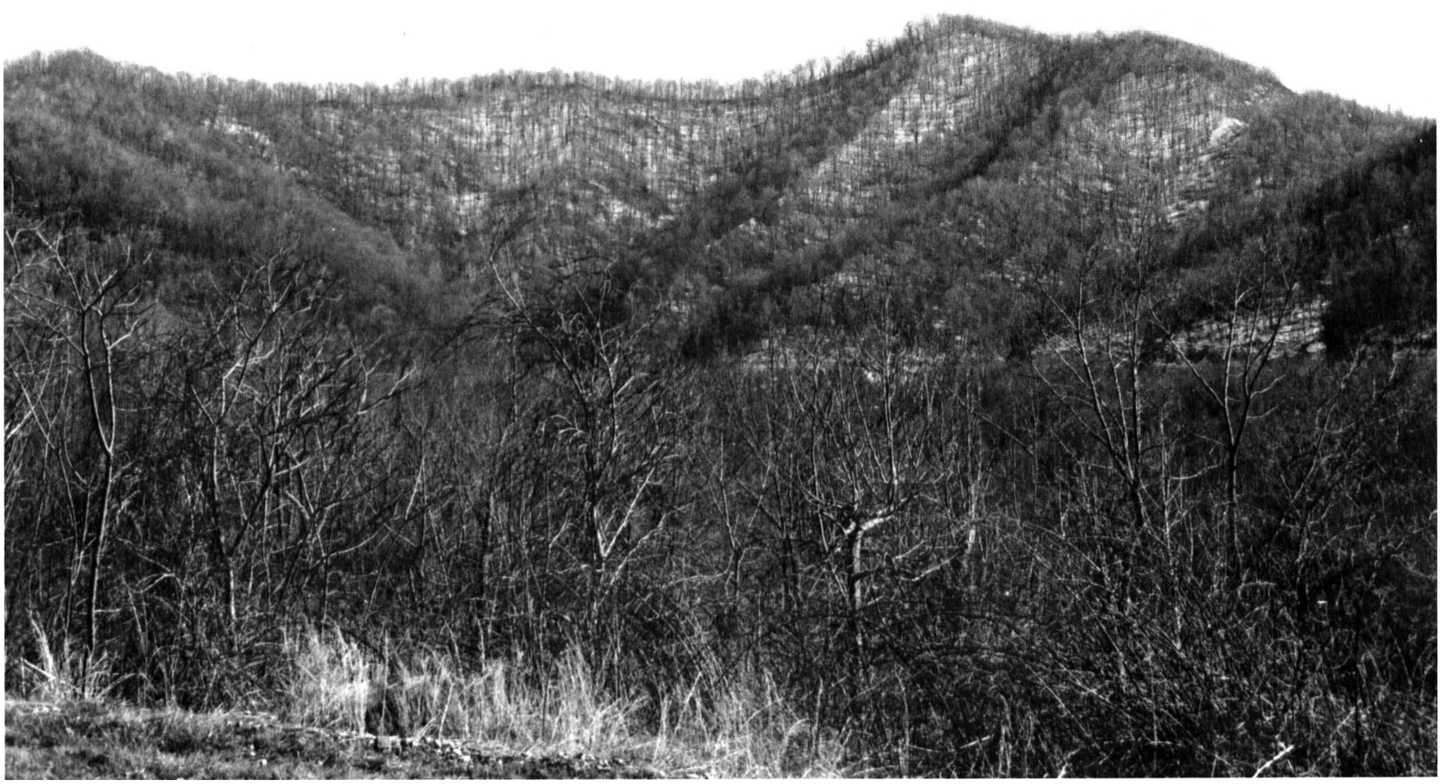
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
West Virginia Agricultural
and Forestry Experiment
Station and Boone
County Commission

Soil Survey of Boone County, West Virginia



How To Use This Soil Survey

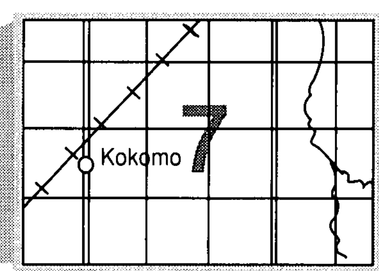
General Soil Map

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.

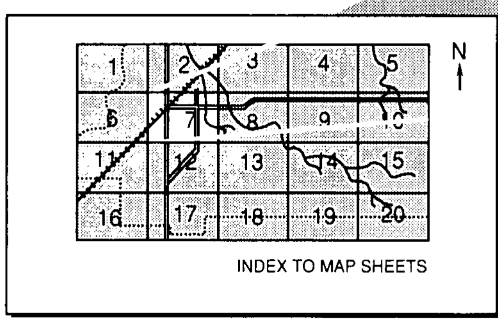
Detailed Soil Maps

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



MAP SHEET

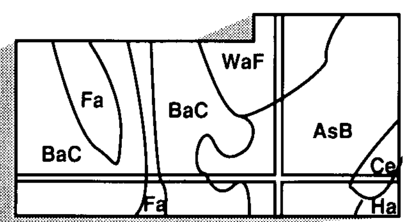
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

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

MAP SHEET



AREA OF INTEREST

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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service, the West Virginia Agricultural and Forestry Experiment Station, and Boone County Commission. The survey is part of the technical assistance furnished to the Guyan Soil Conservation District.

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 Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: A wooded area of the Dekalb-Pineville-Guyandotte association, very steep, extremely stony. More than 90 percent of the acreage in Boone County is woodland.

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Issued June 1994

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Foreword

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

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

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

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

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State Conservationist
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Soil Survey of Boone County, West Virginia

By Barrie L. Wolf, Soil Conservation Service

Fieldwork by Barrie L. Wolf and Frank A. Doonan, Soil Conservation Service

Map finishing by D. Paul Amick, Debra Barnette, Linda Handley, and Denise Donelson, West Virginia Map Unit, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with West Virginia Agricultural and Forestry Experiment Station and Boone County Commission

BOONE COUNTY is in the southern part of West Virginia (fig. 1). It has a total area of 322,000 acres, or about 503 square miles. In 1980, it had a population of 30,447. Madison, the county seat and the largest town in the county, had a population of 3,228 *(11)*.

Boone County is centered in one of the major coal districts in the State. The main enterprises in the county are coal mining, timber production, natural gas production, and farming. Mining and related small industries, railroads, drilling, and logging account for most of the employment in the county.

The county was formed in 1847 from parts of Cabell, Kanawha, and Logan Counties, West Virginia. It was named for Daniel Boone, a noted hunter and explorer whose home was located in the Kanawha Valley from 1789 to 1795 *(11)*.

The county is served by a network of highways, including West Virginia Routes 3, 17, 85, and 94 and U.S. Route 119, which is a four-lane highway. Two railroads have extensive track systems throughout the county. These systems are used to haul coal from the mines.

This soil survey updates the survey of Boone County published in 1915 *(4)*. It provides additional information and has larger maps, which show the soils in greater detail.

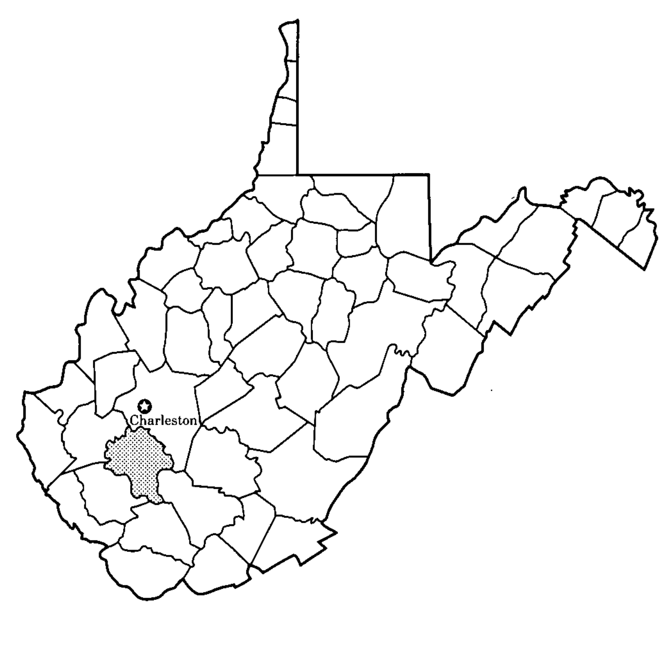

Figure 1.—Location of Boone County in West Virginia.

General Nature of the County

This section gives information about the county. It describes elevation and drainage, farming, and climate.

Elevation and Drainage

Elevation in the county ranges from about 610 feet above sea level at the confluence of Fork Creek and the Big Coal River to about 3,555 feet near Pilot Knob, in the southeastern part of the county.

The Big Coal River and its tributaries drain the northern, eastern, and northeastern parts of the county. The Little Coal River and its tributaries drain the southern, southwestern, and northwestern parts. The Upper Mud River and Trace Fork of the Guyandotte River drain a small acreage in the western part of the county.

Farming

In 1982, Boone County had 26 farms and a total farm acreage of 3,162 acres *(10)*. Between 1978 and 1982, the number of farms in the county decreased by 13 and the average size of the farms increased from 102 to 122 acres.

The main types of farming in the county are the raising of beef cattle and the production of pasture plants, hay, corn, and tobacco. Most of the farm income is derived from the sale of cattle and tobacco.

Climate

Winters are cold and snowy at the higher elevations in Boone County. They are frequently cold in the valleys, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm in the mountains and very warm in the valleys. Very hot days occasionally occur in the valleys. Rainfall is evenly distributed throughout the year. It is appreciably heavier on the windward west-facing slopes than in the valleys. The normal annual precipitation is adequate for all of the crops commonly grown in the county. Summer temperatures and the length of the growing season, however, may be inadequate, particularly at the higher elevations.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Madison, West Virginia, in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 34 degrees F and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Madison on January 17, 1977, is -12 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on July 15, 1973, is 102 degrees.

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

The total annual precipitation is about 44 inches. Of this, about 24 inches, or 55 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 20 inches. The heaviest 1-day rainfall during the period of record was 3.74 inches on November 28, 1973. Thunderstorms occur on about 44 days each year. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

The average seasonal snowfall is about 23 inches. The greatest snow depth at any one time during the period of record was 22 inches. On the average, 11 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

How This Survey Was Made

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

Descriptions of associations identify minor soils rather than inclusions. The minor soils are in areas larger than those of inclusions and could have been separated at the scale used in mapping. They are in areas large enough to be managed differently for uses other than forestry or mining, but they make up a small part of the total acreage of the map unit.

The presence of inclusions or minor soils 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.

The composition of associations and complexes was determined mainly through analysis of straight-line transect data collected by the survey party.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in 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 map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Areas of this general soil map join areas of the maps of Kanawha, Raleigh, and Wyoming Counties, West Virginia. In some areas the map unit names and proportions of component soils differ from those of the maps of the adjacent counties. These differences are the result of variations in the degree of generalization.

Soil Descriptions

1. Dekalb-Pineville-Guyandotte

Very steep, well drained soils that formed mainly in material weathered from sandstone; on mountainous uplands

This map unit consists of soils on uplands, on foot slopes, and in mountain coves throughout most of the county. Stones cover 3 to 15 percent of the surface on most of the acreage, and bedrock is exposed in some areas.

