flakes of mica; very strongly acid; clear smooth boundary.
BC—43 to 51 inches; red (2.5YR 4/6) and yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; common fine and few medium roots; few fine discontinuous pores; many distinct discontinuous clay films on faces of peds; common flakes of mica; very strongly acid; clear smooth boundary.
C—51 to 61 inches; red (2.5YR 4/6), brownish yellow (10YR 6/8), and white (10YR 8/2) saprolite that crushes to sandy clay loam; massive; firm, nonsticky and slightly plastic; few medium roots; many flakes of mica; very strongly acid.

The thickness of the solum is more than 40 inches. The depth to hard bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent throughout the profile. Reaction ranges from very strongly acid to moderately acid.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. It is fine sandy loam.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam or fine sandy loam.

The BE horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam or clay loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam.

The BC horizon has hue of 10R or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam.

The C horizon is saprolite that crushes to sandy clay loam or fine sandy loam.

Laidig Series

Soils of the Laidig series are very deep and are well drained. They formed in colluvial material derived from sandstone, shale, and siltstone. They are on upland foot slopes and colluvial fans. Slopes range from 0 to 35 percent.

Laidig soils are commonly near Berks, Sequoia, Tumbling, and Weikert soils. These nearby soils do not have a fragipan layer like the Laidig soils. Berks and Weikert soils are not as deep over bedrock as the Laidig soils. Tumbling soils have more clay and are redder in the subsoil than the Laidig soils.

Typical pedon of Laidig fine sandy loam, 7 to 15 percent slopes, about 0.75 mile northwest of the intersection of Virginia Highways 320 and 779, about 200 yards north of Virginia Highway 320:

O—1 inch to 0; loose leaves and twigs.
A—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; 5 percent cobbles; strongly acid; abrupt smooth boundary.
E—6 to 13 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and medium roots; 10 percent cobbles; strongly acid; gradual smooth boundary.
Bt1—13 to 22 inches; yellowish brown (10YR 5/4) cobbly loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine medium and coarse roots; few faint clay films on faces of peds; 25 percent cobbles; strongly acid; gradual smooth boundary.
Bt2—22 to 32 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and medium roots; common distinct clay films on faces of peds; 10 percent cobbles; strongly acid; clear smooth boundary.
Btx1—32 to 37 inches; yellowish brown (10YR 5/6) loam; common fine distinct pale brown (10YR 6/3) mottles; moderate thin platy structure; firm, brittle, slightly sticky and nonplastic; common distinct clay films on faces of plates; 10 percent cobbles; strongly acid; gradual smooth boundary.
Btx2—37 to 62 inches; yellowish brown (10YR 5/6) loam; common fine distinct pale brown (10YR 6/3) and prominent dark brown (7.5YR 4/4) mottles; moderate thick platy structure; firm, brittle, slightly sticky and nonplastic; common distinct clay films on faces of plates; 10 percent cobbles; strongly acid.

The thickness of the solum ranges from 60 to 80

inches or more. The depth to the fragipan ranges from 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 35 percent in the A, E, and Bt horizons and from 10 to 70 percent in individual subhorizons of the Bx horizon. Reaction is strongly acid or very strongly acid throughout the profile.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is fine sandy loam in the fine-earth fraction.

The E horizon has hue of 10YR to 7.5YR, value of 4 to 6, and chroma of 2 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The Bx horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 8. It commonly has high- and low-chroma mottles throughout. It is sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

Litz Series

Soils of the Litz series are moderately deep and are well drained. They formed in material weathered from shale, siltstone, and limestone. They are on uplands. Slopes range from 2 to 50 percent.

Litz soils are near Chiswell, Groseclose, Shottower, and Thurmont soils. Chiswell soils are not as deep over bedrock as the Litz soils. Groseclose, Shottower, and Thurmont soils are deeper over bedrock than the Litz soils, and Groseclose and Shottower soils have more clay in the subsoil.

Typical pedon of Litz channery silt loam, in an area of Groseclose-Litz complex, 15 to 25 percent slopes; about 0.2 mile northeast of the junction of U.S. Highway 460 and Virginia Highway 609, about 50 feet northwest of U.S. Highway 460:

Ap—0 to 5 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, nonsticky and nonplastic; many very fine roots; 25 percent rock fragments; strongly acid; clear smooth boundary.

Bw/Bt—5 to 16 inches; brown (7.5YR 4/4) very channery silt loam in the Bw part, irregularly shaped areas of strong brown (7.5YR 5/6) silty clay loam in the Bt part; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine and few medium roots; common distinct clay films on faces of peds in the Bt part; 45 percent shale fragments; strongly acid; clear smooth boundary.

C—16 to 24 inches; strong brown (7.5YR 5/6) very channery silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; 50 percent shale fragments; strongly acid; clear wavy boundary.

R—24 inches; hard red shale.

The thickness of the solum ranges from 10 to 22 inches. The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments of shale, siltstone, or fine-grained sandstone ranges from 15 to 40 percent in the A horizon and from 35 to 80 percent in the Bw/Bt and C horizons. A thin, discontinuous argillic horizon is in some parts of the pedon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 or 3. It is silt loam in the fine-earth fraction.

The Ap horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam in the fine-earth fraction.

The B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. The fine-earth fraction has a cambic B horizon that is silt loam. It also has a discontinuous argillic horizon, which is up to 10 inches thick and is silty clay loam.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam, loam, silty clay loam, or clay loam in the fine-earth fraction.

Macove Series

Soils of the Macove series are very deep and are well drained. They formed in colluvium derived from fine grained sandstone, acid shale, and siltstone. They are on gently sloping and sloping foot slopes and benches. Slopes range from 0 to 15 percent.

Macove soils are commonly near Berks, Gilpin, and Weikert soils. These nearby soils are not as deep over bedrock as the Macove soils.

Typical pedon of Macove gravelly silt loam, 2 to 7 percent slopes, about 0.5 mile southwest of the intersection of Virginia Highways 622 and 700, about 35 feet west of Virginia Highway 700:

Oi—1 inch to 0; loose leaves and twigs.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and medium roots; 20 percent gravel; moderately acid; abrupt smooth boundary.

E—4 to 7 inches; yellowish brown (10YR 5/4) gravelly silt loam; weak fine granular and subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium roots; 20 percent gravel; moderately acid; clear smooth boundary.

BE—7 to 15 inches; yellowish brown (10YR 5/6) very gravelly silt loam; weak fine subangular blocky

structure; friable, nonsticky and nonplastic; common fine and medium roots; 35 percent gravel and channers; strongly acid; clear smooth boundary.
Bt1—15 to 23 inches; brown (7.5YR 5/4) very gravelly loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; few faint discontinuous clay films on faces of peds; 40 percent gravel and channers; strongly acid; gradual smooth boundary.
Bt2—23 to 36 inches; brown (7.5YR 5/4) and yellowish red (5YR 4/6) very gravelly loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; few faint discontinuous clay films on faces of peds; 50 percent gravel and channers; strongly acid; gradual smooth boundary.
Bt3—36 to 65 inches; brown (7.5YR 5/4) and yellowish red (5YR 4/6) extremely gravelly loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few faint discontinuous clay films on faces of peds; 60 percent gravel and channers; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 40 percent in the A and E horizons and from 15 to 55 percent in the B horizons. Reaction is strongly acid or moderately acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 to 3. It is loam or silt loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or silt loam in the fine-earth fraction.

The BE horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 4 to 8. It is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. Some pedons may have high-chroma mottles. It is loam, silt loam, or silty clay loam in the fine-earth fraction.

Opequon Series

Soils of the Opequon series are shallow and are well drained. They formed in material weathered from limestone and dolomite. They are on side slopes in the uplands. Slopes range from 15 to 35 percent.

Opequon soils are commonly near Chilhowie, Frederick, and Groseclose soils. These nearby soils are deeper over bedrock than the Opequon soils.

Typical pedon of Opequon silty clay loam, in an area of Opequon-Rock outcrop complex, 15 to 35 percent slopes; about 3 miles south of the intersection of Virginia Highways 647 and 778, about 100 feet west of Virginia Highway 778:

O—1 inch to 0; loose leaves and twigs.
A—0 to 4 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few fine and medium roots; slightly acid; abrupt smooth boundary.
Bt1—4 to 12 inches; reddish brown (5YR 5/4) clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; many coarse prominent clay films on faces of peds; neutral; clear smooth boundary.
Bt2—12 to 17 inches; reddish brown (2.5YR 4/4) clay; strong medium angular blocky structure; firm, sticky and plastic; many coarse prominent clay films on faces of peds; mildly alkaline; abrupt smooth boundary.
R—17 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 12 to 20 inches. The content of rock fragments, mainly limestone and chert, ranges from 0 to 30 percent by volume. Reaction ranges from moderately acid to mildly alkaline.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 or 4. It is silty clay loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay in the fine-earth fraction.

The bedrock is hard, dark gray or black limestone.

Peaks Series

Soils of the Peaks series are moderately deep and are somewhat excessively drained. They formed in residuum weathered from granite and gneiss. They are on steep and very steep summits and side slopes in the Blue Ridge. Slopes range from 35 to 75 percent.

Peaks soils are commonly near Edgemont, Edneyville, Evard, Hayesville, and Sylvatus soils. Edgemont, Edneyville, Evard, and Hayesville soils are deeper over bedrock than the Peaks soils. Sylvatus soils have more silt in the subsoil than the Peaks soils.

Typical pedon of Peaks gravelly loam, 60 to 75 percent slopes, very stony, about 200 yards west of the Franklin county line; and 4 miles southwest of Simmonds Gap:

O—1 inch to 0; hardwood leaves and twigs.
A—0 to 1 inch; dark brown (10YR 3/3) gravelly loam; weak very fine granular structure; very friable,

nonsticky and nonplastic; many very fine, fine, and medium roots; 20 percent gravel; strongly acid; abrupt smooth boundary.

E—1 to 3 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium granular structure; very friable, nonsticky and nonplastic; common fine and medium discontinuous pores; common very fine, fine, and medium and few coarse roots; 25 percent channers and gravel; strongly acid; clear smooth boundary.

Bw1—3 to 13 inches; yellowish brown (10YR 5/6) very gravelly loam; weak fine and medium subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium discontinuous pores; common fine and few medium roots; 35 percent channers and gravel; strongly acid; clear smooth boundary.

Bw2—13 to 24 inches; yellowish brown (10YR 5/6) very gravelly loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium discontinuous pores; few fine and medium roots; 40 percent channers and gravel; strongly acid; gradual wavy boundary.

Cr—24 to 33 inches; yellowish brown (10YR 5/6) extremely channery loam; massive; very friable, nonsticky and nonplastic; 65 percent channers; strongly acid; clear smooth boundary.

R—33 inches; hard granite gneiss.

The thickness of the solum ranges from 14 to 38 inches. The depth to bedrock is 20 to 40 inches. The content of coarse fragments ranges from 15 to 35 percent in the A horizon and from 35 to 60 percent in the B horizon. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 2 or 3. It is loam in the fine-earth fraction.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It is loam, fine sandy loam sandy loam, or loamy sand in the fine-earth fraction.

The bedrock is hard granite or gneiss.

Purdy Series

Soils of the Purdy series are deep and are poorly drained and very poorly drained. They formed in slackwater-deposited alluvium derived from limestone, shale, and sandstone. They are on stream terraces. Slopes range from 0 to 4 percent.

Purdy soils are commonly near Allegheny, Cotaco, Wheeling, and Zoar soils. These nearby soils are better drained than the Purdy soils.

Typical pedon of Purdy silt loam, 0 to 4 percent slopes, about 0.4 mile west of Virginia Highway 311, about 300 feet north of Virginia Highway 662:

Ap—0 to 12 inches; grayish brown (2.5Y 5/2) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and very fine roots; strongly acid; clear smooth boundary.

BAg—12 to 16 inches; gray (5Y 5/1) silt loam; many medium prominent dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; strongly acid; clear smooth boundary.

Btg1—16 to 20 inches; gray (5Y 5/1) silty clay loam; many medium prominent dark brown (7.5YR 4/4) and common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium and coarse subangular blocky structure; firm, slightly sticky and nonplastic; few fine discontinuous clay films on faces of peds; strongly acid; abrupt smooth boundary.

Btg2—20 to 39 inches; gray (N/5) silty clay; many coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; firm, slightly sticky and slightly plastic; few fine discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

Cg—39 to 62 inches; gray (5Y 5/1) silty clay loam; many medium prominent yellow (10YR 7/8) and common medium prominent strong brown (7.5YR 5/6) mottles; massive; firm, nonsticky and nonplastic; strongly acid.

The thickness of the solum ranges from 28 to 50 inches. The depth to bedrock is more than 60 inches. In unlimed areas, reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is silt loam.

The BA horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is silt loam, loam, or silty clay loam.

The Btg horizon has hue of 2.5Y or 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is silty clay loam, clay loam, silty clay, or clay.

The C horizon is mottled in shades of gray, yellow, red, and brown. It is clay, silty clay, or clay loam in the fine-earth fraction.

Sequoia Series

Soils of the Sequoia series are moderately deep and are well drained. They formed in material weathered from shale and siltstone. They are on summits and side slopes in the uplands. Slopes range from 7 to 40 percent.

Sequoia soils are commonly near Berks, Chilhowie, Tumbling, and Weikert soils. Berks and Weikert soils have less clay in the subsoil than the Sequoia soils. Chilhowie soils have a higher base saturation than the Sequoia soils, and Tumbling soils are deeper over bedrock.

Typical pedon of Sequoia silt loam, 15 to 25 percent slopes, west of the intersection of U.S. Highway 220 and Virginia Highway 674, about 1,000 feet west of a gas pipeline, at an elevation of 1,330 feet:

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many fine and few medium and coarse roots; strongly acid; abrupt smooth boundary.

E—2 to 6 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky and nonplastic; many fine and few medium roots; strongly acid; abrupt smooth boundary.

Bt1—6 to 19 inches; yellowish red (5YR 5/8) silty clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine and medium roots; common very fine and few coarse discontinuous pores; many medium distinct continuous clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—19 to 26 inches; yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and yellow (10YR 7/8) gravelly silty clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine and medium roots; common very fine and few coarse discontinuous pores; many medium distinct clay films on faces of peds; 15 percent shale fragments; very strongly acid; gradual wavy boundary.

Cr—26 to 35 inches; yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) shale bedrock that crushes to very gravelly silty clay loam; massive; firm, slightly sticky and nonplastic; few fine and medium roots; few prominent dark stains on shale fragments; 45 percent shale channers; very strongly acid; clear wavy boundary.

R—35 to 60 inches; soft shale bedrock.

The thickness of the solum and the depth to soft shale range from 20 to 40 inches. The content of shale and siltstone rock fragments ranges from 0 to 10 percent in the A and E horizons, from 5 to 25 percent in the B horizon, and from 5 to 50 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 5, and chroma of 6 or 8. It is silty clay or clay in the fine-earth fraction.

The C horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 5 or 6, and chroma of 6 or 8. It is silty clay, clay loam, or silt loam in the fine-earth fraction.

The Cr horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8.

Shelocta Series

Soils of the Shelocta series are very deep and are well drained. They formed in colluvium derived from fine grained sandstone, siltstone, and shale. They are on gently sloping to moderately steep colluvial foot slopes, side slopes, fans, and benches. Slopes range from 2 to 25 percent.

Shelocta soils are commonly near Berks, Dekalb, Gilpin, Macove, and Weikert soils. Berks, Gilpin, and Weikert soils are not as deep over bedrock as the Shelocta soils. Macove soils have more coarse fragments in the solum than the Shelocta soils.

Typical pedon of Shelocta silt loam, 2 to 7 percent slopes, on a private drive, about 0.05 mile northwest of Virginia Highway 740, about 0.5 mile south of the intersection of Virginia Highways 912 and 740:

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; few fine and medium roots; 2 percent channers; very strongly acid; abrupt smooth boundary.

BE—6 to 17 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; few fine and medium roots; few fine discontinuous pores; 5 percent channers; strongly acid; gradual smooth boundary.

Bt1—17 to 24 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; few fine discontinuous pores; few thin discontinuous clay films on faces of peds; 5 percent channers; strongly acid; clear smooth boundary.

Bt2—24 to 32 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct strong brown (7.5YR 5/6) and prominent light yellowish brown (10YR 6/4) mottles; moderate medium angular

blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine discontinuous pores; common thin discontinuous clay films on faces of peds; 5 percent channers; strongly acid; clear smooth boundary.

Bt3—32 to 48 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct light yellowish brown (10YR 6/6) mottles; moderate medium angular blocky structure; friable, slightly sticky and slightly plastic; few fine discontinuous pores; common thin discontinuous clay films on faces of peds; 10 percent channers; strongly acid; clear smooth boundary.

C—48 to 62 inches; mottled strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/6), and light yellowish brown (10YR 6/6) channery silty clay loam; massive; friable, slightly sticky and slightly plastic; 35 percent gravel; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches or more. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 2 to 20 percent in the A horizon, from 5 to 40 percent in the B horizon, and from 25 to 70 percent in the C horizon. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The Ap horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 or 4. The A horizon is silt loam.

The BE horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is silty clay loam or silt loam in the fine-earth fraction. In some pedons, the lower part is mottled of shades of brown, yellow, red, and gray.

The C horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. Some pedons are mottled of shades of brown, yellow, and gray. The C horizon is silty clay loam, silt loam, or clay loam in the fine-earth fraction.

Shottower Series

Soils of the Shottower series are very deep and are well drained. They formed in alluvium derived from sandstone, shale, and limestone. They are on high terraces. Slopes range from 2 to 30 percent.

Shottower soils are commonly near Allegheny, Chiswell, and Litz soils. These nearby soils have less clay in the subsoil than the Shottower soils. Chiswell and Litz soils are not as deep over bedrock as the Shottower soils.

Typical pedon of Shottower loam, 7 to 15 percent slopes, about 1.2 miles south of the intersection of Virginia Highways 649 and 639, about 0.6 mile west of Virginia Highway 649, about 0.1 mile west on a power line road:

Ap—0 to 10 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and very fine and common medium roots; very strongly acid; clear smooth boundary.

AB—10 to 18 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and very fine and common medium roots; common fine discontinuous pores; very strongly acid; clear smooth boundary.

Bt1—18 to 24 inches; yellowish red (5YR 5/6) clay loam; weak medium subangular blocky structure; friable, sticky and plastic; many fine and common medium roots; many fine discontinuous pores; few distinct discontinuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—24 to 34 inches; dark red (2.5YR 4/6) clay loam; common medium distinct yellowish red (5YR 5/6) mottles; moderate medium angular blocky structure; friable, sticky and plastic; many fine roots; common fine discontinuous pores; many distinct continuous clay films on faces of peds; 10 percent gravel; very strongly acid; clear smooth boundary.

Bt3—34 to 42 inches; red (2.5YR 4/6) clay; common medium prominent light yellowish brown (10YR 6/4) mottles; moderate coarse angular blocky structure; friable, sticky and plastic; few fine roots; few fine discontinuous pores; common fine distinct continuous clay films on faces of peds; 5 percent gravel; extremely acid; clear smooth boundary.

Bt4—42 to 62 inches; red (2.5YR 4/6) clay; many medium prominent light yellowish brown (10YR 6/4) mottles; moderate coarse angular blocky structure; friable, sticky and plastic; common medium and fine roots; few fine discontinuous pores; many fine distinct continuous clay films on faces of peds; 5 percent gravel; extremely acid.

The thickness of the solum and the depth to bedrock are 60 inches or more. The content of rock fragments ranges from 0 to 35 percent in the A and B horizons and from 0 to 60 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 5. It is loam in the fine-earth fraction.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam or fine sandy loam in the fine-earth fraction.

The AB horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay in the fine-earth fraction.

The Bt horizon has hue of 10R to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay, silty clay, silty clay loam, or clay loam in the fine-earth fraction.

Sindion Series

Soils of the Sindion series are very deep and are moderately well drained. They formed in alluvium derived from limestone, sandstone, phyllite, shale, siltstone, granite, gneiss, and schist. They are on flood plains. Slopes range from 0 to 2 percent.

Sindion soils are commonly near Clubcaf, Combs, Derroc, and Speedwell soils. Clubcaf soils are wetter than the Sindion soils. Combs, Derroc, and Speedwell soils are better drained than the Sindion soils. Derroc soils have more coarse fragments than the Sindion soils.

Typical pedon of Sindion loam, 0 to 2 percent slopes, occasionally flooded, about 0.1 mile east of the intersection of Virginia Highways 639 and 670, about 150 feet south of Virginia Highway 639:

Ap1—0 to 5 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak fine granular structure; very friable, nonsticky and nonplastic; few fine roots; mildly alkaline; clear smooth boundary.

Ap2—5 to 10 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak medium granular structure; friable, nonsticky and nonplastic; few fine roots; mildly alkaline; clear smooth boundary.

Bw1—10 to 16 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; neutral; clear smooth boundary.

Bw2—16 to 27 inches; dark yellowish brown (10YR 4/4) loam; common medium prominent grayish brown (10YR 5/2), few medium distinct dark brown (7.5YR 4/4), and few medium prominent dark reddish brown (5YR 3/3) mottles; moderate medium subangular blocky structure; friable, nonsticky and nonplastic; neutral; clear smooth boundary.

Bw3—27 to 36 inches; grayish brown (10YR 5/2) loam; common medium prominent dark brown (7.5YR 4/4) and yellowish red (5YR 5/6) mottles; moderate coarse subangular blocky structure; friable, nonsticky and nonplastic; slightly acid; clear smooth boundary.

Cg1—36 to 59 inches; grayish brown (10YR 5/2) loam; common medium prominent dark brown (7.5YR 4/4) and yellowish red (5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; neutral; clear smooth boundary.

Cg2—59 to 63 inches; grayish brown (10YR 5/2) loam; many medium prominent yellowish red (5YR 5/6) and dark brown (7.5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; neutral.

The thickness of the solum ranges from 30 to 60 inches or more. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 35 percent in the Ap and B horizons and from 0 to 60 percent in the C horizons. Reaction is strongly acid or moderately acid in the surface layer and ranges from moderately acid to neutral in the subsoil.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 2 to 3. It is loam.

The Bw horizon has hue of 7.5YR to 5Y or is neutral in hue. It has value of 2 to 7 and chroma of 1 to 6. It has low-chroma mottles at a depth of 15 to 24 inches. It is loam or silt loam in the fine-earth fraction.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 6. It is loam, silt loam, or clay loam in the fine-earth fraction.

Speedwell Series

Soils of the Speedwell series are very deep and are well drained. They formed in alluvium. They are on the flood plains of rivers and streams. Slopes range from 0 to 2 percent.

Speedwell soils are commonly near Clubcaf, Combs, Derroc, and Sindion soils. Clubcaf and Sindion soils are wetter than the Speedwell soils. Combs and Derroc soils have less clay in the control section than the Speedwell soils.

Typical pedon of Speedwell loam, 0 to 2 percent slopes, occasionally flooded, 0.62 mile west-northwest of Greenhill Church, 0.1 mile south of the Roanoke River:

Ap—0 to 17 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate fine and medium subangular blocky structure; many fine and very fine and common medium roots; few fine discontinuous pores; neutral; abrupt smooth boundary.

Bw1—17 to 35 inches; dark brown (7.5YR 4/4) loam; strong medium subangular blocky structure; firm; few medium and common fine roots; few medium and many fine discontinuous pores; dark grayish brown (10YR 4/2) organic stains in root channels and worm channels; neutral; clear smooth boundary.

Bw2—35 to 45 inches; dark brown (7.5YR 4/4) loam; strong medium angular blocky structure; firm; few medium and common fine roots; many fine discontinuous pores; dark grayish brown (10YR 4/2)

organic stains in root channels and worm channels; neutral; clear smooth boundary.
C—45 to 62 inches; brown (10YR 4/3) loam; few medium faint dark grayish brown (10YR 4/2) mottles; massive; friable, nonsticky and nonplastic; few very fine roots; common fine discontinuous pores; neutral.

The thickness of the solum ranges from 25 to 45 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 10 percent in the A horizon and from 0 to 15 percent in the B and C horizons. Reaction ranges from moderately acid to neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3. It is loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, silt loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is loam, silt loam, or sandy loam in the fine-earth fraction.

Spessard Series

Soils of the Spessard series are very deep and are well drained. They formed in residuum and colluvium derived from sandstone. They are on foot slopes. Slopes range from 7 to 40 percent.

Spessard soils are near Berks, Dekalb, Laidig, and Weikert soils. These nearby soils have more clay in the profile than the Spessard soils. Berks, Dekalb, and Weikert soils are not as deep over bedrock as the Spessard soils. Laidig soils have a fragipan layer that the Spessard soils do not have.

Typical pedon of Spessard loamy sand, 25 to 40 percent slopes, about 0.4 mile southwest of the intersection of Virginia Highways 622 and 684, about 300 feet north of Virginia Highway 622:

A—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand; single grain; loose; many fine and few medium roots; moderately acid; abrupt wavy boundary.
E—9 to 13 inches; yellowish brown (10YR 5/4) loamy sand; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; moderately acid; abrupt wavy boundary.
Bw1—13 to 20 inches; brownish yellow (10YR 6/6) loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium and coarse roots; 2 percent gravel; moderately acid; abrupt wavy boundary.
Bw2—20 to 41 inches; brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium and coarse roots; 5 percent gravel; moderately acid; gradual smooth boundary.
C—41 to 62 inches; yellowish brown (10YR 5/6) loamy sand; massive; firm; few fine roots; 2 percent gravel; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 20 percent in the upper part of the solum, from 30 to 40 percent in the lower part of the solum, and from 0 to 70 percent in the C horizon. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 7.5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. It is loamy sand in the fine-earth fraction.

The E horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loamy sand in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loamy sand in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sand or loamy sand in the fine-earth fraction.

Sylvatus Series

Soils of the Sylvatus series are shallow and are well drained. They formed in materials weathered from metasediments of phyllite, slate and some shale, siltstone, and fine grained sandstone. These soils are on convex side slopes in the uplands of the Blue Ridge. Slopes range from 15 to 80 percent.

Sylvatus soils are near Dekalb and Peaks soils. These nearby soils are not as deep over bedrock and have less silt in the subsoil than the Sylvatus soils.

Typical pedon of Sylvatus very channery silt loam, 35 to 55 percent slopes, about 2 miles north of the intersection of Virginia Highways 612 and 916, about 30 feet east of Virginia Highway 612:

A—0 to 1 inch; very dark gray (10YR 3/1) very channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; 40 percent gravel; very strongly acid; abrupt smooth boundary.
E—1 to 4 inches; brown (10YR 4/3) very channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; 45 percent gravel; very strongly acid; clear smooth boundary.

Bw—4 to 10 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; 50 percent gravel; very strongly acid; gradual smooth boundary.

C—10 to 15 inches; yellowish brown (10YR 5/6) extremely channery silt loam; massive; very friable, nonsticky and nonplastic; common fine and few medium roots; 70 percent rock fragments; very strongly acid; clear smooth boundary.

R—15 inches; yellowish brown phyllite.

The thickness of the solum ranges from 10 to 18 inches. The depth to bedrock ranges from 10 to 20 inches. The content of rock fragments ranges from 15 to 50 percent in the A and E horizons, from 25 to 60 percent in the Bw horizon, and from 45 to 80 percent in the C horizon. Reaction is extremely acid or very strongly acid.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 to 3. It is silt loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam, loam, silty clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 8. It is silt loam, loam, or clay loam in the fine-earth fraction.

Thurmont Series

Soils of the Thurmont series are very deep and are well drained. They formed in alluvial and colluvial deposits derived from a mixture of crystalline rocks. They are on foot slopes, colluvial benches, and stream terraces. Slopes range from 2 to 25 percent.

Thurmont soils are commonly near Chiswell, Edneyville, Evard, Hayesville, and Litz soils. Chiswell and Litz soils are not as deep over bedrock as the Thurmont soils. Edneyville, Evard, and Hayesville soils have a thinner solum than the Thurmont soils. Hayesville soils have more clay in the subsoil than the Thurmont soils.

Typical pedon of Thurmont sandy loam, 2 to 7 percent slopes, about 1.5 miles east of the intersection of Virginia Highways 639 and 612, about 100 feet northwest of Virginia Highway 639:

Ap—0 to 5 inches; dark brown (10YR 3/3) sandy loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; common fine roots; 5 percent gravel; strongly acid; clear smooth boundary.

E—5 to 10 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary.

Bt1—10 to 21 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable, sticky and plastic; few fine roots; common fine discontinuous pores; few fine faint discontinuous clay films on faces of peds; 10 percent gravel; strongly acid; clear smooth boundary.

Bt2—21 to 37 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; few fine discontinuous pores; common medium distinct discontinuous clay films on faces of peds; 10 percent gravel; very strongly acid; clear wavy boundary.

Bt3—37 to 44 inches; yellowish red (5YR 5/8) gravelly sandy clay loam; common medium prominent brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; few fine discontinuous pores; common medium distinct discontinuous clay films on faces of peds; 15 percent gravel; very strongly acid; clear smooth boundary.

2C1—44 to 51 inches; yellowish red (5YR 5/8) gravelly sandy clay loam; massive; friable, sticky and slightly plastic; 30 percent gravel; very strongly acid; gradual smooth boundary.

2C2—51 to 62 inches; yellowish red (5YR 5/8) very gravelly sandy clay loam; massive; friable, slightly sticky and slightly plastic; 45 percent gravel and cobbles; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 50 percent in the A and C horizons and from 0 to 35 percent in the B horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is fine sandy loam in the fine-earth fraction.

The E horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6. It is loam, fine sandy loam, or sandy clay loam in the fine-earth fraction.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay in the fine-earth fraction.

The C or 2C horizon has hue of 5YR to 10YR. It ranges from sandy loam to clay in the fine-earth fraction.

Timberville Series

Soils of the Timberville series are very deep and are well drained. They formed in localized areas of alluvial and colluvial material derived from limestone and shale. They are on colluvial fans and head slopes and are along intermittent drainageways. Slopes range from 2 to 7 percent.

Timberville soils are commonly near Chilhowie, Frederick, Groseclose, and Opequon soils. Chilhowie and Opequon soils are not as deep over bedrock as the Timberville soils. Frederick and Groseclose soils have a redder subsoil than the Timberville soils.

Typical pedon of Timberville silt loam, 2 to 7 percent slopes, occasionally flooded, in the city of Roanoke, about 200 feet northwest of Oakland Avenue, about 800 feet southwest of the intersection of Greenland Drive and Oakland Avenue:

Ap—0 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; common fine roots; neutral; clear smooth boundary.

Bw1—11 to 21 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate fine subangular blocky structure; friable, slightly sticky and nonplastic; few fine manganese stains and concretions; neutral; clear smooth boundary.

Bw2—21 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine manganese stains and concretions; slightly acid; clear smooth boundary.

2B1t—27 to 42 inches; yellowish brown (10YR 5/6) silty clay; common medium prominent yellowish red (5YR 4/6) and distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky and slightly plastic; common medium clay films on faces of peds; common fine manganese stains and concretions; 10 percent gravel; moderately acid; gradual smooth boundary.

2B2t—42 to 48 inches; yellowish brown (10YR 5/8) clay; common medium prominent brown (10YR 5/3) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common medium distinct clay films on faces of peds; 10 percent gravel; moderately acid; gradual smooth boundary.

2B3t—48 to 62 inches; brownish yellow (10YR 6/8), yellowish red (5YR 5/6), and light yellowish brown (10YR 5/3) gravelly silty clay loam; moderate coarse subangular blocky structure; friable, slightly sticky and slightly plastic; common medium distinct clay films on faces of peds; 15 percent gravel; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of rock fragments, which are commonly chert and quartz, ranges from 0 to 10 percent in the A horizon and from 0 to 50 percent in the individual subhorizons of the B horizon. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 5. It is silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, silty clay loam, or clay loam in the fine-earth fraction.

The 2Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, clay loam, silty clay, or clay in the fine-earth fraction.

Tumbling Series

Soils of the Tumbling series are very deep and are well drained. They formed in colluvium derived from sandstone, quartzite, and shale. They are on uplands. Slopes range from 2 to 45 percent.

Tumbling soils are commonly near Berks, Dekalb, Gilpin, Grimsley, Laidig, Sequoia, and Weikert soils. Berks, Dekalb, Gilpin, and Weikert soils are not as deep over bedrock and have less clay in the subsoil than the Tumbling soils. Grimsley soils have less clay in the subsoil and are not as deep over bedrock as the Tumbling soils. Laidig soils have a fragipan that the Tumbling soils do not have. Sequoia soils are not as deep over bedrock as the Tumbling soils.

Typical pedon of Tumbling loam, 7 to 15 percent slopes, at the end of Virginia Highway 661, about 40 feet east:

O—2 inches to 0; dark reddish brown (5YR 3/2) organic material.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; weak fine and very fine granular structure; friable, nonsticky and nonplastic; many fine and very fine and few medium roots; 5 percent gravel; very strongly acid; abrupt smooth boundary.

E—2 to 11 inches; brownish yellow (10YR 5/6) loam; many medium distinct very pale brown (10YR 7/3) mottles; moderate fine and medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and common medium roots; common fine discontinuous pores; 5 percent gravel; very strongly acid; clear smooth boundary.

Bt1—11 to 15 inches; strong brown (7.5YR 5/6) cobbly clay loam; few fine distinct brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular

blocky structure; firm, sticky and plastic; few fine and medium roots; few fine discontinuous pores; few faint discontinuous clay films on faces of peds; 15 percent gravel; very strongly acid; clear smooth boundary.

Bt2—15 to 28 inches; yellowish red (5YR 4/8) cobbly clay; few fine prominent red (2.5YR 4/6) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; common fine and few medium roots; common distinct discontinuous clay films on faces of peds; 20 percent gravel; very strongly acid; clear wavy boundary.

Bt3—28 to 49 inches; yellowish red (5YR 5/8) very gravelly clay; few fine distinct red (2.5YR 4/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and medium roots; common distinct discontinuous clay films on faces of peds; 45 percent gravel; very strongly acid; clear smooth boundary.

Bt4—49 to 62 inches; mottled strong brown (7.5YR 5/6), red (2.5YR 5/8 and 4/6), and white (5YR 8/1) clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; common fine and medium roots; common distinct discontinuous clay films on faces of peds; very strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent in the A horizons and from 0 to 35 percent in the B horizons. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 or 3. The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The A horizon is loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, sandy loam, or silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay, clay loam, or silty clay loam in the fine-earth fraction.

Udorthents

Udorthents consist of areas where the natural soil material has been altered by excavation or covered by earthy material. These areas are deep and very deep, nearly level to steep, and moderately well drained to somewhat excessively drained. The excavated areas are mainly borrow pits from which soil material has been removed and used as foundation material for roads, highways, or buildings. The fill areas are sites where earthy material covers the natural soil or where borrow pits, dumps, natural drainageways, or low areas have been filled.

Udorthents are commonly near Berks, Chiswell, Frederick, Hayesville, Litz, Speedwell, Tumbling, Weikert, and Wheeling soils. These nearby soils all have a well defined subsoil.

A typical pedon for Udorthents is not given because of their variability. Udorthents are more than 40 inches deep but can be more than 40 feet thick in places. Reaction ranges from very strongly acid to mildly alkaline. The content of boulder-sized rock fragments ranges from 0 to 45 percent.

The surface layer has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. It ranges from loam to clay in the fine-earth fraction.

The lower layers have hue of 2.5YR to 2.5Y, value of 3 to 6, and chroma of 4 to 8. They range from loam to clay in the fine-earth fraction.

Weikert Series

Soils of the Weikert series are shallow and are well drained. They formed in residuum derived from acid shale, siltstone, and fine grained sandstone. They are on sloping to very steep, convex, dissected uplands. Slopes range from 15 to 85 percent.

Weikert soils are commonly near Berks, Dekalb, Gilpin, Grimsley, Sequoia, Spessard, and Tumbling soils. These nearby soils are deeper over bedrock than the Weikert soils. Tumbling and Sequoia soils have more clay and fewer coarse fragments in the subsoil than the Weikert soils.

Typical pedon of Weikert channery silt loam, in an area of Weikert-Berks complex, 15 to 45 percent slopes; about 0.3 mile south of the intersection of Virginia Highways 311 and 419, about 0.05 mile west of Virginia Highway 311 on Virginia Highway 1700, about 120 feet southwest of the road entering Laurel subdivision:

O—1 inch to 0; loose leaf litter and twigs.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak very fine granular structure; very friable, nonsticky and nonplastic; many fine and very fine roots; 25 percent channers; very strongly acid; abrupt wavy boundary.

Bw—2 to 11 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; many fine and common medium roots; 40 percent channers; very strongly acid; clear smooth boundary.

C—11 to 17 inches; light yellowish brown (10YR 6/4) extremely channery silt loam; massive; friable, nonsticky and nonplastic; many fine and common

medium roots; 70 percent gravel; very strongly acid; abrupt wavy boundary.
R—17 inches; shale bedrock.

The thickness of the solum ranges from 8 to 20 inches. The depth to bedrock ranges from 10 to 20 inches. The content of rock fragments ranges from 15 to 40 percent in the A horizon, from 35 to 60 percent in the Bw horizon, and from 60 to 80 percent in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is silt loam in the fine-earth fraction.

Wheeling Series

Soils of the Wheeling series are deep and are well drained. They formed in alluvium derived from sandstone, shale, and limestone. They are on stream terraces. Slopes range from 0 to 7 percent.

Wheeling soils are near Allegheny, Cotaco, Purdy, and Zoar soils. Allegheny soils have a lower base saturation than the Wheeling soils. Cotaco, Purdy, and Zoar soils are wetter than the Wheeling soils.

Typical pedon of Wheeling loam, 0 to 2 percent slopes, rarely flooded, about 0.4 mile northeast of the Roanoke River on Virginia Highway 646, about 75 feet southeast of Virginia Highway 646:

Ap1—0 to 5 inches; dark brown (10YR 4/3) loam; weak very fine granular structure; friable, nonsticky and nonplastic; many fine and common medium roots; very strongly acid; clear smooth boundary.
Ap2—5 to 12 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine roots; strongly acid; abrupt smooth boundary.
Bt1—12 to 25 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; firm, slightly sticky and nonplastic; few fine roots; many very fine discontinuous pores; common fine distinct discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.
Bt2—25 to 39 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; firm, slightly sticky and nonplastic; few fine roots; common fine discontinuous pores; common medium distinct discontinuous clay films on faces of peds; few manganese stains on faces of peds; strongly acid; clear smooth boundary.
Bt3—39 to 55 inches; dark yellowish brown (10YR 4/3) and dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; common fine and very fine discontinuous pores; common medium prominent discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.
BC—55 to 71 inches; dark brown (7.5YR 4/4) fine sandy loam; few fine distinct grayish brown (10YR 5/2) mottles; massive; friable, sticky and nonplastic; common fine discontinuous pores; few medium prominent manganese stains on faces of peds; strongly acid; clear smooth boundary.
C—71 to 75 inches; dark yellowish brown (10YR 4/6) sand and gravel; single grain; loose; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 25 percent in the upper 40 inches and from 0 to 60 percent below that depth. Reaction is strongly acid or moderately acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam, loam, or fine sandy loam in the fine-earth fraction.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, or clay loam in the fine-earth fraction.

The BC horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is very fine sandy loam to sandy loam in the fine-earth fraction.

The C horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is loam, fine sandy loam, or clay loam in the fine-earth fraction.

Zoar Series

Soils of the Zoar series are very deep and are moderately well drained. They formed in slackwater sediments on stream terraces. Slopes range from 2 to 7 percent.

Zoar soils commonly are near Allegheny, Cotaco, and Purdy soils. Allegheny and Cotaco soils have less clay in the subsoil than the Zoar soils. Allegheny soils are better drained than the Zoar soils. Purdy soils are wetter than the Zoar soils.