This map unit makes up about 81 percent of the county. It is about 30 percent Dekalb soils, 21 percent Pineville soils, 16 percent Guyandotte soils, and 33 percent soils of minor extent (fig. 2).

The Dekalb soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from sandstone and some interbedded siltstone and shale. The surface layer is very dark grayish brown channery sandy loam. The subsoil is yellowish brown very channery sandy loam.

The Pineville soils are very deep. They are on foot slopes, on the lower side slopes, and in coves. They formed in colluvial material weathered from a mixture of sandstone, siltstone, and shale. The surface layer is dark brown very channery loam. The subsoil is yellowish brown channery loam and brownish yellow very channery loam.

The Guyandotte soils are very deep. They are on north-facing side slopes and in coves. They formed in colluvial material weathered from a mixture of sandstone and some siltstone. The surface layer is very dark brown and very dark grayish brown channery loam. The subsoil is brown and dark yellowish brown very channery loam.

Of minor extent in this unit are the somewhat excessively drained Fiveblock and Sewell and well drained Cedarcreek and Kaymine soils in surface-mined areas, the somewhat excessively drained Itmann soils in mine refuse areas, the well drained Gilpin and Lily and moderately well drained Wharton soils on ridgetops, and the somewhat excessively drained Potomac and well drained Chagrin, Kanawha, and Sensabaugh soils on narrow flood plains.

Most of this map unit is wooded. Some cleared areas in narrow valleys are used for urban development, are farmed, or are used for garden crops. The hazard of erosion is severe. The main limitations affecting most uses are the slope, stones, and depth to bedrock in areas of the Dekalb soils; the slope and stones in areas of the Pineville and Guyandotte soils; and the slope, stones, seasonal high water table, moderately slow or slow permeability, and hazard of flooding in areas of the minor soils.

2. Berks-Shelocta

Very steep, well drained soils that formed in material weathered from siltstone, shale, and sandstone; on mountainous uplands

This map unit consists of soils on uplands, on foot slopes, and in mountain coves in the western part of the

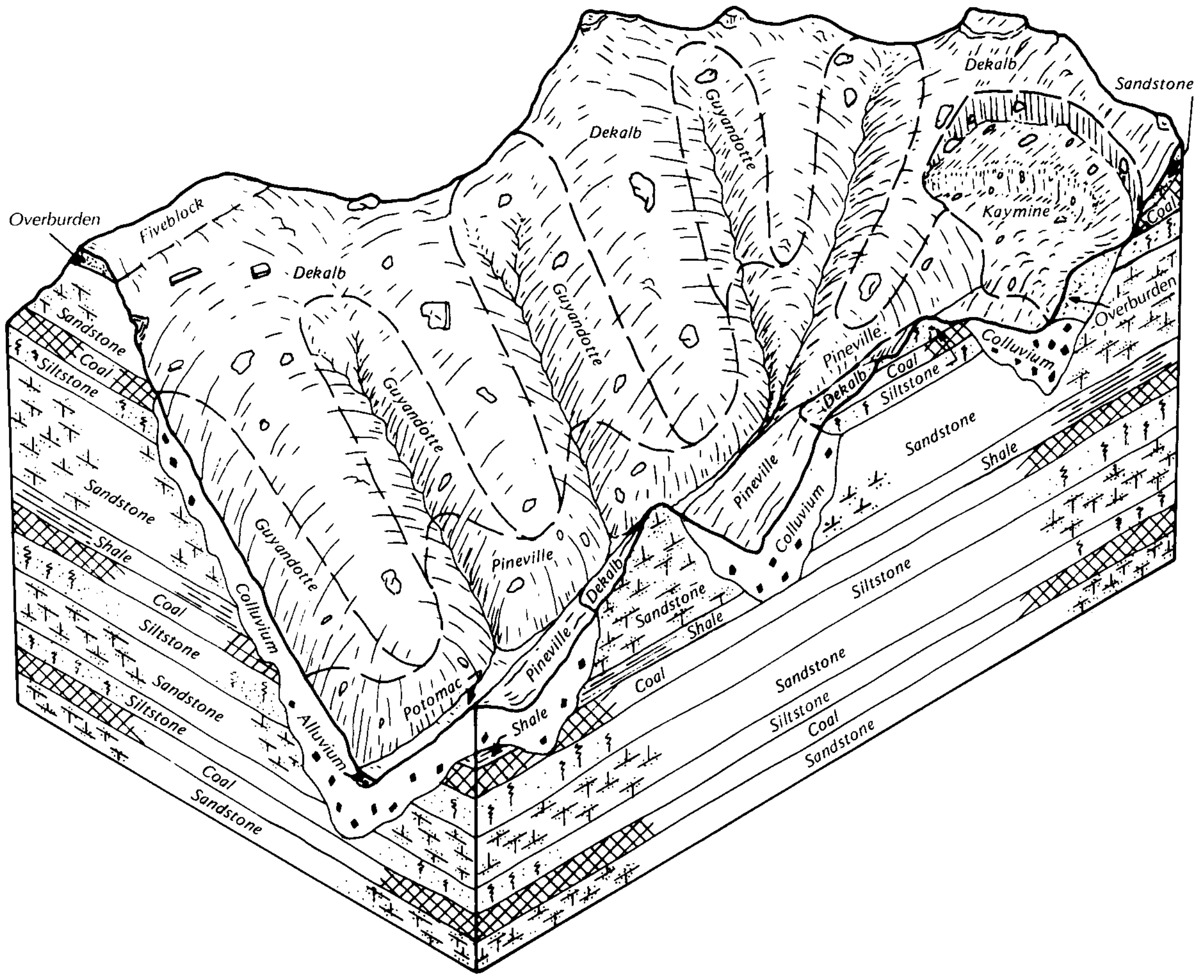

Figure 2.—Typical pattern of soils and parent material in the Dekalb-Pineville-Guyandotte general soil map unit.

county. Stones cover 3 to 15 percent of the surface on most of the acreage, and bedrock is exposed in some areas.

This map unit makes up about 12 percent of the county. It is about 38 percent Berks soils, 32 percent Shelocta soils, and 30 percent soils of minor extent (fig. 3).

The Berks soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from interbedded siltstone, shale, and fine grained sandstone. The surface layer is dark brown very channery loam. The subsoil is yellowish brown very channery loam and extremely channery silt loam.

The Shelocta soils are very deep. They are on foot slopes, on side slopes, and in coves. They formed in colluvial material weathered from a mixture of siltstone, shale, and sandstone. The surface layer is dark brown channery silt loam. The subsoil is dark yellowish brown and yellowish brown channery silt loam and silty clay loam.

Of minor extent in this unit are the well drained Guyandotte soils in north-facing coves; the well drained Dekalb and Gilpin soils and moderately well drained Wharton soils on narrow ridgetops; the well drained Kaymine and Cedarcreek soils in surface-mined areas; the well drained Chagrin, Kanawha, and Sensabaugh soils on narrow flood plains; the somewhat excessively drained Itmann soils in mine refuse areas; and the moderately well drained Lobdell soils on narrow flood plains.

Most of this map unit is wooded. Some cleared areas in narrow valleys are used for urban development, are farmed, or are used for garden crops. The hazard of erosion is severe. The main limitations affecting most uses are the slope, stones, and depth to bedrock in areas of the Berks soils; the slope and stones in areas of the Shelocta soils; and the slope, stones, seasonal high water table, moderately slow or slow permeability, and hazard of flooding in areas of the minor soils.

3. Kaymine-Cedarcreek-Dekalb

Strongly sloping to very steep, well drained soils that formed in material weathered from siltstone, shale, and sandstone; on mountainous uplands

This map unit consists of soils on uplands in the northwestern, eastern, and southern parts of the county. Most areas have been intensively surface mined for coal. Stones and boulders cover 1 to 15 percent of the surface on most of the acreage, and many of the highwalls consist of exposed bedrock.

This map unit makes up about 7 percent of the county. It is about 40 percent Kaymine soils, 35 percent Cedarcreek soils, 10 percent Dekalb soils, and 15 percent soils of minor extent (fig. 4).

The Kaymine soils are very deep. They are in contour surface mines on mountain side slopes. They formed in material weathered from a mixture of siltstone, sandstone, shale, and some coal. The surface layer is dark gray very channery loam. The substratum is dark gray extremely channery loam.

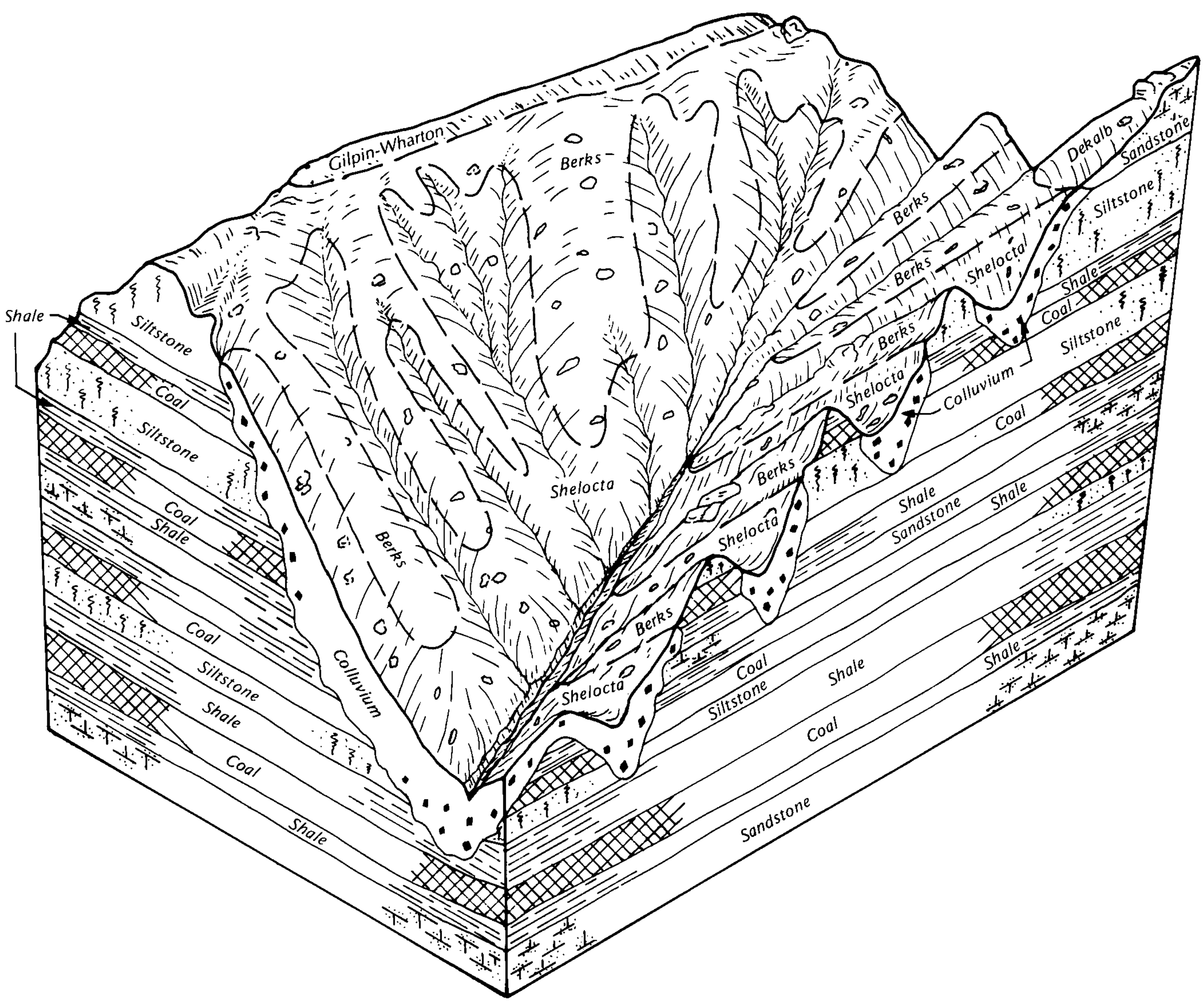

Figure 3.—Typical pattern of soils and parent material in the Berks-Shelocta general soil map unit.