Typical pedon of Zoar silt loam, 2 to 7 percent slopes, about 1 mile northeast of the intersection of Virginia Highway 639 and U.S. Highway 11, about 200 feet west of Southern Railway:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, nonsticky and nonplastic; few fine roots; strongly acid; clear smooth boundary.

BE—8 to 12 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; few very fine discontinuous pores; strongly acid; abrupt smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; common fine prominent grayish brown (10YR 5/2) and few fine prominent yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few very fine discontinuous pores; few fine discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—18 to 31 inches; yellowish brown (10YR 5/6) silty clay; many medium fine prominent gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few very fine discontinuous pores; few fine discontinuous clay films on faces of peds; strongly acid; clear smooth boundary.

Cg1—31 to 39 inches; gray (10YR 6/1) silty clay loam; many medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; massive; firm, slightly sticky and slightly plastic; strongly acid; clear smooth boundary.

Cg2—39 to 62 inches; gray (10YR 6/1) silty clay loam; many medium prominent strong brown (10YR 5/6) mottles; massive; firm, slightly sticky and nonplastic; strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is silt loam.

The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. It has common to many mottles. It is silty clay or silty clay loam.

The C horizon has hue of 5YR or 10YR, value of 5 or 6, and chroma of 1 to 4. It is clay loam, silty clay loam, silty clay, or clay.

Formation of the Soils

This section describes the factors that have affected the formation of soils in the survey area. It also explains the major processes in the development of soil horizons.

Factors of Soil Formation

Soil forms through weathering and other processes that act on parent material. The characteristics of a soil depend upon the interaction of parent material, climate, plants and animal life, relief, and time.

Climate and plants and animals are the active forces of soil formation. They act on the parent material that has accumulated through the deposition of sediments and slowly change it into soil. Although all five factors affect the formation of every soil, the relative importance of each differs from place to place. In extreme cases one factor dominates soil formation and determines most of the soil properties. In general, however, the combined action of the five factors determines the characteristics of each soil.

Parent Material

Parent material is the unconsolidated material in which a soil forms. It is largely responsible for the chemical and mineralogical composition of the soil and the rate of the soil-forming processes. The two most common types of parent material in the survey area are residual and transported materials. Residual material, called residuum, accumulates in place by the weathering of underlying rock. The characteristics of residuum are directly related to those of the underlying rock. Transported material is called alluvium or colluvium. Alluvium is laid down by water. Colluvium is laid down by gravity as unconsolidated deposits of clay, silt, and sand and as rock fragments. The characteristics of transported material are similar to those of the soils or rocks from which the material originated.

The soils in the survey area formed in residuum, alluvium, and colluvium. The residuum is limestone, shale, sandstone, siltstone, quartzite, and sandstone. The soils that formed in limestone, including dolomite, and in shale are the most extensive soils in the Roanoke Valley. They have a wide range of characteristics but typically have a silty surface and a clayey subsoil. Frederick and Groseclose soils are examples. The soils that formed in residuum derived from shale and siltstone served as the parent material for the Berks and Weikert soils. The soils that formed in residuum derived from sandstone include the moderately coarse textured Dekalb soils. Granite-derived soils, such as Hayesville and Peaks soils, and quartzite-derived soils, such as Edgemont soils, are confined to the Blue Ridge.

The alluvium is generally of recent origin and is along rivers and streams. The soils that formed in alluvium vary widely in texture and in stages of development. They include Combs, Derroc, and Speedwell soils.

The colluvium accumulates mainly on side slopes on the lower parts of mountains. The soils that formed in colluvium are generally coarse or medium in texture. They include Laidig, Macove, and Tumbling soils.

Climate

Precipitation and temperature are the main climatic factors that influence soil formation. Water dissolves minerals, promotes biological activity, and transports mineral and organic residue through the soil. Temperature determines the types of physical, chemical, and biological activities that take place in the soil and the speed at which they act.

Because more water enters the soil as a result of precipitation than is lost through evaporation and other processes, many of the soils in the survey area have become leached. Leaching removes many of the soluble materials in the soils, although some small alluvial areas are recharged by limestone springs. The formation of a subsoil, caused mainly by the precipitation, is characteristic of most soils in the survey area. Water percolating through the soil also moves clay from the surface layer to the subsoil. The soils in the survey area typically have a subsoil that contains more clay than the surface layer. Some exceptions are soils that formed in recent alluvium, in sand, or on very steep slopes.

Climate also influences the formation of blocky structure in the subsoil of well developed soils. The development of peds, or aggregates, in the subsoil occurs because the volume of the soil changes as a result of alternate cycles of wetting and drying.

Plant and Animal Life

Plants and animals, micro-organisms, and humans have had an important role in the formation of soils. Plants are generally responsible for the color of the surface layer, the content of organic matter in the soil, and the amount of plant nutrients in the soil. Earthworms, cicada, and burrowing animals mix the soils and create pores. Micro-organisms decompose the organic matter, thus releasing plant nutrients.

Native vegetation was the major living organism affecting soil development before humans settled in the survey area. The native vegetation consisted mainly of hardwoods. Oak, hickory, and chestnut trees were dominant in the original forest. Pine and hemlock were the dominant conifers in the cooler areas. Most hardwoods take a large amount of bases from the soil, recycling them as leaves fall and subsequently decay. Thus, the soils in the survey area are not as leached as they would be if they had formed under a coniferous forest.

Human activities, including the clearing of forests, the introduction of new plants, cultivation, changes in the natural drainage, and applications of lime and fertilizer, have influenced soil formation. The most important changes to the soils as a result of human activities include the mixing of the upper layers of the soil by forming a plow layer; the acceleration of erosion by cultivating strongly sloping soils; and changing the content of plant nutrients, especially in the upper layers of the soil, by applying lime and fertilizer.

Relief

The relief of an area is determined mainly by its geologic formations and the rivers and streams that dissect it. Relief affects the formation of soil by influencing moisture relationships, erosion, temperature, and the type of cover plants.

Relief is largely determined by the underlying geologic formations, the geologic history of the region, and the effects of dissection by rivers and streams. The survey area is bounded on all sides by mountains. Poor Mountain in the Blue Ridge is over 3,900 feet above sea level. The northern part of the valley is split by the 3,000-foot Fort Lewis Mountain and the 2,600-foot Catawba Mountain. A small valley, called Mason Cove, is between these mountains. The mountains are underlain by resistant rocks, such as sandstone, shale, granite, and quartzite. The valley floor is also affected by the underlying geology. The Edinburg shale underlies the areas that have the lowest relief. Valley areas that are hilly are generally underlain by other rocks, such as the Conococheague and Beekmantown dolomites. The areas of shale, such as those underlain by the Rome and Brailler shales, have a drainage pattern that is more well defined than in other areas.

Most of the soils on uplands are naturally well drained. The soils on terraces and flood plains are well drained to poorly drained. The drainage pattern is generally related to the position of the soil. Soils in low, nearly level positions or in depressions are generally poorly drained, while soils in the more sloping areas are well drained.

Time

Time influences the degree of development of a soil or the degree of horizon differentiation in a soil. Soils that have little or no horizon development are considered young, or immature, and soils that have strongly developed horizons are considered old, or mature. Many soils range in maturity between these two stages.

The oldest soils in the survey area those that formed in residuum derived from shale and limestone. These soils, such as Frederick and Groseclose soils, are in less sloping, relatively stable positions, formed in easily weathered material, and have a strong degree of horizon differentiation. Those soils that formed in recent alluvium, such as Derroc soils, have been in place only a relatively short time and show little or no development other than an accumulation of organic matter in the surface layer. Soils on terraces, such as Allegheny, Cotaco, and Shottower soils, have a intermediate degree of horizon development. In very steep areas, geologic erosion has removed soil material in a relatively short amount of time. The soil material has not been in place long enough to develop distinct horizons.

Morphology of the Soils

The results of the soil-forming factors are evidenced by the different layers, or horizons, in a soil profile. The profile extends from the surface downward to material that is little altered by the soil-forming processes.

Most soils contain three major horizons, which are called the A, B, and C horizons. Some soils have a fourth major horizon, called the E horizon, is between the A and B horizons. These horizons may be further subdivided by the use of numbers and letters to indicate changes within one horizon.

The A horizon, or the surface layer, is the horizon that has the largest accumulation of organic matter.

The E horizon is the zone of maximum leaching, or eluviation, of iron and clay. In the survey area, soils in forested mountain areas, such as Dekalb and Edgemont soils, have a distinct E horizon.

The B horizon, or the subsoil, underlies the A horizon. It is the zone of maximum accumulation, or illuviation, of clay, iron, aluminum, and other compounds that are leached from the layers above it. In some soils the B horizon forms through the alteration of the soil material in place with very little illuviation. The alteration may be caused by the oxidation and reduction of iron or by the weathering of clay minerals. The B horizon is generally blocky in structure, is firmer, and, in the case of well drained soils, is brighter in color than the A horizon. Hayesville soils are an example of soils that have a well developed B horizon.

The C horizon is below the B horizon. It consists of material that is little altered by the soil-forming processes but that may be modified by weathering. In some soils, bedrock is directly below the B horizon and the C horizon is absent.

Processes of Soil Formation

In the survey area, several processes affect the formation of soil horizons. The accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation and translocation of clay materials, and the layering of parent material continually affect the soil profile.

The accumulation of organic matter in the A horizon occurs through the decomposition of plant residue. In many areas, the A horizon has eroded or has been mixed with materials from underlying horizons as a result of cultivation. The content of organic matter in the surface layer is variable. It is low in coarse textured soils, such as Spessard soils. It is high in medium textured soils on flood plains, such as Clubcaf soils.

In order for soils to develop a distinct subsoil, some of the lime and other soluble salts must be leached and clay, iron, organic matter, and other materials must be translocated from the surface layer to the subsoil. The factors that affect the leaching include the type of salts that were originally present, the amount of annual precipitation, and the texture of the soil. Most of the soils in this survey area are leached. Some exceptions are soils in alluvial areas that are recharged with carbonates by limestone springs and some soils that are shallow over calcareous rock.

The process of the chemical reduction and transfer of iron occurs in soils that have limited drainage. The naturally wet soils are gray in one or more of their horizons as a result of the reduction of iron. Alderflats and Purdy soils are examples of wet soils that have a high water table.

In areas of soils that are poorly aerated, the iron that has been reduced generally becomes mobile and is removed from the soil. Some of the iron moves within the original horizon or moves to another horizon. Some of the iron is segregated and reoxidized. It forms the red, yellowish red, strong brown, and yellowish brown mottles common in some horizons of soils that have limited drainage. The reduction, segregation, and reoxidation of iron has resulted in mottles in the subsoil of Zoar soils.

When silicate clay forms from primary materials, some iron generally is freed as hydrated oxide. Depending on the degree of hydration, such oxides typically are reddish. The hydrated iron in the most well developed and freely aerated soil in the survey area results in bright brown and red soil colors. For example, the colors in the subsoil of the Frederick soils are a result of the free iron oxide.

The weathering of primary minerals into silicate clay minerals, which occurs mainly through hydrolysis, finally results in the production of kaolinitic clay. Kaolinite is the most common clay mineral in the soils of the survey area. Other clays, such as montmorillinite and illite, are in the soils in smaller amounts. A few soils, such as Chilhowie and Opequon soils, have a B horizon that has montmorillontic clay.

The layering of parent material influences the development of soil horizons in several ways. The formation of silicate clays is dependent on the amount of weatherable minerals in each layer. A layer that has a high content of slowly weatherable quartz sand forms less silicate clay than does a layer that has a high content of easily weathered silt. Water commonly moves more slowly between layers of different textures, resulting in a temporary excess of water in the upper layer. As the water slows down, the minerals carried downward by percolation are deposited or are precipitated. They commonly form either a compact layer or a clay layer, called a fragipan, that has a high content of sand or silt. The genesis of the fragipan is not fully understood, but studies show that swelling and shrinking takes place during cycles of alternating wet and dry periods. The shrinking and swelling may explain the packing of soil particles and the gross polygonal pattern of cracks that occurs in the fragipan. Clay, silica, and oxides of aluminum are the most likely cementing agents that cause brittleness and hardness. Laidig soils are an example of soils that have a well developed fragipan.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

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.

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 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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.

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.

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.

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.

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 (7.6 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 establishing terraces, diversions, and other water-control structures 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.

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 system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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.

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.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.

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.

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.

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 human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or 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.

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.

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.

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.

Ground water (geology). Water filling all the unblocked pores of the 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.

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.

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.

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.

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, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

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).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

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. The content of

organic matter in the surface layer is described as follows:

Low	0 to 2 percent
Moderate	2 to 4 percent
High	4 to 16 percent

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.

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, such as 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.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

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.

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 degrees of acidity or alkalinity, expressed as pH values, are:

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 drawbar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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 groundwater runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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 underlying material. 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.

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.

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. In this survey, slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 7 percent
Strongly sloping	7 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 35 percent
Very steep	more than 35 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

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 depth. The distance from the surface of the soil to the underlying bedrock. Terms describing soil depth are as follows:

Very shallow	0 to 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in

millimeters, of separates 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 substratum. 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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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 soil blowing 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 soil blowing 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.

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.

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). A layer of otherwise suitable soil material that is too thin for the specified use.

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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along 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 1949-89 at Roanoke, Virginia)

Month	Temperature						Precipitation				
				2 years in 10 will have--		Average		2 years in 10 will have--		Average	
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	number of growing degree days*	Average	Less than--	More than--	number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	44.7	26.4	35.6	71	1	69	2.67	1.35	3.82	5	6.5
February----	48.0	28.2	38.1	74	7	85	3.18	1.68	4.50	6	7.1
March-------	56.7	35.2	45.9	82	16	229	3.47	2.01	4.77	6	3.7
April-------	67.6	44.4	56.0	89	25	482	3.32	1.71	4.73	6	.5
May---------	76.3	53.0	64.6	92	34	763	3.83	2.29	5.22	7	.0
June--------	83.6	60.6	72.1	96	44	964	3.34	1.83	4.67	6	.0
July--------	87.1	65.1	76.1	99	51	1120	3.74	2.11	5.19	7	.0
August------	85.7	64.0	74.9	98	49	1080	4.09	2.22	5.73	6	.0
September---	78.8	56.9	67.8	95	38	835	3.42	1.49	5.07	5	.0
October-----	68.5	45.7	57.1	87	26	532	3.42	1.45	5.09	4	.0
November----	57.3	36.6	46.9	78	16	244	2.91	1.42	4.20	5	1.6
December----	47.3	28.9	38.1	72	7	95	2.89	1.48	4.13	5	4.1
Yearly:											
Average---	66.8	45.4	56.1	---	---	---	---	---	---	---	---
Extreme---	105	-11	---	100	0	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,497	40.29	34.29	46.05	68	23.5

* 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 1949-89 at Roanoke, Virginia)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 5	Apr. 14	Apr. 27
2 years in 10 later than--	Mar. 29	Apr. 9	Apr. 22
5 years in 10 later than--	Mar. 16	Mar. 30	Apr. 14
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 5	Oct. 16	Oct. 5
2 years in 10 earlier than--	Nov. 10	Oct. 22	Oct. 11
5 years in 10 earlier than--	Nov. 20	Nov. 2	Oct. 21

TABLE 3.--GROWING SEASON

(Recorded in the period 1949-89 at Roanoke, Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	219	195	171
8 years in 10	229	203	177
5 years in 10	248	217	189
2 years in 10	268	230	201
1 year in 10	278	238	207

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Roanoke County	City Of Roanoke	City Of Salem	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
1A	Alderflats silt loam, 0 to 4 percent slopes	574	0	0	574	0.3
2B	Allegheny loam, 2 to 7 percent slopes	411	78	31	520	0.3
2C	Allegheny loam, 7 to 15 percent slopes	99	2	0	101	0.1
3C3	Chilhowie silty clay loam, 7 to 15 percent slopes, severely eroded	1,156	0	0	1,156	0.6
3D3	Chilhowie silty clay loam, 15 to 25 percent slopes, severely eroded	565	0	0	565	0.3
3E3	Chilhowie silty clay loam, 25 to 60 percent slopes, severely eroded	561	0	0	561	0.3
4E	Chilhowie silty clay loam, 25 to 60 percent slopes, very rocky	1,467	0	0	1,467	0.8
5C	Chiswell-Litz complex, 7 to 15 percent slopes	602	930	171	1,703	0.9
5D	Chiswell-Litz complex, 15 to 25 percent slopes	985	2,065	523	3,573	1.8
5E	Chiswell-Litz complex, 25 to 50 percent slopes	6,209	1,600	970	8,779	4.5
6C	Chiswell-Litz-Urban land complex, 2 to 15 percent slopes	955	3,985	166	5,106	2.6
6D	Chiswell-Litz-Urban land complex, 15 to 35 percent slopes	887	1,915	89	2,891	1.5
7A	Clubcaf silt loam, 0 to 2 percent slopes, occasionally flooded	183	5	5	193	0.1
8A	Combs loam, 0 to 2 percent slopes, occasionally flooded	900	201	217	1,318	0.7
9B	Cotaco loam, 2 to 7 percent slopes	381	20	15	416	0.2
9C	Cotaco loam, 7 to 15 percent slopes	63	0	0	63	*
10D	Dekalb channery sandy loam, 15 to 35 percent slopes	596	0	0	596	0.3
11C	Dekalb channery sandy loam, 7 to 15 percent slopes, very stony	349	0	0	349	0.2
11D	Dekalb channery sandy loam, 15 to 35 percent slopes, very stony	1,087	0	0	1,087	0.6
11E	Dekalb channery sandy loam, 35 to 60 percent slopes, very stony	7,858	14	0	7,872	4.1
11F	Dekalb channery sandy loam, 60 to 80 percent slopes, very stony	3,329	0	0	3,329	1.7
12F	Dekalb-Rock outcrop complex, 25 to 80 percent slopes	6,625	0	0	6,625	3.4
13A	Derroc cobbly sandy loam, 0 to 4 percent slopes, occasionally flooded	1,681	103	174	1,958	1.0
14	Dumps	70	29	26	125	0.1
15C	Edgemont channery sandy loam, 7 to 15 percent slopes	582	79	0	661	0.3
15D	Edgemont channery sandy loam, 15 to 35 percent slopes	1,814	508	0	2,322	1.2
15E	Edgemont channery sandy loam, 35 to 60 percent slopes	3,258	1,808	0	5,066	2.6
16B	Edneyville fine sandy loam, 2 to 7 percent slopes	266	0	0	266	0.1
16C	Edneyville fine sandy loam, 7 to 15 percent slopes	1,236	14	0	1,250	0.6
16D	Edneyville fine sandy loam, 15 to 25 percent slopes	2,834	30	17	2,881	1.5
16E	Edneyville fine sandy loam, 25 to 55 percent slopes	8,397	25	26	8,448	4.3
17C	Evard fine sandy loam, 7 to 15 percent slopes	1,188	0	0	1,188	0.6
17D	Evard fine sandy loam, 15 to 25 percent slopes	1,960	0	0	1,960	1.0
17E	Evard fine sandy loam, 25 to 55 percent slopes	3,360	107	0	3,467	1.8
18B	Frederick silt loam, 2 to 7 percent slopes	99	240	0	339	0.2
18C	Frederick silt loam, 7 to 15 percent slopes	1,846	984	25	2,855	1.5
18D	Frederick silt loam, 15 to 25 percent slopes	1,238	283	0	1,521	0.8
19C	Frederick very gravelly silt loam, 7 to 15 percent slopes	1,082	0	0	1,082	0.6
19D	Frederick very gravelly silt loam, 15 to 25 percent slopes	2,925	0	0	2,925	1.5
19E	Frederick very gravelly silt loam, 25 to 40 percent slopes	702	24	0	726	0.4
20C	Frederick silt loam, 2 to 15 percent slopes, very rocky	216	19	0	235	0.1
20E	Frederick silt loam, 15 to 45 percent slopes, very rocky	1,046	45	0	1,091	0.6
21C	Frederick-Urban land complex, 2 to 15 percent slopes	1,150	1,709	43	2,902	1.5
21D	Frederick-Urban land complex, 15 to 30 percent slopes	75	115	15	205	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Roanoke County	City Of Roanoke	City Of Salem	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
22C	Gilpin loam, 7 to 15 percent slopes	594	4	170	768	0.4
22D	Gilpin loam, 15 to 25 percent slopes	720	0	167	887	0.5
23C	Grimsley cobbly loam, 7 to 15 percent slopes	378	0	0	378	0.2
24C	Groseclose silt loam, 7 to 15 percent slopes	599	56	20	675	0.3
24D	Groseclose silt loam, 15 to 25 percent slopes	364	0	0	364	0.2
24E	Groseclose silt loam, 25 to 35 percent slopes	231	0	0	231	0.1
25C	Groseclose-Litz complex, 2 to 15 percent slopes	522	190	16	728	0.4
25D	Groseclose-Litz complex, 15 to 25 percent slopes	566	98	12	676	0.3
25E	Groseclose-Litz complex, 25 to 35 percent slopes	948	0	0	948	0.5
26B	Hayesville fine sandy loam, 2 to 7 percent slopes	483	5	0	488	0.3
26C	Hayesville fine sandy loam, 7 to 15 percent slopes	2,979	76	0	3,055	1.6
26D	Hayesville fine sandy loam, 15 to 25 percent slopes	3,839	67	40	3,946	2.0
27C	Hayesville gravelly fine sandy loam, 7 to 15 percent slopes	293	0	0	293	0.2
27D	Hayesville gravelly fine sandy loam, 15 to 25 percent slopes	1,731	0	2	1,733	0.9
28E	Hayesville fine sandy loam, 25 to 50 percent slopes, very stony	11,113	237	1	11,351	5.8
29C	Hayesville-Urban land complex, 2 to 15 percent slopes	1,006	207	0	1,213	0.6
29D	Hayesville-Urban land complex, 15 to 30 percent slopes	705	167	0	872	0.4
30C	Laidig fine sandy loam, 7 to 15 percent slopes	884	0	0	884	0.5
30D	Laidig fine sandy loam, 15 to 25 percent slopes	333	0	0	333	0.2
31D	Laidig fine sandy loam, 15 to 25 percent slopes, very stony	118	0	0	118	0.1
32B	Macove gravelly silt loam, 2 to 7 percent slopes	260	0	0	260	0.1
32C	Macove gravelly silt loam, 7 to 15 percent slopes	619	0	0	619	0.3
33E	Opequon-Rock outcrop complex, 15 to 35 percent slopes	351	0	0	351	0.2
34E	Peaks gravelly loam, 35 to 60 percent slopes, very stony	2,072	0	0	2,072	1.1
34F	Peaks gravelly loam, 60 to 75 percent slopes, very stony	5,075	0	0	5,075	2.6
35	Pits, quarries	304	130	0	434	0.2
36A	Purdy silt loam, 0 to 4 percent slopes	124	0	0	124	0.1
37B	Sequoia silt loam, 2 to 7 percent slopes	47	99	0	146	0.1
37C	Sequoia silt loam, 7 to 15 percent slopes	943	44	72	1,059	0.5
37D	Sequoia silt loam, 15 to 25 percent slopes	555	0	187	742	0.4
37E	Sequoia silt loam, 25 to 40 percent slopes	277	0	364	641	0.3
38B	Shelocta silt loam, 2 to 7 percent slopes	237	0	0	237	0.1
38C	Shelotca silt loam, 7 to 15 percent slopes	826	0	0	826	0.4
38D	Shelocta silt loam, 15 to 25 percent slopes	404	0	0	404	0.2
39B	Shottower loam, 2 to 7 percent slopes	161	65	121	347	0.2
39C	Shottower loam, 7 to 15 percent slopes	233	112	474	819	0.4
40C	Shottower cobbly loam, 7 to 15 percent slopes	213	0	0	213	0.1
40D	Shottower cobbly loam, 15 to 30 percent slopes	311	23	112	446	0.2
41C	Shottower-Urban land complex, 4 to 15 percent slopes	428	763	1,060	2,251	1.2
41D	Shottower-Urban land complex, 15 to 25 percent slopes	116	0	140	256	0.1
42A	Sindion loam, 0 to 2 percent slopes, occasionally flooded	745	22	81	848	0.4
43A	Speedwell loam, 0 to 2 percent slopes, occasionally flooded	837	124	63	1,024	0.5
44A	Speedwell-Urban land complex, 0 to 2 percent slopes, occasionally flooded	16	758	1,090	1,864	1.0
45C	Spessard loamy sand, 7 to 15 percent slopes	122	0	0	122	0.1
45D	Spessard loamy sand, 15 to 25 percent slopes	185	0	0	185	0.1
45E	Spessard loamy sand, 25 to 40 percent slopes	257	0	0	257	0.1
46E	Sylvatus very gravelly silt loam, 35 to 55 percent slopes	1,022	0	0	1,022	0.5
46F	Sylvatus very gravelly silt loam, 55 to 75 percent slopes	1,413	0	0	1,413	0.7
47B	Thurmont sandy loam, 2 to 7 percent slopes	244	18	0	262	0.1
47C	Thurmont sandy loam, 7 to 15 percent slopes	878	139	11	1,028	0.5
48B	Timberville silt loam, 2 to 7 percent slopes, occasionally flooded	213	222	12	447	0.2

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Roanoke County	City Of Roanoke	City Of Salem	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
49B	Tumbling loam, 2 to 7 percent slopes	900	65	5	970	0.5
49C	Tumbling loam, 7 to 15 percent slopes	2,821	253	220	3,294	1.7
49D	Tumbling loam, 15 to 25 percent slopes	1,135	71	340	1,546	0.8
50C	Tumbling loam, 7 to 15 percent slopes, very stony	227	0	0	227	0.1
50D	Tumbling loam, 15 to 25 percent slopes, very stony	741	0	0	741	0.4
50E	Tumbling loam, 25 to 45 percent slopes, very stony	1,600	4	38	1,642	0.8
51C	Tumbling-Urban land complex, 2 to 15 percent slopes	347	85	107	539	0.3
52	Udorthents-Urban land complex	2,837	3,150	116	6,103	3.1
53	Urban land	418	2,690	368	3,476	1.8
54C	Weikert-Berks complex, 7 to 15 percent slopes	276	0	0	276	0.1
54E	Weikert-Berks complex, 15 to 45 percent slopes	11,169	0	316	11,485	5.9
55F	Weikert-Rock outcrop complex, 45 to 70 percent slopes	13,470	0	0	13,470	7.1
56A	Wheeling loam, 0 to 2 percent slopes, rarely flooded	149	56	0	205	0.1
56B	Wheeling loam, 2 to 7 percent slopes, rarely flooded	123	27	3	153	0.1
57A	Wheeling-Urban land complex, 0 to 2 percent slopes, rarely flooded	179	544	902	1,625	0.8
58B	Zoar silt loam, 2 to 7 percent slopes	229	0	0	229	0.1
	Water	302	92	57	451	0.2
	Total	157,684	27,600	9,200	194,484	100.0

* Less than 0.1 percent.

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
2B	Allegheny loam, 2 to 7 percent slopes
8A	Combs loam, 0 to 2 percent slopes, occasionally flooded
9B	Cotaco loam, 2 to 7 percent slopes
16B	Edneyville fine sandy loam, 2 to 7 percent slopes
18B	Frederick silt loam, 2 to 7 percent slopes
26B	Hayesville fine sandy loam, 2 to 7 percent slopes
38B	Shelocta silt loam, 2 to 7 percent slopes
39B	Shottower loam, 2 to 7 percent slopes
42A	Sindion loam, 0 to 2 percent slopes, occasionally flooded
43A	Speedwell loam, 0 to 2 percent slopes, occasionally flooded
47B	Thurmont sandy loam, 2 to 7 percent slopes
48B	Timberville silt loam, 2 to 7 percent slopes, occasionally flooded
49B	Tumbling loam, 2 to 7 percent slopes
56A	Wheeling loam, 0 to 2 percent slopes, rarely flooded
56B	Wheeling loam, 2 to 7 percent slopes, rarely flooded
58B	Zoar silt loam, 2 to 7 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	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
1A---------- Alderflats	IVw	---	---	---	---	---	6.6	4.4
2B---------- Allegheny	IIe	115	23	3.5	4.5	45	9.3	6.2
2C---------- Allegheny	IIIe	105	21	3.0	---	40	7.0	---
3C3---------- Chilhowie	IVe	65	13	2.0	---	25	6.1	4.0
3D3---------- Chilhowie	VIe	---	---	---	---	---	5.5	3.6
3E3---------- Chilhowie	VIIe	---	---	---	---	---	---	---
4E---------- Chilhowie	VIIs	---	---	---	---	---	---	---
5C---------- Chiswell-Litz	IVe	---	---	1.9	---	---	5.9	4.0
5D---------- Chiswell-Litz	VIe	---	---	1.7	---	---	5.6	3.8
5E---------- Chiswell-Litz	VIIe	---	---	---	---	---	5.3	3.3
6C**. Chiswell-Litz-Urban land								
6D**. Chiswell-Litz-Urban land								
7A---------- Clubcaf	IVw	---	---	---	---	---	6.6	4.4
8A---------- Combs	I	120	24	4.0	5.0	45	10.6	7.0
9B---------- Cotaco	IIe	110	22	3.0	---	35	8.0	5.3
9C---------- Cotaco	IIIe	95	19	2.5	---	30	6.6	4.4
10D---------- Dekalb	VIe	---	---	---	---	---	---	---
11C---------- Dekalb	VIs	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
11D, 11E-------- Dekalb	VIIs	---	---	---	---	---	---	---
11F------------- Dekalb	VIIe	---	---	---	---	---	---	---
12F**----------- Dekalb-Rock outcrop	VIIs	---	---	---	---	---	---	---
13A------------- Derroc	IIIs	70	13	1.8	2.0	3.0	4.8	3.2
14**. Dumps								
15C------------- Edgemont	IIIe	110	22	2.5	3.5	40	8.0	5.7
15D------------- Edgemont	VIe	---	---	---	---	---	5.5	---
15E------------- Edgemont	VIIe	---	---	---	---	---	---	---
16B------------- Edneyville	IIe	90	18	4.0	3.5	40	8.3	5.5
16C------------- Edneyville	IVe	80	16	3.5	3.2	35	7.5	5.3
16D------------- Edneyville	VIe	---	---	3.0	---	---	7.0	5.0
16E------------- Edneyville	VIIe	---	---	---	---	---	---	---
17C------------- Evard	IIIe	90	18	4.5	3.5	40	8.0	5.5
17D------------- Evard	VIe	---	---	3.7	---	---	7.7	5.0
17E------------- Evard	VIIe	---	---	---	---	---	---	---
18B------------- Frederick	IIe	130	26	3.5	4.5	50	9.3	6.2
18C------------- Frederick	IIIe	120	24	3.0	4.5	45	8.0	5.4
18D------------- Frederick	IVe	80	16	3.0	4.0	35	7.7	5.0
19C------------- Frederick	IVs	---	---	1.5	1.5	---	7.0	4.6
19D------------- Frederick	VIs	---	---	---	---	---	6.5	4.3

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
19E---------- Frederick	VIIe	---	---	---	---	---	---	---
20C---------- Frederick	VIs	---	---	---	---	---	8.0	5.4
20E---------- Frederick	VIIe	---	---	---	---	---	7.5	5.0
21C**. Frederick- Urban land								
21D**. Frederick- Urban land								
22C---------- Gilpin	IIIe	85	17	3.0	3.5	35	8.0	5.4
22D---------- Gilpin	IVe	---	---	---	---	---	7.5	5.0
23C---------- Grimsley	VIs	---	---	---	---	---	5.0	3.3
24C---------- Groseclose	IIIe	110	22	3.2	3.5	45	8.5	5.6
24D---------- Groseclose	IVe	---	---	---	---	---	8.0	5.3
24E---------- Groseclose	VIe	---	---	---	---	---	7.2	4.8
25C---------- Groseclose-Litz	IIIe	92	18	2.9	3.3	41	7.7	5.1
25D---------- Groseclose-Litz	IVe	---	---	---	---	---	6.9	4.6
25E---------- Groseclose-Litz	VIIe	---	---	---	---	---	6.3	4.2
26B---------- Hayesville	IIe	100	20	3.6	4.0	55	8.5	5.7
26C---------- Hayesville	IIIe	90	18	3.0	3.2	45	8.0	5.3
26D---------- Hayesville	IVe	---	---	---	---	---	6.6	4.4
27C---------- Hayesville	IVe	80	---	3.0	3.2	45	---	---
27D---------- Hayesville	VIe	---	---	---	---	---	6.3	4.2
28E---------- Hayesville	VIIs	---	---	---	---	---	4.0	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
29C**. Hayesville-Urban land								
29D**. Hayesville-Urban land								
30C---------- Laidig	IIIe	95	19	3.0	4.0	35	7.0	5.0
30D---------- Laidig	IVe	82	17	5.5	3.3	30	6.5	4.7
31D---------- Laidig	VIIs	---	---	---	---	---	---	---
32B---------- Macove	IIe	90	18	3.0	3.5	---	7.0	4.6
32C---------- Macove	IIIe	85	18	3.0	3.5	---	6.5	4.3
33E**---------- Opequon-Rock outcrop	VIIs	---	---	---	---	---	---	---
34E, 34F-------- Peaks	VIIs	---	---	---	---	---	---	---
35**---------- Pits	VIIIs	---	---	---	---	---	---	---
36A---------- Purdy	IVw	---	---	---	---	---	6.6	4.4
37B---------- Sequoia	IIIe	65	13	3.0	2.7	45	7.0	4.6
37C---------- Sequoia	IVe	---	---	---	---	---	6.6	4.4
37D, 37E-------- Sequoia	VIe	---	---	---	---	---	6.1	4.1
38B---------- Shelocta	IIe	110	22	3.5	4.5	45	9.0	6.0
38C---------- Shelocta	IIIe	100	---	---	4.0	40	8.0	5.4
38D---------- Shelocta	VIe	---	---	---	---	---	6.1	4.1
39B---------- Shottower	IIe	120	24	3.5	4.5	50	9.3	6.1
39C---------- Shottower	IIIe	115	21	3.5	4.5	45	9.0	6.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
40C---------- Shottower	IVs	---	---	---	---	---	8.0	5.4
40D---------- Shottower	VIs	---	---	---	---	---	6.6	4.4
41C**. Shottower-Urban land								
41D**. Shottower-Urban land								
42A---------- Sindion	IIw	125	25	3.5	---	40	8.3	6.1
43A---------- Speedwell	I	145	29	4.5	4.5	45	12.0	8.0
44A**. Speedwell-Urban land								
45C, 45D-------- Spessard	VIIs	---	---	---	---	---	---	---
45E---------- Spessard	VIIe	---	---	---	---	---	---	---
46E, 46F-------- Sylvatus	VIIe	---	---	---	---	---	---	---
47B---------- Thurmont	IIe	125	25	4.5	---	45	9.0	6.0
47C---------- Thurmont	IIIe	115	23	4.0	---	40	8.0	5.4
48B---------- Timberville	IIe	125	25	4.0	4.5	45	10.6	7.1
49B---------- Tumbling	IIe	100	18	3.5	4.5	50	9.3	6.1
49C---------- Tumbling	IIIe	95	16	3.2	4.5	45	8.5	5.6
49D---------- Tumbling	IVe	80	14	3.0	4.0	40	8.0	5.4
50C, 50D-------- Tumbling	VIs	---	---	---	---	---	7.0	4.6
50E---------- Tumbling	VIIe	---	---	---	---	---	5.5	3.7
51C**. Tumbling-Urban land								

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Grass-legume hay	Alfalfa hay	Wheat	Pasture	Kentucky bluegrass
		Bu	Tons	Tons	Tons	Bu	AUM*	AUM*
52**. Udorthents-Urban land								
53**. Urban land								
54C---------- Weikert-Berks	IVe	---	---	---	---	---	6.0	4.0
54E---------- Weikert-Berks	VIIe	---	---	---	---	---	---	---
55F**---------- Weikert-Rock outcrop	VIIs	---	---	---	---	---	---	---
56A---------- Wheeling	I	145	29	4.5	4.5	45	12.0	8.0
56B---------- Wheeling	IIe	145	29	4.5	4.5	45	12.0	8.0
57A**. Wheeling-Urban land								
58B---------- Zoar	IIe	90	18	3.0	---	40	8.0	5.4