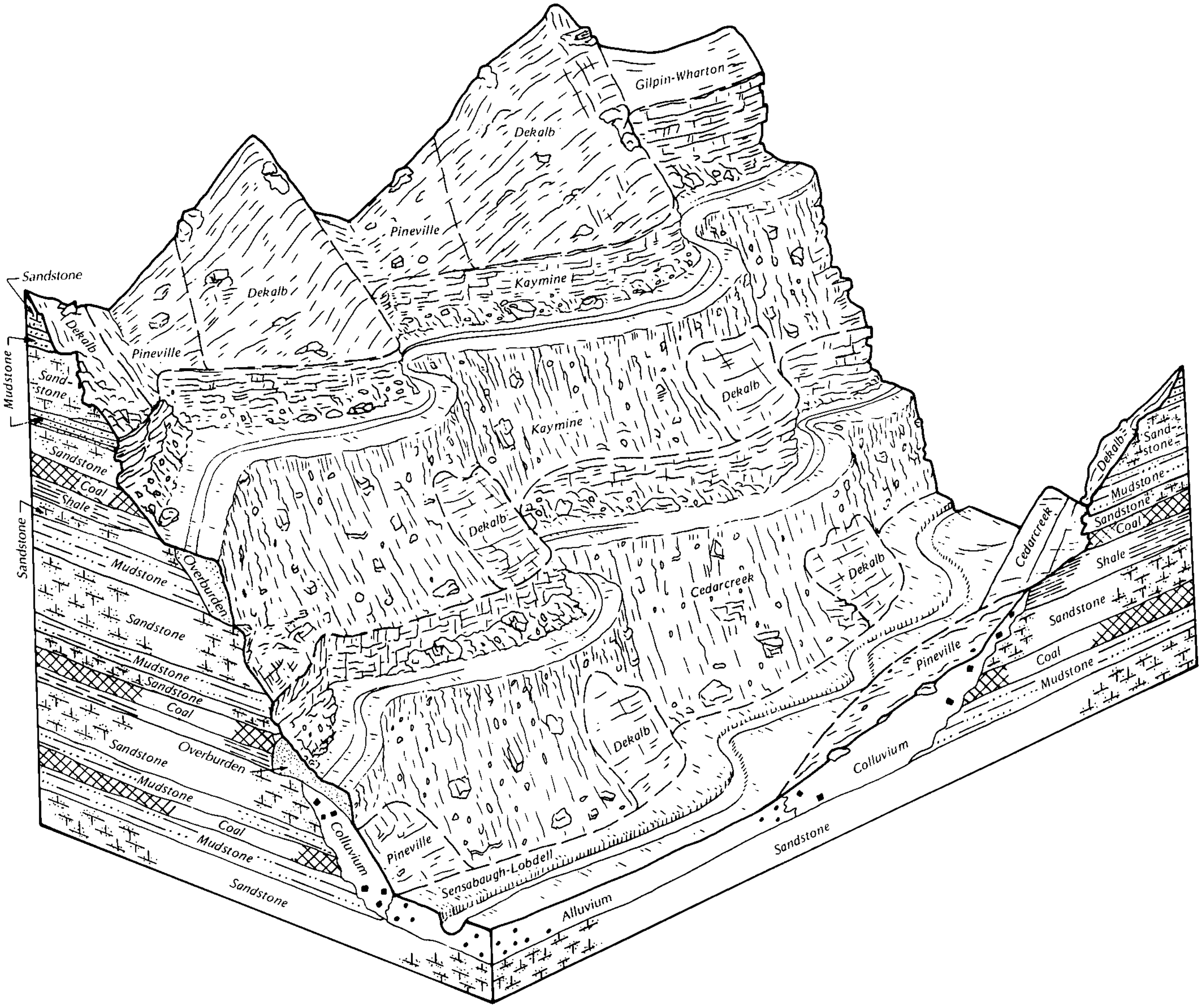

Figure 4.—Typical pattern of soils and parent material in the Kaymine-Cedarcreek-Dekalb general soil map unit.

The Cedarcreek soils are very deep. They are in contour surface mines on mountain side slopes. They formed in material weathered from a mixture of sandstone, siltstone, shale, and some coal. The surface layer is brown very channery loam. The substratum is yellowish brown and brownish yellow very channery loam.

The Dekalb soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from sandstone and some interbedded siltstone and shale. The surface layer is very dark grayish brown channery sandy loam. The subsoil is yellowish brown very channery sandy loam.

Of minor extent in this unit are the well drained Pineville and Shelocta soils in coves and on foot slopes, the well drained Gilpin and Lily soils on ridgetops, the well drained Chagrin and Sensabaugh soils and moderately well drained Lobdell soils on narrow flood plains, the moderately well drained Wharton soils on ridgetops, the somewhat excessively drained Itmann soils in mine refuse areas, and the somewhat excessively drained Fiveblock and Sewell soils in surface-mined areas on ridgetops.

Most of this map unit is wooded. Large areas of reclaimed mine land near Julian support grasses and legumes. The hazard of erosion is severe. The main limitations affecting most uses are the slope, stones, and depth to bedrock in areas of the Dekalb soils; the slope, stones, and boulders in areas of the Cedarcreek and Kaymine soils; and the slope, stones, seasonal high water table, moderately slow or slow permeability, and hazard of flooding in areas of the minor soils.

Detailed Soil Map Units

Dr. John Sencindiver, professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, helped prepare this section.

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 substratum. They also can differ in slope, stoniness, 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, Chagrin fine sandy loam is a phase of the Chagrin series.

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

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. Gilpin-Wharton silt loams, 15 to 35 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Berks-Shelocta association, very steep, extremely stony, 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.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

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

Soil Descriptions

AgB—Allegheny loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It generally is on high and low terraces along Spruce Laurel Fork, Pond Fork, the Little Coal River, and the Big Coal River.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is yellowish brown loam about 26 inches thick. The substratum to a depth of at least 65 inches is loam. The upper 10 inches is yellowish brown and has light yellowish brown and strong brown mottles, and the lower part is light olive brown and has strong brown mottles.

Included with this soil in mapping are a few small areas of the well drained Chagrin, Kanawha, Pineville, and Lily soils and a few areas of moderately well drained soils. Also included are areas of urban land, soils that have slopes of 8 to 15 percent, and soils that are less than 60 inches deep over bedrock. Included areas make up about 20 percent of this unit.

Permeability is moderate in the subsoil and substratum of the Allegheny soil. Available water capacity is high. Runoff is medium. Natural fertility is low. Unless limed, the soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas have been cleared and are used for cultivated crops, hay, or pasture. Some areas are used as homesites. A few small areas are wooded or are idle.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is moderate in unprotected areas. Applying a system of conservation tillage, growing cover crops, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods and until the soil is reasonably firm help to maintain desirable grasses and legumes and control erosion.

This soil is suited to gardens. Early season crops, such as potatoes, cabbage, lettuce, peas, and onions, grow well. The soil also is suited to late season crops, such as sweet corn and tomatoes. Late spring frost is a problem in some areas because of poor air drainage.

The potential productivity of this soil for trees is moderately high, but only a small acreage is wooded. Erosion is a hazard on logging roads and skid trails. It can be controlled by constructing the roads and skid trails on the contour.

Few, if any, limitations affect most kinds of community development on this soil. Maintaining a plant cover on construction sites, establishing a plant cover in unprotected areas, and properly disposing of surface water help to control erosion and sedimentation.

The capability subclass is IIe. The woodland productivity class is 4.

BSF—Berks-Shelocta association, very steep, extremely stony. These soils are on mountains in areas dominated by siltstone bedrock. The Berks soil typically is on ridgetops and the convex upper side slopes. The Shelocta soil typically is on the middle and lower side slopes, on foot slopes, and in coves. Slope ranges from 35 to 80 percent. The landscape is dissected by numerous drainageways. Relief ranges from about 600 to 1,300 feet. Stones cover 3 to 15 percent of the surface in most areas.

This unit is about 40 percent Berks and similar soils, 35 percent Shelocta and similar soils, and 25 percent minor soils and rock outcrop. Areas of the individual soils are large enough to be mapped separately. Because of present and predicted land uses, however, they were mapped as one unit.

The Berks soil is moderately deep and well drained. Typically, the surface layer is dark brown very channery loam about 2 inches thick. The subsoil is yellowish brown very channery loam in the upper part and yellowish brown extremely channery silt loam in the lower part. It extends to bedrock at a depth of about 23 inches. In places the soil is similar to the Berks soil but has fewer rock fragments in the solum.

The Shelocta soil is very deep and well drained. Typically, the surface layer is dark brown channery silt loam about 3 inches thick. The subsoil to a depth of at least 65 inches is yellowish brown channery silt loam, channery silty clay loam, and very channery silty clay loam. In places the soil is similar to the Shelocta soil but has more rock fragments and more sand in the solum.

The most extensive minor soils in this unit are Guyandotte and similar soils in north-facing coves, Gilpin and Wharton soils on ridgetops, and deep, well drained, sandy soils in saddles and on the upper side slopes. Also of minor extent are Kaymine and Cedarcreek soils in contour surface mines, Sensabaugh soils on narrow flood plains, small areas of rock outcrop on ridgetops and the upper side slopes, and areas in coves and drainageways where 15 to 50 percent of the surface is covered by stones and boulders.

Permeability is moderate or moderately rapid in the subsoil and substratum of the Berks soil. Available water capacity is very low to moderate. Runoff is very rapid. Natural fertility is low. Reaction is extremely acid to slightly acid in the surface layer and extremely acid to moderately acid in the subsoil and substratum. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Permeability is moderate in the subsoil and substratum of the Shelocta soil. Available water capacity is moderate or high. Runoff is very rapid. Natural fertility is low or medium. Reaction generally is very strongly acid or strongly acid. In some areas, however, the surface layer is less acid as a result of repeated burning. The depth to bedrock is more than 60 inches.

Most areas are used as woodland. A few areas have been surface mined for coal. A few small areas of the Shelocta soil on side slopes and foot slopes are used as pasture.