* 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.--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					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
1A---------- Alderflats	6W	Slight	Moderate	Severe	Severe	Severe	Yellow-poplar-------	85	6	Eastern white pine, Norway spruce.
2B, 2C---------- Allegheny	7A	Slight	Moderate	Slight	Slight	Severe	Shortleaf pine------ Yellow-poplar------- Virginia pine------- Northern red oak---- White oak-----------	93 80 72 70 70	7 9 8 4 4	Eastern white pine, yellow-poplar, black walnut, shortleaf pine.
3C3---------- Chilhowie	6C	Slight	Moderate	Moderate	Moderate	Slight	Virginia pine------- Northern red oak---- Shortleaf pine------	60 60 60	6 3 6	Eastern white pine, Virginia pine.
3D3, 3E3---------- Chilhowie	6R	Moderate	Moderate	Moderate	Moderate	Slight	Virginia pine------- Northern red oak---- Shortleaf pine------	60 60 60	6 3 6	Eastern white pine, Virginia pine.
4E---------- Chilhowie	6R	Severe	Severe	Moderate	Moderate	Slight	Virginia pine------- Northern red oak---- Shortleaf pine------	60 60 60	6 3 6	Eastern white pine, Virginia pine.
5C**: Chiswell----------	4D	Slight	Slight	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar-------	74 61 93	4 6 7	Eastern white pine, Virginia pine.
Litz----------	4F	Slight	Slight	Moderate	Slight	--------	Northern red oak---- Virginia pine------- Shortleaf pine------ Yellow-poplar-------	74 61 72 93	4 6 8 7	Virginia pine, eastern white pine.
5D**: Chiswell----------	4R	Moderate	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar-------	74 61 93	4 6 7	Eastern white pine, Virginia pine.
Litz----------	4F	Slight	Moderate	Moderate	Slight	--------	Northern red oak---- Virginia pine------- Yellow-poplar-------	80 65 95	4 7 7	Virginia pine, eastern white pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
5E**:										
Chiswell	4R	Severe	Severe	Moderate	Moderate	Moderate	Northern red oak	74	4	Eastern white pine, Virginia pine.
							Virginia pine	61	6	
							Yellow-poplar	93	7	
Litz	4R	Moderate	Severe	Moderate	Slight	---	Northern red oak	80	4	Virginia pine, eastern white pine.
							Virginia pine	65	7	
							Yellow-poplar	95	7	
6C**:										
Chiswell	4D	Slight	Slight	Moderate	Moderate	Moderate	Northern red oak	74	4	Eastern white pine, Virginia pine.
							Virginia pine	61	6	
							Yellow-poplar	93	7	
Litz	4F	Slight	Slight	Moderate	Slight	---	Northern red oak	74	4	Virginia pine, eastern white pine.
							Virginia pine	61	6	
							Shortleaf pine	72	8	
							Yellow-poplar	93	7	
Urban land.										
6D**:										
Chiswell	4R	Moderate	Moderate	Moderate	Moderate	Moderate	Northern red oak	74	4	Eastern white pine, Virginia pine.
							Virginia pine	61	6	
							Yellow-poplar	93	7	
Litz	4F	Slight	Moderate	Moderate	Slight	---	Northern red oak	80	4	Virginia pine, eastern white pine, shortleaf pine.
							Virginia pine	65	7	
							Yellow-poplar	95	7	
Urban land.										
7A---- Clubcaf	5W	Slight	Moderate	Severe	Severe	Severe	Northern red oak	78	5	Eastern cottonwood, American sycamore.
							Eastern cottonwood	95	8	
							Sweetgum	92	8	
							Red maple	---	---	
8A---- Combs	9A	Slight	Slight	Slight	Slight	Severe	Yellow-poplar	115	9	Yellow-poplar, black walnut, eastern white pine.
							Northern red oak	90	5	
							Black walnut	---	---	
9B, 9C---- Cotaco	7A	Slight	Slight	Slight	Slight	Severe	Yellow-poplar	95	7	Eastern white pine, yellow-poplar.
							Virginia pine	81	9	
							Black oak	87	5	
							Sweet birch	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
10D---------- Dekalb	2F	Slight	Moderate	Moderate	Slight	--------	Northern red oak----	52	2	Eastern white pine, Virginia pine, Scotch pine.
11C---------- Dekalb	3F	Slight	Slight	Moderate	Slight	Moderate	Northern red oak----	57	3	Eastern white pine, Virginia pine, Scotch pine.
11D---------- Dekalb	2F	Slight	Moderate	Moderate	Moderate	Moderate	Northern red oak----	52	2	Eastern white pine, Virginia pine, Scotch pine.
11E---------- Dekalb	2R	Moderate	Severe	Moderate	Moderate	Moderate	Northern red oak----	52	2	Eastern white pine, Virginia pine, Scotch pine.
11F---------- Dekalb	2R	Moderate	Severe	Moderate	Slight	--------	Northern red oak----	52	2	Eastern white pine, Virginia pine, Scotch pine.
12F**: Dekalb----------	2R	Moderate	Severe	Moderate	Slight	--------	Northern red oak----	52	2	Eastern white pine, Virginia pine, Scotch pine.
Rock outcrop.										
13A---------- Derroc	12F	Slight	Slight	Slight	Slight	Severe	Eastern white pine--	90	12	Eastern white pine, yellow-poplar.
							Northern red oak----	70	4	
							Yellow-poplar-------	90	6	
							Virginia pine-------	60	6	
15C---------- Edgemont	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	69	4	Eastern white pine, yellow-poplar, Virginia pine.
							Yellow-poplar-------	80	5	
15D---------- Edgemont	4R	Slight	Moderate	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, yellow-poplar, Virginia pine.
							Yellow-poplar-------	90	6	
15E---------- Edgemont	4R	Moderate	Severe	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, yellow-poplar, Virginia pine.
							Yellow-poplar-------	90	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
16B, 16C---------- Edneyville	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, yellow-poplar, Scotch pine.
							Shortleaf pine------	75	8	
							Virginia pine-------	75	8	
							Eastern white pine--	90	12	
							Yellow-poplar-------	98	7	
16D---------- Edneyville	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, yellow-poplar, Scotch pine.
							Shortleaf pine------	75	8	
							Virginia pine-------	75	8	
							Eastern white pine--	90	12	
							Yellow-poplar-------	98	7	
16E---------- Edneyville	4R	Severe	Severe	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, yellow-poplar, Scotch pine.
							Shortleaf pine------	75	8	
							Virginia pine-------	75	8	
							Eastern white pine--	90	12	
							Yellow-poplar-------	98	7	
17C---------- Evard	6A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	90	6	Shortleaf pine, eastern white pine, yellow-poplar.
							Shortleaf pine------	70	8	
							Virginia pine-------	70	8	
							Eastern white pine--	80	10	
							White oak-----------	75	4	
17D---------- Evard	6R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	90	6	Shortleaf pine, eastern white pine, yellow-poplar.
							Shortleaf pine------	70	8	
							Virginia pine-------	70	8	
							Eastern white pine--	80	10	
							White oak-----------	75	4	
17E---------- Evard	6R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar-------	90	6	Shortleaf pine, eastern white pine, yellow-poplar.
							Shortleaf pine------	70	8	
							Virginia pine-------	70	8	
							Eastern white pine--	80	10	
							White oak-----------	75	4	
18B, 18C---------- Frederick	4C	Slight	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
18D---------- Frederick	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
19C---------- Frederick	4S	Slight	Moderate	Severe	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
19D, 19E---------- Frederick	4R	Moderate	Moderate	Severe	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
20C---------- Frederick	4C	Slight	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
20E---------- Frederick	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
21C**:										
Frederick---------	4C	Slight	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	
Urban land.										
21D**:										
Frederick---------	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak----	76	4	Eastern white pine, yellow-poplar, black walnut, Scotch pine.
							Yellow-poplar-------	86	6	
							Black locust--------	80	4	
							White oak-----------	76	4	
							Black walnut--------	76	4	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
21D**: Urban land.										
22C---------- Gilpin	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	80	4	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
							Yellow-poplar-------	95	7	
22D---------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak----	80	4	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
							Yellow-poplar-------	95	7	
23C---------- Grimsley	6X	Slight	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	90	6	Yellow-poplar, eastern white pine, shortleaf pine.
							Shortleaf pine------	70	8	
24C---------- Groseclose	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	85	5	Eastern white pine, yellow-poplar.
							White oak-----------	85	5	
							Eastern white pine--	90	12	
							Yellow-poplar-------	86	6	
24D, 24E---------- Groseclose	5R	Moderate	Moderate	Moderate	Slight	Moderate	Northern red oak----	85	5	Eastern white pine, yellow-poplar, eastern white pine.
							Yellow-poplar-------	86	6	
							White oak-----------	85	5	
							Eastern white pine--	90	12	
25C**: Groseclose--------	5A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	85	5	Eastern white pine, yellow-poplar.
							White oak-----------	85	5	
							Eastern white pine--	90	12	
							Yellow-poplar-------	86	6	
Litz----------	4F	Slight	Slight	Moderate	Slight	--------	Northern red oak----	74	4	Virginia pine, eastern white pine, shortleaf pine.
							Virginia pine-------	61	6	
							Shortleaf pine------	72	8	
							Yellow-poplar-------	93	7	
25D**, 25E**: Groseclose--------	5R	Moderate	Moderate	Moderate	Slight	Moderate	Northern red oak----	85	5	Eastern white pine, yellow-poplar.
							White oak-----------	85	5	
							Eastern white pine--	90	12	
							Yellow-poplar-------	86	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
25D**, 25E**:										
Litz	4F	Slight	Moderate	Moderate	Slight	--------	Northern red oak	80	4	Virginia pine, eastern white pine, shortleaf pine.
							Virginia pine	65	7	
							Yellow-poplar	95	7	
26B, 26C	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	93	7	Eastern white pine, shortleaf pine, Fraser fir, Scotch pine.
Hayesville							Eastern white pine	85	11	
							Northern red oak	---	---	
							Pitch pine	82	8	
							Shortleaf pine	70	8	
							Virginia pine	74	8	
26D	7R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	93	7	Eastern white pine, shortleaf pine, Fraser fir, Scotch pine.
Hayesville							Eastern white pine	85	11	
							Northern red oak	---	---	
							Pitch pine	82	8	
							Shortleaf pine	70	8	
							Virginia pine	74	8	
27C	11A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine	85	11	Eastern white pine, shortleaf pine, Scotch pine.
Hayesville							Yellow-poplar	93	7	
							Northern red oak	70	4	
							Pitch pine	82	8	
							Shortleaf pine	70	8	
							Virginia pine	74	8	
27D	11R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine	85	11	Eastern white pine, shortleaf pine, Scotch pine.
Hayesville							Yellow-poplar	93	7	
							Northern red oak	70	4	
							Shortleaf pine	70	8	
							Virginia pine	74	8	
28E	11R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	90	6	Eastern white pine, shortleaf pine, Scotch pine.
Hayesville							Shortleaf pine	70	8	
							Virginia pine	74	8	
							Eastern white pine	85	11	
							Northern red oak	70	4	
29C**, 29D**:										
Hayesville	11R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine	85	11	Eastern white pine, shortleaf pine, Scotch pine.
							Yellow-poplar	93	7	
							Northern red oak	70	4	
							Shortleaf pine	70	8	
							Virginia pine	74	8	
Urban land.										

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
30C---------- Laidig	4A	Slight	Slight	Slight	Slight	Slight	Northern red oak----	71	4	Eastern white pine, yellow-poplar, black walnut.
							Yellow-poplar-------	89	6	
							Eastern white pine--	80	10	
							Virginia pine-------	70	8	
30D---------- Laidig	4R	Moderate	Moderate	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut.
							Yellow-poplar-------	90	6	
							Eastern white pine--	90	12	
							White ash-----------	80	4	
31D---------- Laidig	4R	Slight	Moderate	Slight	Slight	Moderate	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut, black locust, black cherry.
							White oak-----------	80	4	
							Yellow-poplar-------	90	6	
							White ash-----------	80	4	
							Sugar maple---------	80	4	
							Black cherry--------	80	4	
							Eastern white pine--	90	12	
							Black locust--------	80	---	
32B, 32C---------- Macove	7F	Slight	Slight	Moderate	Slight	Slight	Virginia pine-------	68	7	Eastern white pine, Virginia pine, yellow-poplar.
							White oak-----------	70	4	
							Red maple-----------	---	---	
33E**: Opequon----------	3R	Severe	Severe	Severe	Severe	Moderate	Northern red oak----	60	3	Virginia pine, eastern white pine.
							White oak-----------	60	3	
Rock outcrop.										
34E, 34F---------- Peaks	3R	Moderate	Severe	Slight	Slight	Moderate	Northern red oak----	67	3	Eastern white pine.
							Virginia pine-------	60	6	
							Eastern white pine--	80	9	
36A---------- Purdy	6W	Slight	Severe	Severe	Severe	Severe	Yellow-poplar-------	90	6	Virginia pine, eastern white pine, loblolly pine.
							Shortleaf pine------	75	8	
							Virginia pine-------	75	8	
							Sweetgum------------	85	6	
37B, 37C---------- Sequoia	8A	Slight	Slight	Slight	Slight	Moderate	Virginia pine-------	71	8	Eastern white pine, shortleaf pine, Virginia pine.
							Northern red oak----	70	4	
							Shortleaf pine------	63	7	
37D, 37E---------- Sequoia	8R	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine-------	71	8	Eastern white pine, shortleaf pine, Virginia pine.
							Northern red oak----	70	4	
							Shortleaf pine------	63	7	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
38B, 38C---------- Shelocta	7A	Slight	Slight	Slight	Slight	Severe	Yellow-poplar------- White oak---------- Shortleaf pine------ Red maple---------- Scarlet oak---------	99 77 77 81 80	7 4 9 --- 4	Yellow-poplar, black walnut, eastern white pine, shortleaf pine.
38D---------- Shelocta	7R	Moderate	Moderate	Slight	Slight	Severe	Yellow-poplar------- White oak---------- Shortleaf pine------ Red maple---------- Scarlet oak---------	99 77 77 81 80	7 4 9 --- 4	Yellow-poplar, black walnut, eastern white pine, shortleaf pine.
39B, 39C, 40C------ Shottower	12A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Yellow-poplar------- Shortleaf pine------	95 80 90 76	12 4 6 8	Eastern white pine, yellow-poplar.
40D---------- Shottower	12R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Yellow-poplar------- Shortleaf pine------	95 80 90 76	12 4 6 8	Eastern white pine, yellow-poplar.
41C**: Shottower--------- Urban land.	12A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Yellow-poplar------- Shortleaf pine------	95 80 90 76	12 4 6 8	Eastern white pine, yellow-poplar.
41D**: Shottower--------- Urban land.	12R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine-- Northern red oak---- Yellow-poplar------- Shortleaf pine------	95 80 90 76	12 4 6 8	Eastern white pine, yellow-poplar.
42A---------- Sindion	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- Virginia pine-------	80 95 70	4 7 8	Eastern white pine, yellow-poplar, shortleaf pine.
43A---------- Speedwell	6A	Slight	Slight	Slight	Slight	Slight	Yellow-poplar------- Northern red oak----	90 80	6 4	Eastern white pine, yellow-poplar, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
44A**:										
Speedwell	6A	Slight	Slight	Slight	Slight	Slight	Yellow-poplar	90	6	Eastern white pine, yellow-poplar, black walnut.
							Northern red oak	80	4	
Urban land.										
45C Spessard	5S	Slight	Moderate	Moderate	Slight	Slight	Yellow-poplar	77	5	Yellow-poplar, Virginia pine, eastern white pine.
							White oak	82	5	
							Virginia pine	49	5	
45D, 45E Spessard	5S	Slight	Moderate	Moderate	Slight	Slight	Yellow-poplar	77	5	
							White oak	82	5	
							Virginia pine	49	5	
46E, 46F Sylvatus	4R	Severe	Severe	Moderate	Moderate	Moderate	Virginia pine	45	4	Eastern white pine, Virginia pine.
							Northern red oak	55	3	
							Yellow-poplar	70	4	
47B, 47C Thurmont	4A	Slight	Slight	Slight	Slight	Severe	Northern red oak	76	4	Eastern white pine, yellow-poplar.
							Yellow-poplar	88	6	
							Eastern white pine	88	11	
							Shortleaf pine	77	9	
48B Timberville	5A	Slight	Slight	Slight	Slight	Severe	Yellow-poplar	80	5	Yellow-poplar, black walnut, eastern white pine.
							Northern red oak	90	5	
							Shortleaf pine	80	9	
							Virginia pine	70	8	
49B, 49C Tumbling	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak	70	4	Eastern white pine, yellow-poplar.
							Yellow-poplar	90	6	
							Eastern white pine	80	10	
49D Tumbling	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	70	4	Eastern white pine, yellow-poplar.
							Yellow-poplar	90	6	
							Eastern white pine	80	10	
50C Tumbling	4X	Slight	Moderate	Slight	Slight	Moderate	Northern red oak	70	4	Eastern white pine, yellow-poplar.
							Yellow-poplar	90	6	
							Eastern white pine	80	10	
50D Tumbling	4X	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	70	4	Eastern white pine, yellow-poplar.
							Yellow-poplar	90	6	
							Eastern white pine	80	10	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
50E---------- Tumbling	4R	Severe	Severe	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 90 80	4 6 10	Eastern white pine, yellow-poplar.
51C**: Tumbling----------	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 90 80	4 6 10	Eastern white pine, yellow-poplar.
Urban land.										
54C**: Weikert----------	3D	Slight	Slight	Severe	Moderate	Moderate	Northern red oak---- Virginia pine-------	59 56	3 6	Virginia pine, shortleaf pine, red pine, eastern white pine.
Berks----------	4F	Slight	Slight	Moderate	Slight	Moderate	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.
54E**: Weikert----------	3D	Slight	Moderate	Severe	Moderate	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Moderate	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.
55F**: Weikert----------	3R	Moderate	Severe	Severe	Moderate	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Rock outcrop.										
56A, 56B---------- Wheeling	6A	Slight	Slight	Slight	Slight	--------	Yellow-poplar------- Northern red oak----	90 80	6 4	Eastern white pine, yellow-poplar, black walnut.
57A**: Wheeling----------	6A	Slight	Slight	Slight	Slight	--------	Yellow-poplar------- Northern red oak----	90 80	6 4	Eastern white pine, yellow-poplar, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
57A**: Urban land.										
58B---------- Zoar	10A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine--	80	10	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
							Northern red oak----	70	4	
							Yellow-poplar-------	80	5	
							Virginia pine-------	70	8	
							Black oak-----------	70	4	
							White oak-----------	70	4	

* 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 8.--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
1A Alderflats	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2B Allegheny	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
2C Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
3C3 Chilhowie	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: large stones, slope.
3D3 Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
3E3, 4E Chilhowie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
5C*: Chiswell	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: depth to rock.
Litz	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
5D*: Chiswell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: depth to rock, slope.
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
5E*: Chiswell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: depth to rock, slope.
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
6C*: Chiswell	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
6C*:					
Litz	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
6D*:					
Chiswell	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: depth to rock, slope.
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
7A Clubcaf	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
8A Combs	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
9B Cotaco	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
9C Cotaco	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
10D Dekalb	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11C Dekalb	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones.
11D, 11E Dekalb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
11F Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
12F*:					
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
Rock outcrop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13A---------- Derroc	Severe: flooding.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
14*---------- Dumps	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
15C---------- Edgemont	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, droughty.
15D, 15E---------- Edgemont	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
16B---------- Edneyville	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
16C---------- Edneyville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
16D---------- Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
16E---------- Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17C---------- Evard	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
17D---------- Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
17E---------- Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
18B---------- Frederick	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
18C---------- Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
18D---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
19C---------- Frederick	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight----------	Severe: small stones.
19D---------- Frederick	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, small stones.
19E---------- Frederick	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20C---------- Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
20E---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
21C*: Frederick----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
21D*: Frederick----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
22C---------- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
22D---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
23C---------- Grimsley	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
24C---------- Groseclose	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
24D---------- Groseclose	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
24E---------- Groseclose	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
25C*: Groseclose----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
Litz----------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
25D*: Groseclose----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Litz----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
25E*: Groseclose	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Litz	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
26B Hayesville	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
26C Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
26D Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
27C Hayesville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
27D Hayesville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
28E Hayesville	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
29C*: Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
29D*: Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
30C Laidig	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
30D Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
31D Laidig	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
32B Macove	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
32C---------- Macove	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
33E*:					
Opequon----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.
34E, 34F---------- Peaks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
35*---------- Pits	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight----------	Severe: depth to rock.
36A---------- Purdy	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
37B---------- Sequoia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Slight----------	Moderate: droughty.
37C---------- Sequoia	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: droughty, slope.
37D---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
37E---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
38B---------- Shelocta	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
38C---------- Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
38D---------- Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
39B---------- Shottower	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
39C---------- Shottower	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
40C---------- Shottower	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
40D---------- Shottower	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: slope, large stones.
41C*:					
Shottower----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
41D*:					
Shottower----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
42A---------- Sindion	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
43A---------- Speedwell	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Slight----------	Moderate: flooding.
44A*:					
Speedwell----------	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Slight----------	Moderate: flooding.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
45C---------- Spessard	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Severe: droughty.
45D---------- Spessard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.	Severe: droughty, slope.
45E---------- Spessard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
46E, 46F---------- Sylvatus	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: small stones, depth to rock, slope.
47B---------- Thurmont	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
47C---------- Thurmont	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
48B---------- Timberville	Severe: flooding.	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: flooding.
49B---------- Tumbling	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
49C---------- Tumbling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
49D---------- Tumbling	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
50C---------- Tumbling	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
50D---------- Tumbling	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
50E---------- Tumbling	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
51C*: Tumbling----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
52*: Udorthents.					
Urban land----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
53*---------- Urban land	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
54C*: Weikert----------	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones.	Slight----------	Severe: depth to rock.
Berks----------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
54E*: Weikert----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe----------	Severe: depth to rock.
Berks----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
55F*: Weikert----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe----------	Severe: depth to rock.
Rock outcrop---------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
56A Wheeling	Severe: flooding.	Slight	Slight	Slight	Slight.
56B Wheeling	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
57A*: Wheeling	Severe: flooding.	Slight	Slight	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
58B Zoar	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--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
1A---------- Alderflats	Poor	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
2B---------- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
2C---------- Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
3C3, 3D3---------- Chilhowie	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.
3E3---------- Chilhowie	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
4E---------- Chilhowie	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
5C*:										
Chiswell----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Litz----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
5D*:										
Chiswell----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Litz----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
5E*:										
Chiswell----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Litz----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
6C*:										
Chiswell----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Litz----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Urban land.										
6D*:										
Chiswell----------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Litz----------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										---

See footnote at end of table.

TABLE 9.--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
7A---------- Clubcaf	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
8A---------- Combs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
9B---------- Cotaco	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
9C---------- Cotaco	Fair	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
10D---------- Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
11C---------- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
11D, 11E, 11F------ Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
12F*:										
Dekalb----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
13A---------- Derroc	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
14*---------- Dumps	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
15C---------- Edgemont	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15D---------- Edgemont	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
15E---------- Edgemont	Very poor.	Poor	Poor	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
16B, 16C---------- Edneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
16D---------- Edneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
16E---------- Edneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
17C---------- Evard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
17D---------- Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
17E---------- Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 9.--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
18B---------- Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18C---------- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
18D---------- Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19C---------- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
19D---------- Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19E---------- Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
20C---------- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
20E---------- Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
21C*: Frederick---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										---
21D*: Frederick---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										---
22C---------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
22D---------- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
23C---------- Grimsley	Poor	Poor	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
24C---------- Groseclose	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24D---------- Groseclose	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
24E---------- Groseclose	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
25C*: Groseclose--------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Litz----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 9.--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
25D*:										
Groseclose	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Litz	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
25E*:										
Groseclose	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Litz	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
26B---- Hayesville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
26C---- Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
26D---- Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
27C---- Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27D---- Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
28E---- Hayesville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
29C*:										
Hayesville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Urban land.										---
29D*:										
Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										---
30C---- Laidig	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
30D---- Laidig	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
31D---- Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
32B---- Macove	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
32C---- Macove	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--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
33E*: Opequon	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
34E, 34F Peaks	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
35* Pits	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
36A Purdy	Poor	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
37B Sequoia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
37C Sequoia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
37D, 37E Sequoia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
38B Shelocta	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
38C Shelocta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
38D Shelocta	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
39B Shottower	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39C, 40C Shottower	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
40D Shottower	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
41C*: Shottower	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										---
41D*: Shottower	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										---
42A Sindion	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
43A Speedwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--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
44A*:										
Speedwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										---
45C---- Spessard	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
45D---- Spessard	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
45E---- Spessard	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
46E, 46F---- Sylvatus	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
47B---- Thurmont	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
47C---- Thurmont	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
48B---- Timberville	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
49B---- Tumbling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
49C---- Tumbling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
49D---- Tumbling	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
50C---- Tumbling	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.
50D---- Tumbling	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.
50E---- Tumbling	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.
51C*:										
Tumbling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										---
52*:										
Udorthents.										
Urban land.										---
53*.										
Urban land										---

See footnote at end of table.

TABLE 9.--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
54C*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
54E*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
55F*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
56A Wheeling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
56B Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
57A*:										
Wheeling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										---
58B Zoar	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
1A---------- Alderflats	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
2B---------- Allegheny	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
2C---------- Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
3C3---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: large stones, slope.
3D3, 3E3, 4E------ Chilhowie	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope.
5C*:						
Chiswell---------	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
Litz----------	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
5D*, 5E*:						
Chiswell---------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.
Litz----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
6C*:						
Chiswell---------	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
Litz----------	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.

See footnote at end of table.

TABLE 10.--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
6D*:						
Chiswell	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.
Litz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
7A---------- Clubcaf	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
8A---------- Combs	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
9B---------- Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
9C---------- Cotaco	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.
10D---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
11C---------- Dekalb	Severe: depth to rock, cutbanks cave.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: small stones.
11D, 11E---------- Dekalb	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
11F---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
12F*:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Rock outcrop	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: depth to rock.
13A---------- Derroc	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.
14*---------- Dumps	Variable	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 10.--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
15C---------- Edgemont	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty.
15D, 15E---------- Edgemont	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16B---------- Edneyville	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
16C---------- Edneyville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
16D, 16E---------- Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17C---------- Evard	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
17D, 17E---------- Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
18B---------- Frederick	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
18C---------- Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
18D---------- Frederick	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
19C---------- Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Severe: small stones.
19D, 19E---------- Frederick	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope, small stones.
20C---------- Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
20E---------- Frederick	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
21C*: Frederick--------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.

See footnote at end of table.

TABLE 10.--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
21C*: Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
21D*: Frederick	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
22C--- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
22D--- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
23C--- Grimsley	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: large stones.
24C--- Groseclose	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: slope.
24D, 24E--- Groseclose	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: slope.
25C*: Groseclose	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: small stones, slope.
Litz	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones.
25D*, 25E*: Groseclose	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Litz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
26B--- Hayesville	Moderate: too clayey.	Slight---	Slight---	Moderate: slope.	Moderate: low strength, frost action.	Slight.
26C--- Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 10.--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
26D---------- Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
27C---------- Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope.
27D---------- Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28E---------- Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
29C*, 29D*: Hayesville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
30C---------- Laidig	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: droughty, slope.
30D, 31D---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
32B---------- Macove	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: small stones.
32C---------- Macove	Moderate: slope.	Moderate: slope.	Moderate: small stones.	Severe: slope.	Severe: small stones.	Moderate: small stones, slope.
33E*: Opequon----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: slope, depth to rock.
Rock outcrop-----	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: depth to rock.
34E, 34F---------- Peaks	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
35*---------- Pits	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
36A---------- Purdy	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.

See footnote at end of table.

TABLE 10.--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
37B---------- Sequoia	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.
37C---------- Sequoia	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
37D, 37E---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
38B---------- Shelocta	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
38C---------- Shelocta	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
38D---------- Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
39B---------- Shottower	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
39C---------- Shottower	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
40C---------- Shottower	Moderate: too clayey, large stones, slope.	Moderate: shrink-swell, large stones, slope.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Severe: large stones.
40D---------- Shottower	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
41C*: Shottower--------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
41D*: Shottower--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
42A---------- Sindion	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: wetness, flooding.
43A---------- Speedwell	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--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
44A*:						
Speedwell	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
45C Spessard	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
45D, 45E Spessard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
46E, 46F Sylvatus	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: small stones, depth to rock, slope.
47B Thurmont	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
47C Thurmont	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
48B Timberville	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
49B Tumbling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
49C Tumbling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
49D Tumbling	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
50C Tumbling	Moderate: too clayey, large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, large stones, slope.
50D, 50E Tumbling	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51C*:						
Tumbling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
52*:						
Udorthents.						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 10.--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
53*---------- Urban land	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
54C*:						
Weikert----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
Berks----------	Moderate: depth to rock, large stones, slope.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones.
54E*:						
Weikert----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock.
Berks----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
55F*:						
Weikert----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: depth to rock.
Rock outcrop-----	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: depth to rock.
56A, 56B---------- Wheeling	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action, low strength.	Slight.
57A*:						
Wheeling---------	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action, low strength.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
58B---------- Zoar	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
1A Alderflats	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
2B Allegheny	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
2C Allegheny	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
3C3 Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
3D3, 3E3, 4E Chilhowie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
5C*:					
Chiswell	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Litz	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
5D*, 5E*:					
Chiswell	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Litz	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
6C*:					
Chiswell	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Litz	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 11.--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
6D*:					
Chiswell	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Litz	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
7A Clubcaf	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
8A Combs	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
9B Cotaco	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage, wetness.	Poor: small stones.
9C Cotaco	Severe: wetness.	Severe: seepage, slope.	Severe: wetness.	Severe: seepage, wetness.	Poor: small stones.
10D Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
11C Dekalb	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
11D, 11E Dekalb	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
11F Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
12F*:					
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 11.--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
13A---------- Derroc	Severe: flooding, poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: small stones.
14*---------- Dumps	Variable----------	Variable----------	Variable----------	Variable----------	Variable.
15C---------- Edgemont	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
15D, 15E---------- Edgemont	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
16B---------- Edneyville	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
16C---------- Edneyville	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
16D, 16E---------- Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
17C---------- Evard	Moderate: slope.	Severe: slope.	Moderate: slope, too sandy.	Moderate: slope.	Fair: too sandy, small stones, slope.
17D, 17E---------- Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
18B---------- Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
18C---------- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
18D---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
19C---------- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
19D, 19E---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 11.--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
20C---------- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
20E---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
21C*: Frederick----------	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
21D*: Frederick----------	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
22C---------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
22D---------- Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
23C---------- Grimsley	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: small stones.
24C---------- Groseclose	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
24D, 24E---------- Groseclose	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
25C*: Groseclose---------	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Litz----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
25D*, 25E*: Groseclose---------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 11.--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
25D*, 25E*: Litz	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
26B--- Hayesville	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight---	Fair: too clayey, hard to pack.
26C--- Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
26D--- Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
27C--- Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
27D, 28E--- Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
29C*, 29D*: Hayesville---	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
30C--- Laidig	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: wetness, slope.	Severe: seepage.	Poor: small stones.
30D, 31D--- Laidig	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
32B--- Macove	Severe: large stones.	Severe: seepage, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: large stones.
32C--- Macove	Slight---	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
33E*: Opequon---	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
33E*: Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
34E, 34F: Peaks	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
35*: Pits	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
36A: Purdy	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding,. too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
37B: Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
37C: Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
37D, 37E: Sequoia	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
38B: Shelocta	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Poor: small stones.
38C: Shelocta	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Poor: small stones.
38D: Shelocta	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: small stones, slope.
39B: Shottower	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: small stones.
39C: Shottower	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Poor: small stones.
40C: Shottower	Moderate: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: small stones.
40D: Shottower	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.

See footnote at end of table.

TABLE 11.--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
41C*:					
Shottower	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable	Variable.
41D*:					
Shottower	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
42A	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Sindion					
43A	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey, small stones, thin layer.
Speedwell					
44A*:					
Speedwell	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey, small stones, thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
45C	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Spessard					
45D, 45E	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Spessard					
46E, 46F	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Sylvatus					
47B	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
Thurmont					
47C	Moderate: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Fair: small stones, slope.
Thurmont					
48B	Severe: flooding.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, small stones.
Timberville					

See footnote at end of table.

TABLE 11.--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
49B---------- Tumbling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Poor: small stones.
49C---------- Tumbling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
49D---------- Tumbling	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
50C---------- Tumbling	Moderate: large stones, percs slowly, slope.	Severe: slope.	Severe: large stones.	Moderate: slope.	Poor: large stones.
50D, 50E---------- Tumbling	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
51C*: Tumbling----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
52*: Udorthents.					
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
53*---------- Urban land	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
54C*: Weikert----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Berks----------	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
54E*: Weikert----------	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, seepage, small stones.
Berks----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.

See footnote at end of table.

TABLE 11.--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
55F*:					
Weikert	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, seepage, small stones.
Rock outcrop	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, slope.
56A, 56B	Severe: poor filter.	Severe: flooding, seepage.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
Wheeling					
57A*:					
Wheeling	Severe: poor filter.	Severe: flooding, seepage.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
Urban land	Variable	Variable	Variable	Variable	Variable.
58B	Severe: wetness, percs slowly.	Moderate: slope.	Severe	Moderate: wetness.	Poor: too clayey, hard to pack.
Zoar					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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
1A Alderflats	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
2B Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
2C Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
3C3 Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
3D3 Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
3E3, 4E Chilhowie	Poor: depth to rock, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
5C*: Chiswell	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Litz	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
5D*: Chiswell	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Litz	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
5E*: Chiswell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Litz	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
6C*:				
Chiswell	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Litz	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Urban land	Variable	Variable	Variable	Variable.
6D*:				
Chiswell	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Litz	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Urban land	Variable	Variable	Variable	Variable.
7A Clubcaf	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
8A Combs	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
9B, 9C Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
10D Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
11C Dekalb	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
11D, 11E Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
11F Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
12F*:				
Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
13A Derroc	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14*-- Dumps	Variable	Variable	Variable	Variable.
15C-- Edgemont	Fair: area reclaim.	Probable	Probable	Poor: small stones, area reclaim.
15D, 15E-- Edgemont	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
16B, 16C-- Edneyville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
16D-- Edneyville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
16E-- Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
17C-- Evard	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
17D-- Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
17E-- Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
18B, 18C-- Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
18D-- Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
19C-- Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
19D-- Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
19E-- Frederick	Poor: shrink-swell, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
20C-- Frederick	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
20E---------- Frederick	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
21C*: Frederick----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
21D*: Frederick----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
22C---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
22D---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
23C---------- Grimsley	Fair: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
24C---------- Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
24D---------- Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
24E---------- Groseclose	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
25C*: Groseclose----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Litz----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
25D*: Groseclose----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
Litz----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25E*: Groseclose	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, small stones.
Litz	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
26B, 26C Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
26D Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
27C Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
27D Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
28E Hayesville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
29C*: Hayesville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Urban land	Variable	Variable	Variable	Variable.
29D*: Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Urban land	Variable	Variable	Variable	Variable.
30C Laidig	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
30D, 31D Laidig	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
32B, 32C Macove	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
33E*: Opequon	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
33E*: Rock outcrop	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
34E, 34F: Peaks	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
35*: Pits	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
36A: Purdy	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
37B, 37C: Sequoia	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
37D: Sequoia	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
37E: Sequoia	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
38B, 38C: Shelocta	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
38D: Shelocta	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
39B, 39C: Shottower	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
40C: Shottower	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
40D: Shottower	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
41C*: Shottower	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Urban land	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
41D*:				
Shottower	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Urban land	Variable	Variable	Variable	Variable.
42A Sindion	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
43A Speedwell	Good	Probable	Probable	Poor: area reclaim.
44A*:				
Speedwell	Good	Probable	Probable	Poor: area reclaim.
Urban land	Variable	Variable	Variable	Variable.
45C Spessard	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
45D Spessard	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, small stones, slope.
45E Spessard	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, small stones, slope.
46E, 46F Sylvatus	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
47B Thurmont	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
47C Thurmont	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
48B Timberville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
49B, 49C Tumbling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
49D Tumbling	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
50C---------- Tumbling	Fair: low strength, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
50D---------- Tumbling	Fair: low strength, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
50E---------- Tumbling	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
51C*: Tumbling----------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
52*: Udorthents.				
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
53*---------- Urban land	Variable----------	Variable----------	Variable----------	Variable.
54C*: Weikert----------	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Berks----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
54E*: Weikert----------	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
55F*: Weikert----------	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Rock outcrop---------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
56A, 56B---------- Wheeling	Fair: low strength.	Probable----------	Probable----------	Fair: small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
57A*:				
Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
Urban land	Variable	Variable	Variable	Variable.
58B				
Zoar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1A---------- Alderflats	Moderate: seepage.	Severe: wetness.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
2B---------- Allegheny	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
2C---------- Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
3C3, 3D3, 3E3, 4E- Chilhowie	Severe: slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
5C*, 5D*, 5E*: Chiswell---------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, large stones.	Slope, large stones.
Litz----------	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
6C*, 6D*: Chiswell---------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, large stones.	Slope, large stones.
Litz----------	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
7A---------- Clubcaf	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
8A---------- Combs	Severe: seepage.	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
9B---------- Cotaco	Moderate: seepage, slope.	Severe: piping, wetness.	Slope----------	Wetness, droughty, slope.	Erodes easily, wetness.	Erodes easily, droughty.
9C---------- Cotaco	Severe: slope.	Severe: piping, wetness.	Slope----------	Wetness, droughty, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, droughty.
10D---------- Dekalb	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11C, 11D, 11E----- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
11F---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
12F*:						
Dekalb-----------	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
13A---------- Derroc	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Large stones---	Large stones, droughty.
14*---------- Dumps	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
15C, 15D, 15E----- Edgemont	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope----------	Slope, droughty.
16B---------- Edneyville	Severe: seepage.	Severe: piping.	Deep to water	Slope, droughty.	Favorable------	Droughty.
16C, 16D, 16E----- Edneyville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope----------	Slope, droughty.
17C, 17D, 17E----- Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
18B---------- Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
18C, 18D---------- Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
19C, 19D, 19E----- Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty.	Slope, droughty.	Slope, droughty.
20C, 20E---------- Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
21C*, 21D*:						
Frederick--------	Severe: slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
22C, 22D---------- Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
23C---------- Grimsley	Severe: seepage, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
24C, 24D, 24E----- Groseclose	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
25C*, 25D*, 25E*: Groseclose-------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Litz----------	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
26B---------- Hayesville	Severe: seepage.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
26C, 26D, 27C, 27D---------- Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
28E---------- Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, large stones.	Slope, large stones.	Large stones, slope.
29C*, 29D*: Hayesville-------	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
30C, 30D, 31D----- Laidig	Severe: seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, large stones, wetness.	Large stones, slope, droughty.
32B---------- Macove	Severe: seepage.	Severe: seepage, piping, large stones.	Deep to water	Slope, large stones, droughty.	Large stones---	Large stones, droughty.
32C---------- Macove	Severe: seepage, slope.	Severe: seepage, piping, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
33E*: Opequon----------	Severe: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
34E, 34F---------- Peaks	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35*---------- Pits	Severe: depth to rock.	Slight---------	Deep to water	Depth to rock	Depth to rock	Depth to rock.
36A---------- Purdy	Slight---------	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
37B---------- Sequoia	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, droughty.	Depth to rock, erodes easily.	Erodes easily, droughty.
37C, 37D, 37E----- Sequoia	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
38B---------- Shelocta	Severe: seepage.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
38C, 38D---------- Shelocta	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
39B---------- Shottower	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
39C---------- Shottower	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
40C, 40D---------- Shottower	Severe: slope.	Severe: large stones.	Deep to water	Large stones, slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
41C*, 41D*: Shottower--------	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
42A---------- Sindion	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness--------	Favorable.
43A---------- Speedwell	Severe: seepage.	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
44A*: Speedwell--------	Severe: seepage.	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
45C, 45D, 45E----- Spessard	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
46E, 46F---------- Sylvatus	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
47B---------- Thurmont	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope----------	Favorable------	Favorable.
47C---------- Thurmont	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope----------	Slope----------	Slope.
48B---------- Timberville	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
49B---------- Tumbling	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Slope----------	Large stones---	Large stones.
49C, 49D---------- Tumbling	Severe: slope.	Moderate: large stones.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
50C, 50D, 50E----- Tumbling	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
51C*:						
Tumbling---------	Severe: slope.	Moderate: large stones.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
52*: Udorthents.						
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
53*---------- Urban land	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
54C*, 54E*:						
Weikert----------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Slope----------	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Berks----------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
55F*:						
Weikert----------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Slope----------	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop-----	Severe: depth to rock, slope.	Slight---------	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
56A---------- Wheeling	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
56B---------- Wheeling	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
57A*:						
Wheeling	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
58B Zoar	Moderate: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
1A---------- Alderflats	0-5	Silt loam--------	CL, CL-ML	A-1-b, A-4	0	95-100	90-100	90-100	65-80	20-30	5-10
	5-50	Silty clay loam, clay loam, silty clay.	CL, CH	A-6, A-7	0	95-100	90-100	90-100	75-90	30-55	10-30
	50-62	Sandy loam, loamy sand.	SM	A-2	0	95-100	95-100	45-85	15-45	<20	NP-4
2B, 2C---------- Allegheny	0-8	Loam----------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	8-43	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	43-62	Clay loam, loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
3C3---------- Chilhowie	0-5	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
	5-34	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3D3---------- Chilhowie	0-5	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
	5-34	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3E3---------- Chilhowie	0-5	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
	5-34	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
4E---------- Chilhowie	0-5	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
	5-34	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5C*, 5D*, 5E*: Chiswell--------	0-2	Channery silt loam.	CL, GC, SC	A-2, A-4, A-6	3-15	55-90	50-75	40-70	30-65	25-40	8-20
	2-12	Very channery silt loam, extremely channery clay loam.	GC, GP-GC, SC	A-2, A-6, A-7-6	0-20	15-75	10-50	10-45	8-40	25-50	10-30
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Litz----------	0-5	Channery silt loam.	GM, GC, ML, CL	A-4, A-2	5-15	60-85	30-75	30-70	30-65	<25	NP-10
	5-24	Very channery silt loam, channery silty clay loam.	GM, GC, GM-GC	A-2, A-4, A-6	15-20	40-60	15-60	14-50	13-45	<30	NP-15
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
6C*, 6D*:											
Chiswell--------	0-2	Channery silt loam.	CL, GC, SC	A-2, A-4, A-6	3-15	55-90	50-75	40-70	30-65	25-40	8-20
	2-12	Very channery silt loam, extremely channery clay loam.	GC, GP-GC, SC	A-2, A-6, A-7-6	0-20	15-75	10-50	10-45	8-40	25-50	10-30
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Litz------------	0-5	Channery silt loam.	GM, GC, ML, CL	A-4, A-2	5-15	60-85	30-75	30-70	30-65	<25	NP-10
	5-24	Very channery silt loam, channery silty clay loam.	GM, GC, GM-GC	A-2, A-4, A-6	15-20	40-60	15-60	14-50	13-45	<30	NP-15
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
7A--------------- Clubcaf	0-9	Silt loam--------	CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-37	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-100	25-40	5-20
	37-62	Silty clay loam, channery sandy loam, loam.	CL, CL-ML, SC	A-4, A-6	0	85-100	55-100	50-100	40-100	25-40	5-20
8A--------------- Combs	0-18	Loam-------------	SM, SC-SM, ML, CL-ML	A-4	0	90-100	75-100	65-100	45-80	<25	NP-5
	18-72	Loam, fine sandy loam, silt loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	90-100	75-100	65-100	30-80	<25	NP-5
9B, 9C----------- Cotaco	0-11	Loam-------------	ML, CL-ML, SM, SC-SM	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	11-50	Clay loam, loam	SC, SM, GC, CL	A-2, A-4, A-6, A-1-b	0-10	60-100	50-95	40-90	20-80	<35	NP-15
	50-63	Very gravelly loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-b	0-10	45-100	35-95	30-90	15-80	<35	NP-15
10D-------------- Dekalb	0-5	Channery sandy loam.	ML, CL-ML	A-4	0-5	80-90	75-85	70-80	55-70	10-32	NP-10
	5-21	Channery sandy loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-25	Channery sandy loam, very channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
11C, 11D, 11E---- Dekalb	0-5	Very stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-21	Channery sandy loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	21-25	Channery sandy loam, very channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
11F---------- Dekalb	0-5	Channery sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-21	Channery sandy loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-25	Channery sandy loam, very channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12F*: Dekalb----------	0-5	Channery sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-21	Channery sandy loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-25	Channery sandy loam, very channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13A---------- Derroc	0-4	Cobbly sandy loam	ML, SM, CL-ML, SC	A-2, A-4	15-40	80-95	65-95	50-80	25-60	<25	NP-10
	4-31	Cobbly sandy loam, very cobbly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	31-65	Very cobbly sandy loam, extremely cobbly sandy loam.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-70	35-55	30-50	20-45	10-25	<25	NP-8
14*---------- Dumps	0-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
15C, 15D, 15E---- Edgemont	0-6	Channery sandy loam.	SM, GM, ML	A-2, A-4	0-10	55-90	50-70	35-60	15-55	---	---
	6-38	Loam, channery sandy clay loam, clay loam.	SM, GM, GP-GM, SP-SM	A-2, A-1, A-4	0-15	55-95	50-90	30-65	10-40	<31	NP-8
	38-62	Loam, channery clay loam.	GM, SM, SP-SM, GP-GM	A-1, A-2, A-3, A-4	5-25	35-75	10-70	10-65	5-45	<31	NP-6
16B, 16C, 16D, 16E---------- Edneyville	0-4	Fine sandy loam	SM, SC-SM, MH, ML	A-2, A-4, A-5	0-5	85-100	80-100	65-95	30-69	25-61	NP-7
	4-31	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4, A-5	0-5	85-100	80-100	65-95	30-68	25-45	NP-10
	31-62	Sandy loam, gravelly sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4, A-5	0-10	75-100	65-100	60-88	28-49	25-45	NP-10
17C---------- Evard	0-3	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	3-31	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	31-44	Loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	44-68	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
17D, 17E---------- Evard	0-5	Fine sandy loam	SM, ML	A-2, A-4	0-5	80-100	75-100	65-90	20-60	<35	NP-9
	5-31	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	31-44	Loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	44-68	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
18B, 18C, 18D---- Frederick	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	12-72	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40
19C, 19D, 19E---- Frederick	0-12	Very gravelly silt loam.	GC, GM-GC	A-2, A-1	0-15	40-60	35-50	25-35	15-30	20-45	5-25
	12-72	Gravelly silty clay loam, silty clay, clay.	CH, MH, SM, SC	A-7	0-5	80-100	50-95	45-90	35-85	50-70	20-40
20C, 20E---------- Frederick	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	12-72	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
21C*, 21D*:											
Frederick-------	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	12-72	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
22C, 22D--------- Gilpin	0-4	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-29	Loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-39	Channery loam, channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
23C-------------- Grimsley	0-9	Cobbly loam------	ML, CL-ML, SM, SC-SM	A-4, A-2, A-1-b	10-35	65-90	60-85	35-80	20-65	<30	NP-10
	9-58	Cobbly loam, cobbly clay loam, very cobbly loam.	GC, GM-GC, SC, SC-SM	A-2, A-4, A-6, A-1-b	25-45	50-75	45-70	25-60	15-50	20-39	5-20
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
24C, 24D, 24E---- Groseclose	0-18	Silt loam--------	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	75-100	50-100	30-90	20-35	5-15
	18-62	Clay, silty clay loam, silty clay.	CH	A-7	0	80-100	75-100	70-100	50-95	35-65	20-45
25C*, 25D*, 25E*:											
Groseclose------	0-18	Gravelly silt loam.	GM, GC, ML, SC	A-4, A-6	0-10	60-80	55-75	40-75	35-70	<35	NP-15
	18-62	Clay, silty clay loam, silty clay.	CH	A-7	0	80-100	75-100	70-100	50-95	50-95	30-60
Litz------------	0-5	Channery silt loam.	GM, GC, ML, CL	A-4, A-2	5-15	60-85	30-75	30-70	30-65	<25	NP-10
	5-24	Very channery silt loam, channery silty clay loam.	GM, GC, GM-GC	A-2, A-4, A-6	15-20	40-60	15-60	14-50	13-45	<30	NP-15
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
26B, 26C, 26D---- Hayesville	0-8	Fine sandy loam	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	8-51	Clay loam, clay, loam.	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	51-62	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
27C, 27D--------- Hayesville	0-8	Gravelly fine sandy loam.	SM, SC, CL, ML	A-2, A-4	0-5	70-90	60-75	40-70	25-60	25-35	NP-10
	8-51	Clay loam, clay, loam.	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	51-62	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
28E-------------- Hayesville	0-8	Very stony fine sandy loam.	SM, SC, ML, CL	A-4	25-50	90-100	85-100	60-95	36-75	25-35	NP-10
	8-51	Clay loam, clay, loam.	ML, MH, CL, CH	A-6, A-7	5-25	90-100	85-100	75-100	60-95	35-70	11-30
	51-62	Sandy clay loam, clay loam.	SM, ML, MH, CL	A-2, A-6, A-7	0-5	90-100	85-100	70-100	30-80	30-55	11-25
29C*, 29D*: Hayesville------	0-8	Fine sandy loam	SM, SC, ML, CL	A-4	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	8-51	Clay loam, clay, loam.	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	51-62	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
30C, 30D--------- Laidig	0-6	Fine sandy loam	SM, SC-SM	A-1, A-2, A-4	0-5	80-95	75-90	45-70	25-45	15-25	NP-5
	6-32	Loam, channery sandy clay loam, channery sandy loam.	SM, SC, CL, ML	A-2, A-4, A-6	2-20	70-95	50-90	40-80	20-70	15-40	2-18
	32-62	Channery sandy clay loam, very channery loam, channery sandy loam, loam.	GC, SC, GM-GC, CL-ML	A-2, A-4, A-6	2-20	50-90	40-85	30-80	15-70	15-35	2-16
31D-------------- Laidig	0-6	Very stony fine sandy loam.	GM-GC, SM, CL-ML, SC-SM	A-4	3-15	65-90	50-80	45-80	35-70	15-30	NP-10
	6-32	Loam, channery sandy clay loam, channery sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	70-95	50-90	40-80	20-70	15-40	2-18
	32-62	Channery sandy clay loam, very channery loam, channery sandy loam, loam.	SC, GM-GC, CL-ML, GC	A-2, A-4, A-6	5-20	50-90	40-85	30-80	15-70	15-35	2-16