Because of the slope, the stones on the surface, and the hazard of erosion, these soils generally are not suited to cultivated crops, hay, or pasture.

These soils are suited to deciduous and coniferous trees. The potential productivity of the Berks and similar soils is moderate on south-facing slopes and moderately high on north-facing slopes. Timber stands are dominantly scarlet oak, black oak, chestnut oak, white oak, hickory, yellow-poplar, and red maple.

The potential productivity of the Shelocta and similar soils is moderately high on north- and south-facing slopes. Timber stands are dominantly hickory, white oak, yellow-poplar, black oak, cucumbertree, American beech, and northern red oak.

In many areas the trees are of poor quality because of repeated fire damage, especially on south-facing slopes. Fire control is difficult because of long, very steep slopes, which provide little protection from the wind. The hazard of fire is greater in areas near the numerous residential developments in narrow valleys. Roads to mining areas and to gas wells are used by firefighters and provide access to logging areas.

Erosion on roads to gas wells, on logging roads and skid trails, and in loading areas is a major management concern. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching bare areas. Special equipment or management techniques that are adapted to very steep slopes should be used in harvesting timber. Poor harvesting methods can cause very severe erosion in the harvested areas.

These soils are suited to woodland wildlife habitat. Many areas support a moderate population of grouse, turkey, squirrel, and white-tailed deer. In many areas, especially those of the Shelocta soil in north-facing coves and on side slopes, the locally important understory vegetation consists of ginseng, trillium, mayapple, springbeauty, and ferns.

In most areas these soils are not suited to community development because of the slope. Extensive excavation and leveling are required during construction. The hazard of erosion is very severe in areas cleared for construction.

The capability subclass is VIIs. In areas of the Berks soil, the woodland productivity class is 3 on south aspects and 4 on north aspects. In areas of the Shelocta soil, it is 4 on south aspects and 5 on north aspects.

CeB—Cedarcreek very channery loam, 3 to 8 percent slopes, very stony. This soil is very deep and well drained. It is in areas that formerly were surface mined for coal. It generally is on gently sloping mountaintops and on benches throughout the county. Stones and boulders cover 1 to 3 percent of the surface.

Typically, the surface layer is brown very channery loam about 3 inches thick. The substratum to a depth of at least 65 inches is yellowish brown and brownish yellow very channery loam. About 55 percent of the rock fragments are siltstone, 40 percent are sandstone, and 5 percent are coal and other rock types.

Included with this soil in mapping are areas of soils that are less than 60 inches deep over bedrock, strongly sloping to very steep soils on outslopes, small wet depressions, small areas of rubble land on outslopes and in rock drains, and a few areas of rock outcrop on highwalls. Also included are a few small areas of Berks, Dekalb, Gilpin, Lily, and Wharton soils on ridgetops; Pineville soils on side slopes and in coves; and areas of Kaymine, Fiveblock, and Sewell soils. Included areas make up about 25 percent of this unit.

Permeability is moderate or moderately rapid in the substratum of the Cedarcreek soil. Available water capacity is low to high. Natural fertility is low or medium. Runoff is medium. Unless limed, the soil is extremely acid to strongly acid. In some areas that have been limed during reclamation, the surface layer is less acid. The depth to bedrock is more than 60 inches.

Most areas support grasses and legumes. Some of the older reclaimed areas support small trees, such as black locust, yellow-poplar, red maple, eastern white pine, pitch pine, and Virginia pine.

Because of the stones and boulders on the surface, this soil is generally unsuitable for cultivated crops. The areas on ridgetops have limited suitability for hay and pasture. If hay is harvested, a suitable cutting height is needed to allow machinery to clear stones, to conserve soil moisture, and to reduce stress on plants. Erosion is a severe hazard in pastured areas. Timely deferment of grazing, rotation grazing, applications of lime and fertilizer as needed, and selection of desirable species for planting help to maintain desirable grasses and legumes and control erosion.

The potential productivity of this soil for trees is moderately high. In most areas the trees are young and are not of harvestable size. The soil is well suited eastern white pine, Virginia pine, black locust, yellow-poplar, red maple, hybrid poplar, and paulownia. Planting adequate numbers of healthy seedlings at the proper time of the year helps to establish a desirable stand. The seedlings of some trees planted in established stands of grasses and legumes grow slowly. Constructing logging roads and skid trails on the contour and seeding and mulching disturbed areas help to control erosion. Access to some areas may be a problem because of very steep adjacent side slopes.

This soil has fair potential for woodland wildlife habitat. The variety of vegetation provides food and cover for wildlife. The included small wet areas help to provide water.

The main limitations affecting community development are the stones and boulders and the

Figure 5.—Rock outcrop, a strip bench, and an outslope in an area of Cedarcreek-Rock outcrop complex, very steep, extremely stony.

potential for differential settling. Onsite investigation and testing are needed to determine the limitations and potential for community development.

The capability subclass is VIs. The woodland productivity class is 4.

CgF—Cedarcreek-Rock outcrop complex, very steep, extremely stony. This unit consists of a very deep, well drained Cedarcreek soil and areas of Rock outcrop. The unit is in areas that formerly were surface mined for coal. It generally is on mountain side slopes and consists of nearly vertical highwalls of rock outcrop, gently sloping to moderately steep benches, and very steep outslopes (fig. 5). The highwalls make up about 15 percent of the unit. The benches make up about 25 percent. They generally are concave and have slopes of 3 to 25 percent. The outslopes make up about 60 percent of the unit. They have stones and boulders on 3 to 15 percent of the surface and have slopes of 35 to 80 percent.

This unit is about 65 percent Cedarcreek soil, 15 percent Rock outcrop, and 20 percent included soils. The Cedarcreek soil and Rock outcrop occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of Cedarcreek soil is brown very channery loam about 3 inches thick. The substratum to a depth of at least 65 inches is yellowish brown and brownish yellow very channery loam. About 55 percent of the rock fragments are siltstone, 40 percent are sandstone, and 5 percent are coal and other rock types.

Rock outcrop consists of exposures or highwalls of bedrock that have been formed by surface mining. It is vertical or nearly vertical and is about 25 to 100 feet in height above the bench floor.

Included in this unit in mapping are areas of soils that are less than 20 inches deep over bedrock, soils that are 40 to 60 inches deep over bedrock, small wet depressions on benches, and areas on outslopes where stones and boulders cover as much as 70 percent of the surface. Also included are areas of Berks and Dekalb soils near the edges of the highwalls; areas of Guyandotte, Pineville, and Shelocta soils in coves; and small areas of Kaymine and Itmann soils on benches and outslopes.

Permeability is moderate or moderately rapid in the substratum of the Cedarcreek soil. Available water capacity is low to high. Natural fertility is low or medium. Runoff is medium or rapid on the benches and very rapid on the outslopes. Unless limed, the soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas are used as woodland. Some reclaimed areas support grasses and legumes. The Rock outcrop generally is barren.

Because of the slope, the stones and boulders on the surface, and the hazard of erosion, the Cedarcreek soil is generally unsuitable for cultivated crops and hay. The less sloping areas on benches have limited suitability for pasture. Erosion is a severe hazard in overgrazed areas. Timely deferment of grazing, rotation grazing, applications of lime and fertilizer, and selection of desirable species for planting help to establish and maintain good forage and control erosion.

The potential productivity of the Cedarcreek soil for trees is moderately high. The soil is suited to both coniferous and deciduous trees. In most areas the trees are not large enough to be harvested for sawlogs, but in some areas they can be harvested for mine timber. Erosion is a hazard on logging roads and skid trails. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching disturbed areas. Access to some areas may be a problem because of the highwalls and very steep side slopes.

The vegetation on the Cedarcreek soil varies but commonly consists of black locust, yellow-poplar, American sycamore, eastern white pine, and Virginia pine. The understory vegetation consists of black birch, red maple, sourwood, sassafras, blackberry, and multiflora rose. Some open areas support grasses and legumes, autumn-olive, and European alder.

The Cedarcreek soil has fair potential for woodland wildlife habitat. The variety of vegetation provides food and cover for wildlife. The small wet areas on benches help to provide water. Many areas support good populations of grouse.

Many areas of the Cedarcreek soil are used for underground coal mining. The areas on benches are used for access to the coal seams. Erosion on roads and around mine sites is a major management concern. It can be controlled by constructing the roads on the contour, using small sediment basins to collect runoff, and seeding and mulching disturbed areas.

The main limitations affecting community development are the slope, the stones and boulders, the Rock outcrop, and the potential for differential settling. Onsite investigation and testing are needed to determine the limitations and potential for most urban uses.

The capability subclass is VIIs. In areas of the Cedarcreek soil, the woodland productivity class is 4.

Ch—Chagrin fine sandy loam. This soil is nearly level and well drained. It is on low flood plains, mainly along Pond Fork, Spruce Laurel Fork, the Big Coal River, and the Little Coal River. It is occasionally flooded. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 33 inches. The upper 14 inches is dark yellowish brown fine sandy loam, and the lower 9 inches is dark yellowish brown loam. The substratum to a depth of 65 inches or more is dark yellowish brown. It is fine sandy loam in the upper part and stratified fine sandy loam and loamy fine sand in the lower part.

Included with this soil in mapping are a few areas of the somewhat excessively drained Potomac soils, the well drained Kanawha and Sensabaugh soils, and the moderately well drained Lobdell soils. Also included are a few areas of soils that have a surface layer of sandy loam, a few areas of urban land, areas of Udorthents, a few areas that are frequently flooded, and small areas of soils that are strongly acid in the substratum. Included areas make up about 20 percent of this unit.

Permeability is moderate in the subsoil and substratum of the Chagrin soil. Available water capacity is high. Runoff is slow. Natural fertility is medium or high. The soil is moderately acid to neutral. The depth to bedrock is more than 60 inches.

Many areas have been cleared and are used for gardens, for cultivated crops, or for hay and pasture. Some areas are wooded. A few areas are used as homesites.

This soil is well suited to cultivated crops, hay, and pasture. A variety of early and late season garden crops can be grown. Late spring frost is a problem because of poor air drainage. Crops can be grown year after year, but a protective cover crop is needed. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods help to maintain desirable grasses and legumes.

The potential productivity of this soil for trees is moderately high. Most of the wooded areas support American sycamore and river birch. Stands of yellow-poplar and a few stands of oaks are along the Big Coal River and the Little Coal River.

The flooding is the main hazard affecting community development. Establishing a plant cover in unprotected areas and properly disposing of surface water help to control stream scouring and sedimentation.

The capability class is IIw. The woodland productivity class is 5.

DPF—Dekalb-Pineville-Guyandotte association, very steep, extremely stony. These soils are on mountains in areas dominated by sandstone bedrock. The Dekalb soil typically is on ridgetops and the convex upper side slopes. The Pineville soil typically is on the middle and lower side slopes, on foot slopes, and in south-facing coves. The Guyandotte soil typically is in north-facing coves and on the upper and middle north-facing side slopes. Soils that are similar to the Guyandotte soil are in similar south-facing landscape positions. Slope ranges from 35 to 80 percent. The landscape is dissected by numerous drainageways. Relief ranges from about 900 to 1,800 feet. Stones cover 3 to 15 percent of the surface in most areas.