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
32B, 32C---------- Macove	0-7	Gravelly silt loam.	SM, GM	A-4, A-1-b, A-2-4	5-10	30-60	25-60	20-50	15-40	20-30	NP-7
	7-23	Very gravelly silt loam, very channery silt loam, very gravelly loam.	GM, SM, GP-GM	A-4, A-1-a, A-1-b	5-15	40-65	30-60	25-50	5-40	20-30	NP-7
	23-65	Extremely gravelly silt loam, very gravelly loam, channery silt loam.	GM, SM, GP-GM	A-2, A-1-b, A-1-a	10-25	35-60	25-50	20-45	5-25	20-30	NP-7
33E*:											
Opequon----------	0-4	Silty clay loam	CL, MH, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	4-17	Silty clay loam, clay, silty clay.	CH, MH, CL	A-6, A-7	0-10	80-100	60-100	60-100	55-95	35-65	15-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
34E, 34F---------- Peaks	0-3	Very stony loam	SM, GM, ML, CL-ML	A-2, A-4	5-25	50-90	45-80	40-75	20-55	<30	NP-7
	3-24	Very channery sandy loam, channery fine sandy loam, channery loam.	SM, GM, GM-GC, SC-SM	A-2, A-4	5-40	45-75	30-65	20-55	10-40	<30	NP-7
	24-33	Extremely channery sandy loam, very channery fine sandy loam, extremely channery loam.	SM, GM, GM-GC, SC-SM	A-2, A-4	10-50	45-75	30-65	20-55	10-40	<30	NP-7
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
35*---------- Pits	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
36A---------- Purdy	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	90-100	25-50	4-20
	12-39	Silty clay, clay, clay loam, silty clay loam.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	75-85	30-65	11-30
	39-62	Silty clay, clay loam, clay, silty clay loam.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	70-95	30-65	11-30
37B, 37C, 37D, 37E---------- Sequoia	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	6-35	Silty clay, clay, gravelly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	35-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
38B, 38C, 38D---- Shelocta	0-6	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	6-48	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	48-62	Channery silt loam, channery silty clay loam, very channery clay loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-b	0-15	40-85	35-70	25-70	20-65	20-40	3-20
39B, 39C--------- Shottower	0-18	Loam-------------	CL	A-4, A-6	0-2	90-100	75-100	60-95	50-85	20-35	5-15
	18-34	Silty clay loam, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-10	70-100	60-100	55-95	50-90	35-55	10-35
	34-62	Silty clay loam, clay, gravelly silty clay.	CH, CL, GC	A-7	0-10	65-100	55-100	50-85	45-80	35-65	15-40
40C, 40D--------- Shottower	0-18	Cobbly loam------	CL, SC	A-4, A-6	10-45	80-95	65-90	50-85	35-80	20-35	5-15
	18-34	Silty clay loam, clay loam, silty clay.	CL, CH, SC	A-2, A-6, A-7	2-10	75-90	50-80	45-70	30-65	35-55	10-35
	34-62	Silty clay loam, clay, cobbly silty clay.	CL, CH, SC	A-2, A-7	2-10	75-90	50-75	45-70	30-65	35-65	15-40
41C*, 41D*: Shottower-------	0-18	Loam-------------	CL	A-4, A-6	0-2	90-100	75-100	60-95	50-85	20-35	5-15
	18-34	Silty clay loam, clay loam, gravelly silty clay.	CL, CH	A-6, A-7	0-10	70-100	60-100	55-95	50-90	35-55	10-35
	34-62	Silty clay loam, clay, gravelly silty clay.	CH, CL, GC	A-7	0-10	65-100	55-100	50-85	45-80	35-65	15-40
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
42A-------------- Sindion	0-10	Loam-------------	ML, CL-ML, CL	A-4	0-2	95-100	90-100	80-100	65-90	20-30	NP-8
	10-36	Loam, silt loam, silty clay loam.	ML, CL, CL-ML, SM	A-4, A-6	0-2	75-100	50-100	50-95	45-85	20-40	NP-15
	36-63	Loam, very cobbly sandy loam, clay loam.	ML, SM, CL, SC-SM	A-2, A-4, A-1-b	10-20	35-100	15-100	15-85	10-80	15-35	NP-10
43A-------------- Speedwell	0-17	Loam-------------	ML, CL, CL-ML	A-4	0	90-100	90-100	75-100	55-90	20-35	2-10
	17-62	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	75-100	50-100	50-95	45-85	20-40	2-20
44A*: Speedwell-------	0-17	Loam-------------	ML, CL, CL-ML	A-4	0	90-100	90-100	75-100	55-90	20-35	2-10
	17-62	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	75-100	50-100	50-95	45-85	20-40	2-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
44A*:											
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
45C, 45D, 45E---- Spessard	0-9	Loamy sand-------	SW-SM, SP-SM, SM	A-1, A-2, A-3	0-5	80-100	85-100	35-80	5-35	<20	NP
	9-13	Loamy sand, loamy fine sand, sand.	SW-SM, SP-SM, SM	A-1, A-2, A-3	0-5	90-100	85-100	35-80	5-35	<20	NP
	13-41	Loamy sand, gravelly loamy fine sand, gravelly sand.	SW-SM, SP-SM, SM	A-1, A-2, A-3	0-5	85-100	75-100	35-80	5-35	<20	NP
	41-62	Loamy sand, sand, gravelly loamy sand.	SW-SM, SP-SM, SM	A-1, A-2, A-3	0-10	85-100	70-100	35-80	5-35	<20	NP
46E, 46F--------- Sylvatus	0-4	Very channery silt loam.	GM-GC, GC, SC, SC-SM	A-1, A-2, A-4	5-20	40-65	20-50	20-45	15-40	25-40	4-15
	4-10	Very channery silt loam, very channery silty clay loam.	GM-GC, GC, SC, GP-GC	A-2, A-4, A-6, A-7	5-20	15-65	10-50	10-45	8-40	25-50	4-25
	10-15	Very channery silt loam, extremely channery silty clay loam.	GM-GC, GW-GC, GP-GC	A-1, A-2	5-35	15-45	10-35	10-25	8-15	25-40	4-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
47B, 47C--------- Thurmont	0-10	Sandy loam-------	SM, ML, CL, SC-SM	A-2, A-4	0-3	80-100	75-100	55-70	25-65	<30	NP-10
	10-37	Clay loam, loam, gravelly sandy clay loam.	SC, CL	A-2, A-6, A-7	0-5	80-100	70-90	65-80	30-60	30-45	12-20
	37-44	Sandy loam, sandy clay loam, gravelly sandy clay loam.	SC	A-2, A-6, A-7	0-5	75-90	70-90	45-75	30-45	30-45	12-25
	44-62	Very gravelly sandy clay loam.	SM, SC-SM	A-1, A-2	0-30	70-85	50-75	30-50	15-35	<20	NP-7
48B--------------- Timberville	0-11	Silt loam--------	ML, CL-ML, SC-SM, SM	A-4	0-3	85-100	75-100	55-95	35-85	<25	NP-7
	11-27	Silty clay loam, gravelly loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	55-100	50-100	40-90	35-85	15-40	5-20
	27-62	Clay, silty clay loam, gravelly clay loam, silty clay.	CL, CH, SC, GC	A-6, A-7	0-10	55-95	50-95	45-90	40-85	35-60	14-32
49B, 49C, 49D---- Tumbling	0-11	Loam-------------	CL-ML, CL	A-4, A-6	0-2	80-100	75-100	65-95	50-80	15-30	4-15
	11-15	Clay loam, clay, cobbly clay loam.	CL, SC	A-2, A-4, A-6	0-20	75-100	60-95	50-90	30-70	30-45	8-20
	15-62	Cobbly clay loam, clay loam, cobbly clay.	CL, CH, SC, GC	A-2, A-7	0-20	60-95	50-95	45-85	30-75	40-55	15-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
50C, 50D, 50E---- Tumbling	0-11	Very stony loam	CL-ML, SC-SM, SC	A-4, A-6	2-10	80-100	60-95	60-90	40-80	15-30	4-15
	11-15	Clay loam, cobbly clay, very cobbly clay.	CL, SC	A-2, A-4, A-6	5-45	75-100	60-95	50-90	30-70	30-45	8-20
	15-62	Clay loam, cobbly clay, very cobbly clay, clay.	CL, CH, SC, GC	A-7, A-2	10-45	60-95	50-95	45-85	30-75	40-55	15-30
51C*: Tumbling--------	0-11	Loam----------	CL-ML, CL	A-4, A-6	0-2	80-100	75-100	65-95	50-80	15-30	4-15
	11-15	Clay loam, very cobbly clay, cobbly clay loam.	CL, SC	A-2, A-4, A-6	0-20	75-100	60-95	50-90	30-70	30-45	8-20
	15-62	Cobbly clay loam, clay loam, clay.	CL, CH, SC, GC	A-2, A-7	0-20	60-95	50-95	45-85	30-75	40-55	15-30
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
52*: Udorthents.											
Urban land------	0-6	Variable---------	---	---	---	---	---	---	---	---	---
53*-------------- Urban land	0-6	Variable---------	---	---	---	---	---	---	---	---	---
54C*, 54E*: Weikert---------	0-2	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	2-17	Channery loam, very channery silt loam, extremely channery silt loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks-----------	0-4	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	4-19	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	19-27	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
55F*:											
Weikert	0-2	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	2-17	Channery loam, very channery silt loam, extremely channery silt loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
56A, 56B Wheeling	0-12	Loam	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	12-71	Silty clay loam, loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	71-75	Stratified very fine sand to gravel.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	5-45	<20	NP-10
57A*:											
Wheeling	0-12	Loam	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	12-71	Silty clay loam, loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	71-75	Stratified very fine sand to gravel.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	5-45	<20	NP-10
Urban land	0-6	Variable	---	---	---	---	---	---	---	---	---
58B Zoar	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-40	3-15
	8-31	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	30-55	11-32
	31-62	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-60	11-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
1A	0-5	15-25	1.20-1.40	0.2-0.6	0.16-0.23	5.1-6.5	Low	0.43	3	1-2
Alderflats	5-50	30-50	1.30-1.60	0.06-0.2	0.14-0.18	5.1-6.5	Low	0.37		
	50-62	2-18	1.20-1.60	0.6-2.0	0.10-0.16	5.1-6.5	Low	0.37		
2B, 2C	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low	0.32	4	2-4
Allegheny	8-43	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low	0.28		
	43-62	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low	0.28		
3C3	0-5	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-8.4	Moderate	0.37	2	.5-2
Chilhowie	5-34	55-80	1.30-1.45	0.06-0.2	0.10-0.15	6.1-8.4	High	0.24		
	34	---	---	---	---	---		----		
3D3	0-5	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-8.4	Moderate	0.37	2	.5-2
Chilhowie	5-34	55-80	1.30-1.45	0.06-0.2	0.10-0.15	6.1-8.4	High	0.24		
	34	---	---	---	---	---		----		
3E3	0-5	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-8.4	Moderate	0.37	2	.5-2
Chilhowie	5-34	55-80	1.30-1.45	0.06-0.2	0.10-0.15	6.1-8.4	High	0.24		
	34	---	---	---	---	---		----		
4E	0-5	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-8.4	Moderate	0.37	2	.5-2
Chilhowie	5-34	55-80	1.30-1.45	0.06-0.2	0.10-0.15	6.1-8.4	High	0.24		
	34	---	---	---	---	---		----		
5C*, 5D*, 5E*:										
Chiswell	0-2	10-27	1.20-1.40	0.6-2.0	0.10-0.14	3.6-6.0	Low	0.24	2	.5-2
	2-12	10-35	1.20-1.60	0.6-2.0	0.04-0.10	3.6-6.0	Low	0.10		
	12	---	---	---	---	---		----		
Litz	0-5	10-27	1.20-1.50	0.6-2.0	0.13-0.16	4.5-5.5	Low	0.32	3	.5-2
	5-24	10-35	1.20-1.50	0.6-2.0	0.10-0.16	4.5-5.5	Low	0.32		
	24	---	---	---	---	---		----		
6C*, 6D*:										
Chiswell	0-2	10-27	1.20-1.40	0.6-2.0	0.10-0.14	3.6-6.0	Low	0.24	2	.5-2
	2-12	10-35	1.20-1.60	0.6-2.0	0.04-0.10	3.6-6.0	Low	0.10		
	12	---	---	---	---	---		----		
Litz	0-5	10-27	1.20-1.50	0.6-2.0	0.13-0.16	4.5-5.5	Low	0.32	3	.5-2
	5-24	10-35	1.20-1.50	0.6-2.0	0.10-0.16	4.5-5.5	Low	0.32		
	24	---	---	---	---	---		----		
Urban land	0-6	---	---	---	---	---		----	---	---
7A	0-9	12-20	1.35-1.60	0.6-2.0	0.14-0.23	5.6-7.8	Low	0.28	5	2-4
Clubcaf	9-37	18-35	1.40-1.65	0.6-2.0	0.14-0.23	5.6-7.8	Low	0.37		
	37-62	18-35	1.40-1.65	0.6-2.0	0.13-0.23	5.6-7.8	Low	0.37		
8A	0-18	5-18	1.20-1.50	0.6-6.0	0.12-0.21	5.6-7.3	Low	0.28	5	2-5
Combs	18-72	5-18	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low	0.28		
9B, 9C	0-11	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low	0.37	3	2-4
Cotaco	11-50	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low	0.28		
	50-63	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low	0.28		