This unit is about 35 percent Dekalb and similar soils, 25 percent Pineville and similar soils, 20 percent Guyandotte and similar soils, and 20 percent minor soils and rock outcrop. Areas of the individual soils are large enough to be mapped separately. Because of present and predicted land uses, however, they were mapped as one unit.

The Dekalb soil is moderately deep and well drained. Typically, the surface layer is very dark grayish brown channery sandy loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam. It extends to bedrock at a depth of about 24 inches. In places the soil is similar to the Dekalb soil but has less sand and more silt in the solum.

The Pineville soil is very deep and well drained. Typically, the surface layer is dark brown very channery loam about 3 inches thick. The subsoil is about 55 inches of yellowish brown channery loam and brownish yellow very channery loam. The substratum to a depth of at least 65 inches is brownish yellow very channery loam. In places the soil is similar to the Pineville soil but has more rock fragments in the solum.

The Guyandotte soil is very deep and well drained. Typically, the surface layer is very dark brown and very dark grayish brown channery loam about 10 inches thick. The subsoil is very channery loam at least 55 inches thick. The upper 9 inches is brown, and the lower 46 inches is dark yellowish brown. In some areas on south-facing slopes, the soil is similar to the Guyandotte soil but has a thinner or lighter colored surface layer. In places the soil is similar to the Guyandotte soil but has fewer rock fragments and more silt in the solum.

The most extensive minor soils in this unit are Lily soils on ridgetops; deep, well drained, sandy soils in saddles and on the upper side slopes; Cedarcreek, Fiveblock, and Kaymine soils in contour surface mines; and Potomac soils on narrow flood plains. Also of minor extent are small areas of rock outcrop on ridgetops and the upper side slopes and areas in coves and drainageways where 15 to 50 percent of the surface is covered by stones and boulders.

Permeability is rapid in the subsoil and substratum of the Dekalb soil. Available water capacity is very low to moderate. Runoff is very rapid. Natural fertility is very low or low. Reaction is extremely acid to slightly acid in the surface layer and extremely acid to strongly acid in the subsoil and substratum. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Permeability is moderate in the subsoil of the Pineville soil and moderate or moderately rapid in the substratum. Available water capacity is moderate or high. Runoff is very rapid. Natural fertility is low or medium. Reaction is extremely acid to neutral in the surface layer and strongly acid or very strongly acid in the subsoil and substratum. The depth to bedrock is more than 60 inches.

Permeability is moderate or moderately rapid in the Guyandotte soil. Available water capacity is low to high. Runoff is very rapid. Natural fertility is medium or high. Reaction is extremely acid to neutral in the surface layer and extremely acid to strongly acid in the subsoil and substratum. The depth to bedrock is more than 60 inches.

Most areas are used as woodland. A few small areas have been surface mined for coal. A few small areas of the Pineville soil on foot slopes are used as pasture.

Because of the slope, the stones on the surface, and the hazard of erosion, these soils generally are not suited to cultivated crops, hay, or pasture.

These soils are suited to deciduous and coniferous trees. The potential productivity of the Dekalb and similar soils is moderate on south-facing slopes and moderately high on north-facing slopes. Timber stands are dominantly chestnut oak, hickory, black oak, yellow-poplar, scarlet oak, white oak, and shortleaf pine.

The potential productivity of the Pineville and similar soils is moderately high on north- and south-facing slopes. Timber stands are dominantly hickory, white oak, yellow-poplar, black oak, sugar maple, beech, and red oak.

The potential productivity of the Guyandotte and similar soils is moderately high. Timber stands are dominantly yellow-poplar, sugar maple, hickory, basswood, red oak, cucumbertree, and black walnut.

In many areas the trees are of poor quality because of repeated fire damage, especially on south-facing slopes. Fire control is difficult because of long, very steep slopes, which provide little protection from the wind. The hazard of fire is greater in areas near the numerous residential developments in narrow valleys. Roads to mining areas and to gas wells are used by firefighters and provide access to logging areas.

Erosion on roads to gas wells, on logging roads and skid trails, and in loading areas is a major management concern. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching bare areas. Special equipment or management techniques that are adapted to very steep slopes should be used in harvesting timber. Poor harvesting methods can cause severe erosion in the harvested areas.

These soils are suited to woodland wildlife habitat. Many areas support a moderate population of grouse, turkey, squirrel, deer, and European wild boar. The European wild boar has been introduced into a rugged area in the southern part of the county. In many areas, especially those of the Guyandotte and Pineville soils in north-facing coves and on side slopes, the understory vegetation consists of wild leek, ginseng, trillium, mayapple, springbeauty, and ferns.

In most areas these soils are not suited to community development because of the slope. Extensive excavation and leveling are required during construction. The hazard of erosion is very severe in areas cleared for construction.

The capability subclass is VIIs. In areas of the Dekalb soil, the woodland productivity class is 3 on south aspects and 4 on north aspects. In areas of the Pineville soil, it is 4 on south aspects and 5 on north aspects. In areas of the Guyandotte soil, it is 5.

FvF—Fiveblock very channery sandy loam, very steep, extremely stony. This soil is very deep and somewhat excessively drained. It is in areas that formerly were surface mined for coal. It generally is on mountaintops along the eastern boundary of the county. It consists of steep and very steep outslopes and areas of valley fill. The outslopes generally are convex slopes that range from 35 to 70 percent. They make up about 60 percent of the unit. The areas of valley fill generally are benched concave slopes that range from 50 to 80 percent. They make up about 40 percent of the unit. Stones and boulders cover 3 to 15 percent of the surface in most areas.

Typically, the surface layer is dark brown very channery sandy loam about 4 inches thick. The upper part of the substratum is dark grayish brown and brown extremely channery sandy loam. The lower part to a depth of 65 inches or more is brown extremely channery loamy sand. Sandstone makes up about 90 percent and siltstone 10 percent of the total content of rock fragments.

Included with this soil in mapping are soils that are less than 20 inches deep over bedrock, soils that are 20 to 40 inches deep over bedrock, small wet depressions on benches, outslopes and drainage cores in areas of valley fill where stones and boulders cover more than 90 percent of the surface, a few areas of soils that have slopes of more than 3 percent but less than 15 percent, a few areas of the moderately deep Dekalb soils near the edges of outslopes and ridgetops, and a few areas of the very deep Pineville and Guyandotte soils in coves. Also included are some small areas of the very deep Kaymine soils on benches and outslopes and a few areas of soils that have sand in the substratum. Included areas make up about 25 percent of this unit.

Permeability is moderately rapid or rapid in the substratum of the Fiveblock soil. Available water capacity is very low to moderate. Runoff is very rapid. Natural fertility is medium or high. Reaction is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas support grasses and legumes. Some of the older reclaimed areas support small trees, such as black locust, yellow-poplar, and red maple.

Because of the slope and the stones and boulders on the surface, this soil generally is unsuitable for cultivated crops, hay, and pasture.

The potential productivity of this soil for trees is moderately high. In most areas the trees are young and are not of harvestable size. The soil is well suited eastern white pine, Virginia pine, black locust, yellow-poplar, red maple, bigtooth aspen, and paulownia. Planting adequate numbers of healthy seedlings at the proper time of the year helps to establish a desirable stand. The seedlings of some trees planted in established stands of grasses and legumes grow slowly. Erosion on logging roads, skid trails, and log landings is a management concern. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching disturbed areas. Access to some areas may be difficult because of very steep side slopes.

This soil has fair potential for woodland wildlife habitat. The variety of vegetation provides food and cover for wildlife. The small wet areas on benches help to provide water.

This soil is not suited to community development because of the slope, the potential for differential settling, and the difficulty in excavating caused by the stones and boulders.

The capability subclass is VIIs. The woodland productivity class is 4.

GwE—Gilpin-Wharton silt loams, 15 to 35 percent slopes. These soils are moderately steep and steep and are well drained and moderately well drained. They are along ridgetops in the northern part of the county. The Gilpin soil is moderately deep, and the Wharton soil is deep. This unit is about 45 percent Gilpin soil, 30 percent Wharton soil, and 25 percent included soils. The soils in this unit occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Gilpin soil is dark brown silt loam about 1 inch thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is channery silt loam about 25 inches thick. The upper 18 inches is strong brown, and the lower 7 inches is yellowish brown. The substratum is yellowish brown very channery silty clay loam. It extends to bedrock at a depth of about 36 inches.

Typically, the surface layer of the Wharton soil is very dark grayish brown silt loam about 2 inches thick. The subsoil extends to a depth of 34 inches. The upper 14 inches is yellowish brown silt loam. The next 13 inches is yellowish brown silty clay loam that has light brownish gray and brownish yellow mottles. The lower 5 inches is light brownish gray silty clay loam that has brownish yellow mottles. The substratum is light brownish gray channery silty clay loam that has strong brown and brown mottles. It extends to bedrock at a depth of about 44 inches.

Included with these soils in mapping are small areas of the moderately deep, well drained Berks, Dekalb, and Lily soils; a few small areas of soils that are less than 20 inches deep over bedrock; and a few areas of the very deep, well drained Shelocta and Pineville soils. Also included are small areas of soils that have slopes of less than 15 percent or more than 35 percent.

Permeability is moderate in the subsoil and substratum of the Gilpin soil. Available water capacity is moderate. Runoff is rapid. Natural fertility is low or medium. Unless limed, the soil is very strongly acid or strongly acid. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Permeability is moderately slow or slow in the subsoil and substratum of the Wharton soil. Available water capacity is moderate or high. Runoff is rapid. Natural fertility is low or medium. Unless limed, the soil is extremely acid to strongly acid. The root zone of some plants is restricted by a seasonal high water table at a depth of 1.5 to 3.0 feet. The depth to bedrock is 40 inches or more.

Most areas are wooded. Some small areas have been cleared and are used for gardens, hay, or pasture. A few small areas are used as homesites.

These soils are not suited to cultivated crops or hay, but they are suited to pasture. Erosion is a severe or very severe hazard in unprotected areas. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry or wet periods help to maintain desirable grasses and legumes and control erosion.

The potential productivity of these soils for trees is moderately high. Most areas have stands of oaks, hickory, yellow-poplar, black locust, and red maple. The Wharton soil becomes very soft during wet periods. Special management is needed to control erosion on logging roads and skid trails. Constructing the roads and skid trails on the contour helps to control erosion and sedimentation.

The main limitation affecting community development is the slope. The depth to bedrock in the Gilpin soil and the wetness of the Wharton soil are additional limitations.

The capability subclass is VIe. In areas of the Gilpin soil, the woodland productivity class is 5 on north aspects and 4 on south aspects. In areas of the Wharton soil, it is 4.

ImE—Itmann channery loam, steep. This soil is very deep and somewhat excessively drained. It formed mainly in material weathered from coal and high-carbon shale. It generally is in areas of valley fill and on steep and very steep slopes close to active and abandoned coal mines. Most areas are active waste-dumping sites that have been covered with 6 to 18 inches of natural soil material during reclamation. A few areas are ponded. Slope is dominantly 20 to 60 percent but ranges from 3 to 60 percent. Top slopes make up about 30 percent of the unit. They generally are gently sloping or strongly sloping. Outslopes make up about 70 percent of the unit. They are steep or very steep.

Typically, the surface layer is dark brown channery loam about 9 inches thick. The subsurface layer is mixed dark brown and black very channery loam about 4 inches thick. The substratum to a depth of at least 65 inches is black extremely channery loam and extremely channery sandy loam. More than 50 percent of the rock fragments are carbolith.

Included with this soil in mapping are areas that have not been covered with natural soil material and areas of the well drained Berks, Cedarcreek, Dekalb, Kaymine, and Pineville soils. Also included are areas of soils that are less acid than the Itmann soil and areas that have been burned or are burning. Included areas make up about 25 percent of this unit.

Permeability is moderate to rapid in the upper part of the Itmann soil and moderately rapid or rapid in the substratum. Available water capacity is very low to moderate. Runoff is medium or rapid on the benches and very rapid on the outslopes. Natural fertility is very low. Unless limed, the soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas have been recently reclaimed and support grasses and legumes. A few areas support blackberry, weeds, and small trees.

This soil is not suitable for cultivated crops, hay, or pasture because of the very low natural fertility and the hazard of erosion. The hazard of rill and gully erosion is very severe. Controlling surface water by diversions, seeding, and heavy mulching help to establish vegetation and reduce the hazard of erosion.

The potential productivity of this soil for trees is low. The soil has very poor potential for woodland wildlife habitat.

Onsite investigation and testing are needed to determine the limitations and potential for most urban uses.

The capability subclass is VIIs. No woodland productivity class is assigned.

ItF—Itmann extremely channery sandy loam, very steep. This soil is very deep and somewhat excessively drained. It formed mainly in material weathered from coal and high-carbon shale. It generally is on hillsides and in areas of valley fill close to abandoned and active coal mines (fig. 6). A few areas of valley fill have impounded water behind them. Slope is dominantly 25 to 80 percent but ranges from 5 to 80 percent. Top slopes make up about 25 percent of the unit. They are gently sloping to moderately steep and generally are narrow. Outslopes make up about 75 percent of the unit. They are steep or very steep.

Typically, the surface layer is black extremely channery sandy loam about 3 inches thick. The substratum to a depth of at least 65 inches is black extremely channery loam and extremely channery sandy loam. Coal and other high-carbon fragments make up about 55 percent, siltstone 40 percent, and sandstone 5 percent of the total content of rock fragments.

Included with this soil in mapping are a few small areas of the well drained Berks, Cedarcreek, Dekalb, Kaymine, and Pineville soils. Also included are areas of soils that are less acid than the Itmann soil and areas that have been burned or are burning. Included areas make up about 30 percent of this unit.

Permeability is moderately rapid or rapid in the substratum of the Itmann soil. Available water capacity is very low to moderate. Runoff is medium or rapid in benched areas and very rapid on the outslopes. Natural fertility is very low. Unless limed, the soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas are barren. A few small burned areas support sweet birch trees.

This soil is not suitable for cultivated crops, hay, or pasture because of the slope, the very low natural fertility, and the hazard of erosion. The hazard of rill and gully erosion is very severe. Most steep and very steep areas cannot be easily revegetated because of the very low fertility, the very low to moderate available water capacity, the acidity of the soil, and a high temperature in the surface layer. Controlling surface runoff by diversions, seeding, applying lime and fertilizer, and heavy mulching help to establish vegetation and reduce the hazard of erosion.

The potential productivity of this soil for trees is low. The soil has very poor potential for woodland wildlife habitat.

Onsite investigation and testing are needed to determine the limitations and potential for most urban uses. The included burned areas are used as a local source of subgrade and fill material for roads.

The capability subclass is VIIIs. No woodland productivity class is assigned.

Ka—Kanawha loam. This soil is nearly level and well drained. It is on high flood plains, mainly along Spruce Laurel Fork, the Big Coal River, and the Little Coal River. It is subject to rare flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 54 inches. The upper 32 inches is yellowish brown loam, and the lower 12 inches is yellowish brown fine sandy loam that has a few very pale brown mottles. The substratum to a depth of at least 65 inches is yellowish brown fine sandy loam that has strong brown and light gray mottles.

Included with this soil in mapping are a few areas of the moderately well drained Lobdell soils and the well drained Chagrin soils. Also included are a few areas of soils that have a surface layer of sandy loam, a few areas of urban land, areas of Udorthents, and a few small areas of soils that are similar to the Kanawha soil but are strongly acid in the substratum. Included areas make up about 20 percent of this unit.

Permeability is moderate in the subsoil of the Kanawha soil and moderate or moderately rapid in the

Figure 6.—An area of Itmann extremely channery sandy loam, very steep.

substratum. Available water capacity is high. Runoff is slow. Natural fertility is medium or high. Unless limed, the soil is strongly acid or moderately acid in the surface layer and the upper part of the subsoil and moderately acid to neutral in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

Many areas have been cleared and are used for cultivated crops (fig. 7), hay, or pasture. Some areas are used as homesites. A few small areas are wooded.

This soil is well suited to cultivated crops, hay, and pasture. A variety of early and late season garden crops can be grown. Late spring frost is a problem because of poor air drainage. Crops can be grown year after year, but a protective cover crop is needed. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods help to maintain desirable grasses and legumes.

The potential productivity of this soil for trees is moderately high, but only a small acreage is wooded. A few stands of yellow-poplar and mixed oaks are along the Big Coal River, the Little Coal River, and Spruce Laurel Fork.

The rare flooding is the main hazard affecting community development. Establishing a plant cover in unprotected areas and properly disposing of surface water help to control stream scouring and sedimentation.

The capability class is I. The woodland productivity class is 5.

Kc—Kanawha-Urban land complex. This unit consists of a nearly level, well drained Kanawha soil and areas of Urban land. The unit is along the larger streams in the county. The Kanawha soil is subject to rare flooding. Slope ranges from 0 to 3 percent. The unit is about 40 percent Kanawha soil, 40 percent Urban land, and 20 percent included soils. The Kanawha soil and Urban land occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Kanawha soil is very dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 54 inches. The upper 32 inches is yellowish brown loam, and the lower 12 inches is yellowish brown fine sandy loam that has a few very pale brown mottles. The substratum to a depth of at least 65 inches is yellowish brown fine sandy loam that has strong brown and light gray mottles.

The Urban land is covered by streets, parking lots, buildings, and other structures.

Included in this unit in mapping are a few small areas of the somewhat excessively drained Potomac soils, the well drained Allegheny and Chagrin soils, and the moderately well drained Lobdell soils. Also included are a few small areas of soils that are frequently flooded,

Figure 7.—A cultivated area of Kanawha loam.

soils that are similar to the Kanawha soil but are very strongly acid, soils that have slopes of 3 to 8 percent, and some areas of Udorthents.

Permeability is moderate in the subsoil of the Kanawha soil and moderate or moderately rapid in the substratum. Available water capacity is high. Runoff is slow. Natural fertility is medium or high. Unless limed, the soil is strongly acid or moderately acid in the surface layer and the upper part of the subsoil and moderately acid to neutral in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

Most areas are used as sites for homes or commercial structures. Many small areas of the Kanawha soil are used for gardens. A few small areas are wooded or are idle.

The Kanawha soil is well suited to gardens. A wide variety of early and late season crops can be grown. Late spring frost is a problem in some areas because of poor air drainage. Garden crops can be grown year after year, but a protective cover crop is needed. Working the residue from the cover crop into the soil helps to maintain fertility and tilth.

The rare flooding is the main hazard affecting community development. Establishing a plant cover in unprotected areas and properly disposing of surface water help to control stream scouring and sedimentation.

No capability class is assigned. In areas of the Kanawha soil, the woodland productivity class is 4.

KeB—Kaymine very channery loam, 3 to 8 percent slopes, very stony. This soil is very deep and well drained. It is in areas that formerly were surface mined for coal. It generally is on mountaintops in the western part of the county. It is on gently sloping hilltops and benches. Stones and boulders cover 1 to 3 percent of the surface in most areas.

Typically, the surface layer is dark gray very channery loam about 5 inches thick. The substratum to a depth of at least 65 inches dark gray extremely channery loam. About 60 percent of the rock fragments are siltstone, 30 percent are sandstone, and 10 percent are coal.

Included with this soil in mapping are areas of moderately deep soils, deep soils, soils that have slopes of more than 8 percent, outslopes, small wet depressions, and small areas of rubble land. Also included are small areas of Cedarcreek, Fiveblock, and Sewell soils; small areas of Gilpin and Wharton soils on ridgetops; small areas of Berks and Shelocta soils on side slopes; and small areas of sandy soils. Included areas make up about 20 percent of this unit.

Permeability is moderate or moderately rapid in the substratum of the Kaymine soil. Available water capacity is low to high. Runoff is medium. Natural fertility is medium or high. Reaction is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas support grasses and legumes. Some of the older reclaimed areas support small trees, such as black locust, yellow-poplar, red maple, and eastern white pine.

Because of the stones and boulders on the surface, this soil is generally unsuitable for cultivated crops. The areas on ridgetops have limited suitability for hay and pasture. If hay is harvested, a suitable cutting height is needed to allow machinery to clear stones, to conserve soil moisture, and to reduce stress on plants. Erosion is a severe hazard in pastured areas. Timely deferment of grazing, rotation grazing, applications of lime and fertilizer as needed, and selection of desirable species for planting help to maintain desirable grasses and legumes and control erosion.

The potential productivity of this soil for trees is moderately high. In most areas the trees are young and are not of harvestable size. The soil is well suited eastern white pine, Virginia pine, black locust, yellow-poplar, red maple, hybrid poplar, and paulownia. Planting adequate numbers of healthy seedlings at the proper time of the year helps to establish a desirable stand. The seedlings of some trees planted in established stands of grasses and legumes grow slowly. Constructing logging roads and skid trails on the contour and seeding and mulching disturbed areas help to control erosion. Access to some areas may be a problem because of very steep side slopes.

This soil has fair potential for woodland wildlife habitat. The variety of vegetation provides food and cover for wildlife. The included small wet areas help to provide water.

The main limitations affecting community development are the stones and boulders and the potential for differential settling. Onsite investigation and testing are needed to determine the limitations and potential for community development.

The capability subclass is VIs. The woodland productivity class is 4.

KmF—Kaymine-Cedarcreek-Dekalb complex, very steep, extremely stony. These well drained soils are on mountain side slopes (fig. 8). The very deep Kaymine and Cedarcreek soils are in areas that have been surface mined for coal. They are on gently sloping or strongly sloping benches and steep or very steep outslopes. They are adjacent to nearly vertical highwalls. The moderately deep Dekalb soil is on very steep side slopes that have not been mined. Slope

Figure 8.—An area of Kaymine-Cedarcreek-Dekalb complex, very steep, extremely stony.

ranges from 3 to 35 percent on the benches and from 35 to 80 percent on the outslopes and side slopes. Stones and boulders cover 3 to 15 percent of the surface mined-areas. Highwalls make up about 15 percent of the surface-mined areas; benches, 25 percent; and outslopes, 60 percent.