See footnote at end of table.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
10D----------	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.24	2	2-4
Dekalb	5-21	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-25	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	25	---	---	---	---	---	----------	----		
11C, 11D, 11E----	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-4.4	Low----------	0.17	2	2-5
Dekalb	5-21	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-25	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	25	---	---	---	---	---	----------	----		
11F----------	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2	2-4
Dekalb	5-21	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-25	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	25	---	---	---	---	---	----------	----		
12F*:										
Dekalb----------	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2	2-4
	5-21	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-25	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	25	---	---	---	---	---	----------	----		
Rock outcrop----	0-60	---	---	---	---	---	----------	----	---	---
13A----------	0-4	5-15	1.40-1.65	2.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	3	1-2
Derroc	4-31	5-15	1.55-1.70	2.0-20	0.06-0.09	5.6-7.3	Low----------	0.17		
	31-65	5-10	1.55-1.70	>6.0	0.04-0.07	5.6-7.3	Low----------	0.17		
14*----------	0-60	---	---	---	---	---	----------	----	---	---
Dumps										
15C, 15D, 15E----	0-6	5-20	1.20-1.40	0.6-6.0	0.10-0.14	3.6-5.5	Low----------	0.15	3	1-2
Edgemont	6-38	18-30	1.30-1.50	0.6-6.0	0.08-0.12	3.6-5.5	Low----------	0.15		
	38-62	5-30	1.40-1.60	0.6-6.0	0.06-0.10	3.6-5.5	Low----------	0.15		
16B, 16C, 16D,										
16E----------	0-4	5-18	1.40-1.60	2.0-6.0	0.11-0.17	4.5-6.0	Low----------	0.24	4	1-2
Edneyville	4-31	7-20	1.40-1.60	2.0-6.0	0.10-0.16	4.5-6.0	Low----------	0.20		
	31-62	5-20	1.40-1.60	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.20		
17C----------	0-3	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.24	5	1-2
Evard	3-31	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	31-44	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low----------	0.24		
	44-68	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
17D, 17E----------	0-5	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.24	5	1-2
Evard	5-31	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.24		
	31-44	12-30	1.20-1.40	0.6-2.0	0.10-0.25	4.5-6.0	Low----------	0.24		
	44-68	5-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.24		
18B, 18C, 18D----	0-12	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low----------	0.32	4	1-2
Frederick	12-72	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
19C, 19D, 19E----	0-12	13-27	1.35-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.28	4	1-2
Frederick	12-72	35-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.0	Moderate-----	0.24		
20C, 20E----------	0-12	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low----------	0.32	4	1-2
Frederick	12-72	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		
21C*, 21D*:										
Frederick-------	0-12	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.0	Low----------	0.32	4	1-2
	12-72	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.24		

See footnote at end of table.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
21C*, 21D*:										
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
22C, 22D---------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-2
Gilpin	4-29	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	29-39	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	39	---	---	---	---	---	----------	----		
23C--------------	0-9	10-20	1.35-1.45	2.0-6.0	0.07-0.12	4.5-5.5	Low----------	0.20	4	.5-2
Grimsley	9-58	20-35	1.40-1.50	2.0-6.0	0.05-0.11	4.5-5.5	Low----------	0.20		
	58	---	---	---	---	---	----------	----		
24C, 24D, 24E----	0-18	7-27	1.25-1.55	2.0-6.0	0.11-0.20	3.6-5.5	Low----------	0.43	4	1-2
Groseclose	18-62	35-60	1.35-1.60	0.06-0.2	0.10-0.17	3.6-5.5	High---------	0.24		
25C*, 25D*, 25E*:										
Groseclose------	0-18	13-35	1.25-1.55	2.0-6.0	0.12-0.20	3.6-5.5	Low----------	0.28	4	1-2
	18-62	35-60	1.35-1.60	0.06-0.2	0.10-0.17	3.6-5.5	High---------	0.24		
Litz------------	0-5	10-27	1.20-1.50	0.6-2.0	0.13-0.16	4.5-5.5	Low----------	0.32	3	.5-2
	5-24	10-35	1.20-1.50	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.32		
	24	---	---	---	---	---	----------	----		
26B, 26C, 26D----	0-8	10-25	1.35-1.60	2.0-6.0	0.12-0.20	3.6-6.5	Low----------	0.20	5	1-3
Hayesville	8-51	25-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.24		
	51-62	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low----------	0.20		
27C, 27D---------	0-8	6-25	1.35-1.60	2.0-6.0	0.10-0.18	3.6-6.5	Low----------	0.20	5	1-3
Hayesville	8-51	25-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.24		
	51-62	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low----------	0.20		
28E--------------	0-8	12-26	1.35-1.60	2.0-6.0	0.08-0.14	3.6-5.5	Low----------	0.15	4	1-3
Hayesville	8-51	25-50	1.30-1.60	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.28		
	51-62	25-40	1.25-1.55	0.6-2.0	0.12-0.20	3.6-6.0	Low----------	0.28		
29C*, 29D*:										
Hayesville------	0-8	10-25	1.35-1.60	2.0-6.0	0.12-0.20	3.6-6.5	Low----------	0.20	5	1-3
	8-51	25-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.24		
	51-62	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low----------	0.20		
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
30C, 30D---------	0-6	7-20	1.20-1.40	2.0-6.0	0.10-0.12	3.6-5.5	Low----------	0.24	4	1-2
Laidig	6-32	18-35	1.30-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	32-62	18-35	1.40-1.70	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.17		
31D--------------	0-6	7-27	1.20-1.40	0.6-6.0	0.08-0.12	3.6-5.5	Low----------	0.28	4	1-2
Laidig	6-32	18-35	1.30-1.50	0.6-2.0	0.08-0.10	3.6-5.5	Low----------	0.28		
	32-62	18-35	1.40-1.70	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.17		
32B, 32C---------	0-7	10-25	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.20	5	.5-2
Macove	7-23	10-30	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.20		
	23-65	10-30	1.20-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20		
33E*:										
Opequon---------	0-4	27-45	1.20-1.50	0.2-2.0	0.16-0.21	5.1-7.8	High---------	0.32	1	2-4
	4-17	35-75	1.40-1.70	0.2-2.0	0.12-0.16	5.1-7.8	High---------	0.17		
	17	---	---	---	---	---	----------	----		
Rock outcrop----	0-60	---	---	---	---	---	----------	----	---	---

See footnote at end of table.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
34E, 34F--------- Peaks	0-3 3-24 24-33 33	4-16 5-18 5-18 ---	1.20-1.40 1.20-1.40 1.20-1.40 ---	6.0-20 6.0-20 6.0-20 ---	0.08-0.12 0.06-0.10 0.06-0.10 ---	4.5-6.0 4.5-6.0 4.5-6.0 ---	Low---------- Low---------- Low---------- ----------	0.15 0.10 0.05 ----	2	.5-2
35*-------------- Pits	0-60	---	---	---	---	---	----------	----	---	---
36A-------------- Purdy	0-12 12-39 39-62	18-35 35-50 35-50	1.30-1.50 1.30-1.60 1.30-1.60	0.2-0.6 <0.2 <0.2	0.18-0.24 0.12-0.18 0.10-0.16	3.6-5.5 3.6-5.5 3.6-5.5	Moderate----- Moderate----- Moderate-----	0.43 0.32 0.32	3	2-4
37B, 37C, 37D, 37E-------------- Sequoia	0-6 6-35 35-60	15-27 35-60 ---	1.30-1.50 1.35-1.55 ---	0.6-2.0 0.2-0.6 ---	0.17-0.20 0.08-0.16 ---	4.5-5.5 4.5-5.5 ---	Low---------- Moderate----- ----------	0.37 0.24 ----	3	.5-2
38B, 38C, 38D---- Shelocta	0-6 6-48 48-62	10-25 18-34 15-34	1.15-1.30 1.30-1.55 1.30-1.55	0.6-2.0 0.6-2.0 0.6-6.0	0.16-0.22 0.10-0.20 0.08-0.16	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.32 0.28 0.17	4	.5-2
39B, 39C--------- Shottower	0-18 18-34 34-62	15-27 30-50 40-70	1.30-1.45 1.45-1.60 1.45-1.60	0.6-6.0 0.6-2.0 0.6-2.0	0.14-0.22 0.10-0.15 0.10-0.14	3.6-6.0 3.6-6.0 3.6-6.0	Low---------- Moderate----- Moderate-----	0.32 0.24 0.20	5	.5-2
40C, 40D--------- Shottower	0-18 18-34 34-62	15-27 30-50 40-70	1.30-1.45 1.40-1.60 1.40-1.60	0.6-6.0 0.6-2.0 0.6-2.0	0.12-0.18 0.08-0.12 0.06-0.10	3.6-6.0 3.6-6.0 3.6-6.0	Low---------- Moderate----- Moderate-----	0.24 0.20 0.17	5	.5-2
41C*, 41D*: Shottower------- 	0-18 18-34 34-62	15-27 30-50 40-70	1.30-1.45 1.45-1.60 1.45-1.60	0.6-6.0 0.6-2.0 0.6-2.0	0.14-0.22 0.10-0.15 0.10-0.14	3.6-6.0 3.6-6.0 3.6-6.0	Low---------- Moderate----- Moderate-----	0.32 0.24 0.20	5	.5-2
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
42A-------------- Sindion	0-10 10-36 36-63	15-27 18-35 15-35	1.35-1.60 1.45-1.70 1.50-1.70	0.6-2.0 0.6-2.0 0.6-6.0	0.16-0.22 0.08-0.18 0.06-0.14	6.1-8.4 6.1-8.4 6.1-8.4	Low---------- Low---------- Low----------	0.32 0.32 0.28	5	2-3
43A-------------- Speedwell	0-17 17-62	12-20 18-35	1.20-1.40 1.30-1.50	0.6-2.0 0.6-2.0	0.16-0.22 0.08-0.18	6.1-8.4 6.1-8.4	Low---------- Low----------	0.32 0.32	5	2-3
44A*: Speedwell------- 	0-17 17-62	12-20 18-35	1.20-1.40 1.30-1.50	0.6-2.0 0.6-2.0	0.16-0.22 0.08-0.18	6.1-8.4 6.1-8.4	Low---------- Low----------	0.32 0.32	5	2-3
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
45C, 45D, 45E---- Spessard	0-9 9-13 13-41 41-62	1-6 1-6 1-6 1-5	1.20-1.30 1.30-1.40 1.40-1.50 1.40-1.50	>6.0 >6.0 >6.0 >6.0	0.04-0.09 0.04-0.09 0.04-0.09 0.04-0.09	4.5-6.0 4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Low---------- Low----------	0.10 0.05 0.05 0.05	5	.5-2
46E, 46F--------- Sylvatus	0-4 4-10 10-15 15	10-27 10-35 10-30 ---	1.20-1.40 1.20-1.60 1.20-1.40 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.10-0.14 0.10-0.14 0.04-0.10 ---	3.6-5.0 3.6-5.0 3.6-5.0 ---	Low---------- Low---------- Low---------- ----------	0.16 0.10 0.08 ----	1	.5-2

See footnote at end of table.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
47B, 47C---------	0-10	10-25	1.20-1.40	2.0-6.0	0.10-0.15	4.5-5.5	Low----------	0.32	4	.5-2
Thurmont	10-37	18-35	1.30-1.50	0.6-2.0	0.13-0.19	4.5-5.5	Low----------	0.20		
	37-44	18-30	1.30-1.50	0.6-2.0	0.07-0.12	4.5-5.5	Low----------	0.20		
	44-62	10-20	1.20-1.40	0.6-2.0	0.04-0.08	4.5-5.5	Low----------	0.20		
48B---------------	0-11	6-25	1.30-1.50	2.0-6.0	0.11-0.20	3.6-6.5	Low----------	0.32	5	1-3
Timberville	11-27	13-35	1.30-1.50	0.6-2.0	0.11-0.19	3.6-6.5	Low----------	0.24		
	27-62	35-60	1.40-1.55	0.6-2.0	0.10-0.18	3.6-6.5	Moderate-----	0.24		
49B, 49C, 49D----	0-11	10-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	5	.5-2
Tumbling	11-15	25-45	1.20-1.45	0.6-2.0	0.10-0.12	4.5-5.5	Low----------	0.20		
	15-62	35-55	1.20-1.45	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.20		
50C, 50D, 50E----	0-11	10-27	1.20-1.45	0.6-6.0	0.14-0.18	4.5-5.5	Low----------	0.24	5	.5-2
Tumbling	11-15	25-45	1.20-1.45	0.6-2.0	0.10-0.12	4.5-5.5	Low----------	0.17		
	15-62	35-55	1.20-1.45	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
51C*:										
Tumbling--------	0-11	10-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	5	.5-2
	11-15	25-45	1.20-1.45	0.6-2.0	0.10-0.12	4.5-5.5	Low----------	0.20		
	15-62	35-55	1.20-1.45	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.20		
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
52*:										
Udorthents.										
Urban land------	0-6	---	---	---	---	---	----------	----	---	---
53*---------------	0-6	---	---	---	---	---	----------	----	---	---
Urban land										
54C*, 54E*:										
Weikert---------	0-2	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-4
	2-17	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	17	---	---	---	---	---	----------	----		
Berks-----------	0-4	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	2-4
	4-19	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	19-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	27	---	---	---	---	---	----------	----		
55F*:										
Weikert---------	0-2	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-4
	2-17	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	17	---	---	0.6-20	---	---	----------	----		
Rock outcrop----	0-60	---	---	---	---	---	----------	----	---	---
56A, 56B---------	0-12	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low----------	0.37	4	.5-1
Wheeling	12-71	15-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32		
	71-75	2-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.20		
57A*:										
Wheeling--------	0-12	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low----------	0.37	4	.5-1
	12-71	15-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32		
	71-75	2-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.20		
Urban land------	0-6	---	---	---	---	---	----------	----	---	---

See footnote at end of table.

TABLE 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
58B----------	0-8	15-30	1.20-1.40	0.6-2.0	0.15-0.18	4.5-5.5	Low----------	0.43	3	1-4
Zoar	8-31	35-50	1.30-1.60	0.06-0.6	0.12-0.15	4.5-5.5	Moderate-----	0.32		
	31-62	35-50	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Moderate-----	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "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	Hardness		Uncoated steel	Concrete
					Ft			In				
1A---------- Alderflats	D	None--------	---	---	0-1.0	Apparent	Nov-May	>60	---	High-----	High-----	High.
2B, 2C---------- Allegheny	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
3C3, 3D3, 3E3, 4E- Chilhowie	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
5C*, 5D*, 5E*:												
Chiswell---------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Litz----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
6C*, 6D*:												
Chiswell---------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Litz----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	>10	---	---	---	---
7A---------- Clubcaf	D	Occasional	Brief to long.	Dec-Apr	0-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
8A---------- Combs	B	Occasional	Brief-----	Dec-May	>6.0	---	---	>60	---	Moderate	Low------	Low.
9B, 9C---------- Cotaco	C	None--------	---	---	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	Moderate	High.
10D---------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
11C, 11D, 11E----- Dekalb	A	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
11F---------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
12F*:												
Dekalb----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
12F*:												
Rock outcrop-----	D	None--------	---	---	>6.0	---	---	0	Hard	---	---	---
13A---------- Derroc	B	Occasional	Very brief to brief.	Dec-Mar	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
14*---------- Dumps	-	None--------	---	---	>6.0	---	---	>60	---	---	---	---
15C, 15D, 15E----- Edgemont	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
16B, 16C, 16D, 16E---------- Edneyville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
17C, 17D, 17E----- Evard	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
18B, 18C, 18D, 19C, 19D, 19E, 20C, 20E--------- Frederick	B	None--------	---	---	>6.0	---	---	>72	---	Moderate	Moderate	High.
21C*, 21D*:												
Frederick--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	>10	---	---	---	---
22C, 22D---------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
23C---------- Grimsley	B	None--------	---	---	>6.0	---	---	40-60	Soft	Moderate	Low------	High.
24C, 24D, 24E----- Groseclose	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
25C*, 25D*, 25E*:												
Groseclose-------	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
Litz----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
26B, 26C, 26D, 27C, 27D--------- Hayesville	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
28E---------- Hayesville	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
29C*, 29D*: Hayesville-------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Urban land-------	-	None---------	---	---	>2.0	---	---	>10	---	---	---	---
30C, 30D, 31D----- Laidig	C	None---------	---	---	2.5-4.0	Perched	Jan-Mar	>60	---	Moderate	Moderate	High.
32B, 32C---------- Macove	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
33E*: Opequon----------	C	None---------	---	---	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
Rock outcrop-----	D	None---------	---	---	>6.0	---	---	0	Hard	---	---	---
34E, 34F---------- Peaks	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
35*---------- Pits	-	None---------	---	---	>6.0	---	---	0	Hard	---	---	---
36A---------- Purdy	D	None---------	---	---	0.0-1.0	Apparent	Nov-Jun	>60	---	High-----	High-----	High.
37B, 37C, 37D, 37E---------- Sequoia	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Moderate.
38B, 38C, 38D----- Shelocta	B	None---------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
39B, 39C, 40C, 40D---------- Shottower	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
41C*, 41D*: Shottower---------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
41C*, 41D*: Urban land	-	None	---	---	>2.0	---	---	>10	---	---	---	---
42A--- Sindion	B	Occasional	Very brief to brief.	Dec-Mar	1.5-3.0	Apparent	Dec-Apr	>60	---	High	Low	Moderate.
43A--- Speedwell	B	Occasional	Very brief to brief.	Jan-Apr	>6.0	---	---	>60	---	Moderate	Low	Moderate.
44A*: Speedwell	B	Occasional	Very brief to brief.	Jan-Apr	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Urban land	-	Occasional	---	---	>2.0	---	---	>10	---	---	---	---
45C, 45D, 45E--- Spessard	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.
46E, 46F--- Sylvatus	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	---	---
47B, 47C--- Thurmont	B	None	---	---	4.0-6.0	Apparent	Dec-Mar	>60	---	Moderate	Moderate	High.
48B--- Timberville	B	Occasional	Very brief	Apr-Oct	>6.0	---	---	>60	---	Moderate	Low	High.
49B, 49C, 49D, 50C, 50D, 50E--- Tumbling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
51C*: Tumbling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Urban land	-	None	---	---	>2.0	---	---	>10	---	---	---	---
52*: Udorthents.												
Urban land	-	None	---	---	>2.0	---	---	>10	---	---	---	---
53*--- Urban land	-	None	---	---	>2.0	---	---	>10	---	---	---	---
54C*, 54E*: Weikert	B/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
54C*, 54E*:												
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
55F*:												
Weikert	B/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Rock outcrop	D	None	---	---	>6.0	---	---	0	Hard	---	---	---
56A, 56B Wheeling	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
57A*:												
Wheeling	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Urban land	-	Rare	---	---	>2.0	---	---	>10	---	---	---	---
58B Zoar	C	None	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alderflats	Clayey, mixed, mesic Typic Ochraquults
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Chilhowie	Very-fine, mixed, mesic Typic Hapludalfs
Chiswell	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Clubcaf	Fine-silty, mixed, mesic Cumulic Haplaquolls
Combs	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Derroc	Loamy-skeletal, siliceous, mesic Dystric Fluventic Eutrochrepts
Edgemont	Fine-loamy, mixed, mesic Typic Hapludults
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Frederick	Clayey, mixed, mesic Typic Paleudults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grimsley	Loamy-skeletal, siliceous, mesic Typic Hapludults
Groseclose	Clayey, mixed, mesic Typic Hapludults
Hayesville	Clayey, kaolinitic, mesic Typic Kanhapludults
Laidig	Fine-loamy, siliceous, mesic Typic Fragiudults
Litz	Loamy-skeletal, mixed, mesic Ruptic-Ultic Dystrochrepts
Macove	Loamy-skeletal, mixed, mesic Typic Hapludults
Opequon	Clayey, mixed, mesic Lithic Hapludalfs
Peaks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Purdy	Clayey, mixed, mesic Typic Ochraquults
Sequoia	Clayey, mixed, mesic Typic Hapludults
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Shottower	Clayey, kaolinitic, mesic Typic Paleudults
Sindion	Fine-loamy, mixed, mesic Fluvaquentic Hapludolls
Speedwell	Fine-loamy, mixed, mesic Fluventic Hapludolls
Spessard	Mixed, mesic Typic Udipsamments
Sylvatus	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Thurmont	Fine-loamy, mixed, mesic Typic Hapludults
Timberville	Clayey, mixed, mesic Typic Hapludults
Tumbling	Clayey, kaolinitic, mesic Typic Paleudults
Udorthents	Udorthents
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Zoar	Clayey, mixed, mesic Aquic Hapludults

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