This unit is about 35 percent Kaymine and similar soils, 25 percent Cedarcreek and similar soils, 20 percent Dekalb and similar soils, and 20 percent included soils. The soils in this unit occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Kaymine soil is dark gray very channery loam about 5 inches thick. The substratum to a depth of at least 65 inches is dark gray extremely channery loam. About 60 percent of the rock fragments are siltstone, 30 percent are sandstone, and 10 percent are coal.

Typically, the surface layer of the Cedarcreek soil is brown very channery loam about 3 inches thick. The substratum to a depth of at least 65 inches is yellowish brown and brownish yellow very channery loam. About 55 percent of the rock fragments are siltstone, 40 percent are sandstone, and 5 percent are coal.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam. It extends to bedrock at a depth of about 24 inches.

Included with these soils in mapping are a few areas of rock outcrop on vertical highwalls. Also included are small areas of the well drained Berks, Dekalb, Kaymine, Sewell, Pineville, and Guyandotte soils and the somewhat excessively drained Itmann soils; soils that are less than 20 inches deep over bedrock; wet soils; areas where 15 to 50 percent of the surface is covered by stones; rubble land; and soils that are similar to the Dekalb soil but have fewer rock fragments.

Permeability is moderate or moderately rapid in the substratum of the Kaymine soil. Available water capacity is low to high. Natural fertility is medium or high. Runoff is medium or rapid on the benches and very rapid on the outslopes. Reaction is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Permeability is moderate or moderately rapid in the substratum of the Cedarcreek soil. Available water capacity is low to high. Natural fertility is low or medium. Runoff is medium or rapid on the benches and very rapid on the outslopes. Reaction is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Permeability is rapid in the subsoil and substratum of the Dekalb soil. Available water capacity is very low to moderate. Natural fertility is low. Runoff is very rapid. Reaction is extremely acid to slightly acid in the surface layer and extremely acid to strongly acid in the subsoil and substratum. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Most areas are used as woodland. Some areas support grasses and legumes.

Because of the slope, the stones and boulders on the surface, and the hazard of erosion, these soils generally are unsuitable for cultivated crops and hay. The hazard of erosion is very severe if the soils do not have an adequate plant cover. The less sloping areas on benches have limited suitability for pasture, but erosion is a severe hazard if the pasture is overgrazed. Timely deferment of grazing, rotation grazing, applications of lime and fertilizer, and selection of desirable species for planting help to establish and maintain good forage and control erosion.

The potential productivity of these soils for trees is moderately high. The soils are suited to both coniferous and deciduous trees. In most areas the trees are not large enough to be harvested for sawlogs, but in some areas they can be harvested for mine timber. Erosion is a hazard on logging roads and skid trials. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching disturbed areas. Access to some areas may be difficult because of the highwalls and the slope.

The vegetation on the Kaymine and Cedarcreek soils differs from place to place but commonly consists of black locust, yellow-poplar, American sycamore, eastern white pine, and Virginia pine. The understory vegetation commonly consists of black birch, red maple, sourwood, sassafras, blackberry, and multiflora rose. The vegetation on the Dekalb soil commonly consists of chestnut oak, scarlet oak, red maple, and black locust. Some open areas support grasses, legumes, and autumn-olive.

These soils have fair potential for woodland wildlife habitat. The variety of vegetation provides excellent food and cover for wildlife. The small wet depressions on benches help to provide water. Many areas support good populations of grouse.

Many areas of these soils are used for underground coal mines or for access to the mines. Erosion is a hazard on roads and around mine sites. It can be controlled by constructing the roads on the contour, using sediment basins to collect runoff, and seeding and mulching disturbed areas.

The stones and boulders, the slope, the potential for differential settling, and the highwalls are the main limitations affecting community development. Onsite investigation and testing are needed to determine the limitations and potential for most urban uses.

The capability subclass is VIIs. The woodland productivity class is 4.

KrF—Kaymine-Rock outcrop complex, very steep, extremely stony. This unit consists of a very deep, well drained Kaymine soil and areas of Rock outcrop. The unit is in areas that formerly were surface mined for coal. It generally is on mountain side slopes. It consists of nearly vertical highwalls, gently sloping or strongly sloping benches, and very steep outslopes. The highwalls make up about 15 percent of the unit. The benches generally are concave and have slopes of 3 to 35 percent. They make up about 25 percent of the unit. The outslopes generally are convex and have slopes of 35 to 80 percent. They make up about 60 percent of the unit. In most areas stones and boulders cover 3 to 15 percent of the surface.

This unit is about 65 percent Kaymine soil, 15 percent Rock outcrop, and 20 percent included soils. The Kaymine soil and Rock outcrop occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Kaymine soil is dark gray very channery loam about 5 inches thick. The substratum to a depth of at least 65 inches is dark gray extremely channery loam. About 60 percent of the rock fragments are siltstone, 30 percent are sandstone, and 10 percent are coal.

Rock outcrop consists bedrock that has been exposed by surface mining. The highwalls are vertical or nearly vertical and are about 25 to 100 feet above the bench floor.

Included in this unit in mapping are areas of soils that are less than 20 inches deep over bedrock, soils that are 40 to 60 inches deep over bedrock, small wet depressions on benches, and areas on outslopes where more than 90 percent of the surface is covered by stones and boulders. Also included are a few areas of the very deep Pineville soils in coves, areas of the moderately deep Berks and Dekalb soils near the edge of highwalls, and small areas of the very deep Cedarcreek, Fiveblock, and Itmann soils on benches and outslopes.

Permeability is moderate or moderately rapid in the substratum of the Kaymine soil. Available water capacity is low to high. Natural fertility is medium or high. Runoff is medium or rapid on the benches and very rapid on the outslopes. Reaction is moderately acid to mildly alkaline. The depth to bedrock is more than 60 inches.

Most areas of the Kaymine soil are used as woodland. Some reclaimed areas support grasses and legumes. The Rock outcrop generally is barren.

Because of the slope, the stones and boulders on the surface, and the hazard of erosion, the Kaymine soil is generally unsuitable for cultivated crops and hay. The less sloping areas on benches have limited suitability for pasture, but erosion is a severe hazard if the pasture is overgrazed. Timely deferment of grazing, rotation grazing, applications of lime and fertilizer, and selection of desirable species for planting help to establish and maintain good forage and control erosion.

The potential productivity of the Kaymine soil for trees is moderately high. The soil is suited to both coniferous and deciduous trees. In most areas the trees are not large enough to be harvested for sawlogs, but in some areas they can be harvested for mine timber. Erosion is a hazard on logging roads and skid trails. It can be controlled by constructing the roads and skid trails on the contour and by seeding and mulching disturbed areas. Access to some areas may be difficult because of the highwalls and very steep side slopes.

The vegetation on the Kaymine soil differs from place to place but commonly consists of black locust, yellow-poplar, American sycamore, and eastern white pine. The understory vegetation commonly consists of sugar maple, red maple, redbud, blackberry, jewel weed, and multiflora rose. Some open areas support grasses, legumes, and autumn-olive.

The Kaymine soil has fair potential for woodland wildlife habitat. The variety of vegetation provides excellent food and cover for wildlife. The small wet areas on benches help to provide water. Many areas support good populations of grouse.

Many areas of the Kaymine soil are used for underground coal mining. The areas on benches are used for access to the coal seams. Erosion is a hazard on roads and around mine sites. It can be controlled by constructing the roads on the contour, using sediment basins to collect runoff, and seeding and mulching bare areas.

The stones and boulders, the slope, the vertical rock exposures, and the potential for differential settling are the main limitations affecting community development. Onsite investigation and testing are needed to determine the limitations and potential for most urban uses.

The capability subclass is VIIs. In areas of the Kaymine soil, the woodland productivity class is 4.

LdE—Lily-Dekalb complex, 15 to 35 percent slopes. These soils are moderately steep and steep, well drained, and moderately deep. They are along ridgetops throughout the southern part of the county. This unit is about 50 percent Lily soil, 30 percent Dekalb soil, and 20 percent included soils. The soils in this unit occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Lily soil is very dark grayish brown loam about 4 inches thick. The subsoil extends to bedrock at a depth of about 30 inches. It is yellowish brown. It is channery sandy loam in the upper 10 inches and channery loam in the lower 16 inches.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam. It extends to bedrock at a depth of about 24 inches.

Included with these soils in mapping are small areas of the moderately deep, well drained Berks and Gilpin soils, a few small areas of the moderately well drained Wharton soils, and a few small areas of soils that are less than 20 inches or more than 40 inches deep over bedrock. Also included are small areas where 1 to 3 percent of the surface is covered by stones and a few areas of soils that have slopes of less than 15 percent or more than 35 percent.

Permeability is moderately rapid in the subsoil and substratum of the Lily soil. Available water capacity is low or moderate. Runoff is rapid or very rapid. Natural fertility is low. Unless limed, the soil is extremely acid to strongly acid. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Permeability is rapid in the subsoil and substratum of the Dekalb soil. Available water capacity is very low to moderate. Runoff is rapid or very rapid. Natural fertility is low. Reaction is extremely acid to slightly acid in the surface layer and extremely acid to strongly acid in the subsoil and substratum. The root zone of some plants is

Figure 9.—An area of Lily-Dekalb complex, 15 to 35 percent slopes.

restricted by the bedrock at a depth of 20 to 40 inches.

Most areas are wooded (fig. 9). Some small areas have been cleared and are used for gardens, hay, or pasture. A few small areas are used as homesites.

These soils are not suited to cultivated crops or hay. They have limited suitability for pasture. Erosion is a severe or very severe hazard in unprotected areas. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods help to maintain desirable grasses and legumes and control erosion.

The potential productivity of these soils for trees is moderate or moderately high. Most areas have stands or oaks, hickory, yellow-poplar, black locust, and red maple. Special management is needed to control erosion on logging roads and skid trails. Constructing the roads and skid trails on the contour helps to control erosion and sedimentation.

The slope and the depth to bedrock are the main limitations affecting community development. Maintaining a plant cover on construction sites, establishing a plant cover in bare areas, and properly disposing of surface water help to control erosion and sedimentation.

The capability subclass is VIe. In areas of the Lily soil, the woodland productivity class is 5 on north aspects and 4 on south aspects. In areas of the Dekalb soil, it is 4 on north aspects and 3 on south aspects.

PnE—Pineville-Lily complex, 15 to 35 percent slopes. These soils are moderately steep and steep and are well drained. They are on dissected foot slopes and the lower hillside benches. This unit is about 45 percent Pineville soil, 35 percent Lily soil, and 20 percent included soils. The soils in this unit occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layer of the Pineville soil is dark brown very channery loam about 3 inches thick. The upper 43 inches of the subsoil is yellowish brown channery loam, and the lower 12 inches is brownish yellow very channery loam. The substratum to a depth of at least 65 inches also is brownish yellow very channery loam.

Typically, the surface layer of the Lily soil is very dark grayish brown loam about 4 inches thick. The subsoil extends to bedrock at a depth of about 30 inches. It is yellowish brown. It is channery sandy loam in the upper 10 inches and channery loam in the lower 16 inches.

Included with these soils in mapping are a few small areas of the well drained Allegheny, Dekalb, Gilpin, Guyandotte, Kanawha, and Sensabaugh soils and the moderately well drained Wharton soils. Also included are a few small areas of urban land, a few areas where as much as 3 percent of the surface is covered by stones, and a few areas of soils that have slopes of less than 15 percent or more than 35 percent.

Permeability is moderate in the subsoil of the Pineville soil and moderate or moderately rapid in the substratum. Available water capacity is moderate or high. Runoff is rapid. Natural fertility is low or medium. Reaction is extremely acid to neutral in the surface layer and extremely acid to strongly acid in the subsoil and substratum. The depth to bedrock is more than 60 inches.

Permeability is moderately rapid in the subsoil and substratum of the Lily soil. Available water capacity is low or moderate. Runoff is rapid. Natural fertility is low. Unless limed, the soil is extremely acid to strongly acid. The root zone of some plants is restricted by the bedrock at a depth of 20 to 40 inches.

Most areas are wooded. Many small areas are used for gardens, hay, or pasture. Some areas are used as homesites.

Because of the slope, these soils generally are unsuitable for cultivated crops and hay and cannot be easily managed for pasture. The hazard of erosion is severe or very severe in unprotected areas. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods and until the soil is firm help to maintain desirable grasses and legumes and control erosion.

The potential productivity of these soils for trees is moderately high. Most areas have stands of yellow-poplar, and some areas have stands of northern red oak, hickory, white oak, black locust, and American beech. Special management is needed to control erosion on roads and skid trails. Constructing the roads and skid trails on the contour helps to control erosion and sedimentation.

The slope of both soils and the depth to bedrock in the Lily soil are the main limitations affecting community development. Maintaining a plant cover on construction sites, establishing a plant cover in unprotected areas, and properly disposing of surface water can help to control erosion and sedimentation.

The capability subclass is VIe. The woodland productivity class is 5 on north aspects and 4 on south aspects.

Po—Potomac sandy loam. This soil is nearly level and somewhat excessively drained. It is on high flood plains along small streams in the southern part of the county. It is subject to rare flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. The substratum extends to a depth of at least 65 inches. The upper 8 inches is dark yellowish brown gravelly loamy sand, and the lower 50 inches is yellowish brown very gravelly loamy sand.

Included with this soil in mapping are a few small areas of the somewhat excessively drained Itmann soils; the well drained Chagrin, Kanawha, Pineville, and Sensabaugh soils; the moderately well drained Lobdell soils; and soils that are similar to the Potomac soil but do not have gravel in the surface layer or substratum. Also included are small areas of soils that are occasionally flooded, a few small areas of urban land, areas of Udorthents, and soils that have slopes of 3 to 8 percent. Included areas make up about 20 percent of this unit.

Permeability is rapid or very rapid in the substratum of the Potomac soil. Available water capacity is low or very low. Runoff is slow or medium. Natural fertility is low or medium. Unless limed, the soil is strongly acid to neutral. The depth to bedrock is more than 60 inches.

Many areas are wooded or are idle. Some areas are used for industrial or homesite development or for gardens.

The suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture. Droughtiness during dry periods is a major management concern. Growing cover crops, applying a system of conservation tillage, including hay in the cropping sequence, and working the residue from cover crops into the soil improve the available water capacity and help to maintain fertility and tilth. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods help to maintain desirable grasses and legumes.

This soil has limited suitability for gardens. It is well suited to early season crops, such as potatoes, cabbage, lettuce, and onions. Droughtiness during dry periods is the major limitation. Late spring frost is a problem because of poor air drainage.

The potential productivity of this soil for trees is moderately high. Most of the wooded areas support American sycamore and river birch. A few stands of yellow-poplar, American beech, and eastern hemlock are along the upper reaches of Pond Fork, Spruce Laurel Fork, and West Fork.

The hazard of flooding and the rapid or very rapid permeability in the substratum are the main limitations affecting community development. Establishing a plant cover in unprotected areas and properly disposing of surface water help to control stream scouring and sedimentation.

The capability subclass is IVs. The woodland productivity class is 5.

SeB—Sensabaugh-Lobdell loams, 2 to 8 percent slopes. These soils are nearly level and gently sloping and are well drained and moderately well drained. They are on bottom land. They are in narrow drainageways that are subject to rare flooding. The Sensabaugh soil is in gently sloping areas, and the Lobdell soil generally is on the slightly lower, more nearly level flood plains. This unit is about 45 percent Sensabaugh soil, 35 percent Lobdell soil, and 20 percent included soils. The soils in this unit occur as areas so intermingled that mapping them separately was not practical.

Typically, the surface layeı of the Sensabaugh soil is very dark grayish brown loam about 6 inches thick. The next 5 inches is brown gravelly loam. The subsoil is dark yellowish brown gravelly loam about 29 inches thick. The substratum to a depth of at least 65 inches is dark yellowish brown very gravelly loam. It has a few strong brown and pale brown mottles below a depth of 55 inches.

Typically, the surface layer of the Lobdell soil is dark brown loam about 8 inches thick. The subsoil is brown loam about 19 inches thick. It has light brownish gray and yellowish brown mottles in the lower part. The substratum to a depth of at least 65 inches is light brownish gray fine sandy loam and loam mottled with strong brown.

Included with these soils in mapping are a few areas of the somewhat excessively drained Potomac soils and the well drained Chagrin, Allegheny, Kanawha, and Pineville soils. Also included are a few areas of soils that are strongly acid or very strongly acid, areas of soils that are frequently flooded or occasionally flooded, and areas of poorly drained soils.

Permeability is moderate or moderately rapid in the subsoil and substratum of the Sensabaugh soil. Available water capacity is moderate or high. Runoff is medium. Natural fertility is medium or high. Unless limed, the soil is moderately acid to neutral. The depth to bedrock is more than 60 inches.

Permeability is moderate in the subsoil of the Lobdell soil and moderate or moderately rapid in the substratum. Available water capacity is high. Runoff is slow. Natural fertility is medium or high. Unless limed, the soil is strongly acid to slightly acid in the surface layer and subsoil and moderately acid or slightly acid in the substratum. A seasonal high water table 2.0 to 3.5 feet below the surface restricts the root zone of some plants. The depth to bedrock is more than 60 inches.

Many areas are used for homesite development or gardens. Some areas are used for hay, cultivated crops (fig. 10), or pasture. A few small areas are wooded or are idle.

These soils are suited to cultivated crops. Areas of the soils are long and narrow, however, and cannot be easily farmed. In some areas of the Lobdell soil, diversions are needed to intercept runoff from the higher areas. Applying a system of conservation tillage, using suitable crop rotations, delaying tillage until the soils are reasonably dry, and working the residue of cover crops into the soils help to maintain fertility and tilth. In pastured areas proper stocking rates, rotation grazing, and deferment of grazing during dry periods and until the soil is firm help to maintain desirable grasses and legumes.

These soils are suited to a variety of early season and late season garden crops. Late spring frost is a problem because of poor air drainage.

The potential productivity of these soils for trees is moderately high, but only a small acreage is wooded. Most of the wooded areas support yellow-poplar, American sycamore, and mixed oaks. The Lobdell soil may become soft during wet periods.

The hazard of flooding on both soils and the wetness of the Lobdell soil are the main limitations affecting community development. Establishing a plant cover in

Figure 10.—An area of Sensabaugh-Lobdell loams, 2 to 8 percent slopes, used for corn.

unprotected areas and properly disposing of surface water help to control erosion, stream scouring, and sedimentation.

The capability subclass is IIe. The woodland productivity class is 5.

SwF—Sewell very channery sandy loam, very steep, extremely stony. This soil is very deep and somewhat excessively drained. It is in areas that formerly were surface mined for coal. It generally is on mountaintops and side slopes in the southern and western parts of the county. Outslopes in areas of this soil generally are convex slopes that range from 35 to 80 percent. Some of the older areas of contour mines have vertical bedrock highwalls and narrow, nearly level benches. Stones and boulders cover 1 to 15 percent of the surface in most areas.

Typically, the surface layer is yellowish brown very channery sandy loam about 6 inches thick. The substratum extends to a depth of at least 65 inches. The upper 25 inches is strong brown very channery sandy loam, and the lower 34 inches is yellowish brown extremely channery sandy loam. About 90 percent of the rock fragments are sandstone, and 10 percent are siltstone and coal.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock, small areas of rubble land on outslopes, a few areas of the moderately deep Dekalb and Lily soils near the edges of outslopes and ridgetops, and a few areas of the very deep Pineville soils in coves. Also included are some small areas of the very deep Cedarcreek and Fiveblock soils on benches and outslopes and areas of sandy soils. Included areas make up about 30 percent of this unit.

Permeability is moderately rapid or rapid in the substratum of the Sewell soil. Available water capacity is very low to moderate. Runoff is slow or medium on the benches and very rapid on the outslopes. Natural fertility is low. Reaction is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas support grasses and legumes. Some of the older reclaimed areas support small trees, such as black locust, red maple, yellow-poplar, and sourwood.

Because of the slope and the stones and boulders on the surface, this soil is unsuitable for cultivated crops, hay, and pasture.

The potential productivity of this soil for trees is moderately high. In most areas the trees are young and are not of harvestable size. The soil is well suited to eastern white pine, Virginia pine, black locust, yellow-poplar, red maple, hybrid poplar, and paulownia. Planting adequate numbers of healthy seedlings at the proper time of the year helps to establish a desirable stand. The seedlings of some trees planted in established stands of grasses and legumes grow slowly. Constructing logging roads and skid trails on the contour and seeding and mulching disturbed areas help to control erosion. Access to some areas may be difficult because of very steep side slopes and some bedrock highwalls.

This soil has fair potential for woodland wildlife habitat. The variety of vegetation provides food and cover for wildlife. The small wet areas on benches help to provide water.

The slope, the stones and boulders, and the potential for differential seedling are the major limitations affecting community development.

The capability subclass is VIIs. The woodland productivity class is 4.

Ud—Udorthents, smoothed. These nearly level to very steep soils consist of mixed soil material and rock fragments in areas that have been excavated, graded, or filled. The soils generally are along the Big Coal River, the Little Coal River, Pond Fork, Spruce Laurel Fork, and U.S. Route 119.

These soils commonly are gray, brown, and yellow and generally are mottled. In most areas they are loamy, but in a few areas they are sandy. The depth to bedrock varies, but it generally is more than 60 inches in filled areas.

In a few areas these soils have limited suitability for pasture, but in most areas they are better suited to woodland or wildlife habitat. Onsite investigation and testing are necessary to determine the limitations and potential for most uses.

No capability class or woodland productivity class is assigned.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to food, feed, forage, fiber, and oilseed 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 and requires minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for food or fiber or must be available for those uses. Thus, urban or built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated 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 Soil Conservation Service.

A total of 8,795 acres in the county, or about 2.7 percent of the total acreage, is prime farmland. This land is mainly adjacent to the Big Coal River and the Little Coal River.

The map units that are considered prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

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

Dixie L. Shreve, state resource conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the county, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Some general principles of management apply to all of the soils in the county suitable for crops and pasture, although individual soils or groups of soils require different kinds of management. The general principles are described in the following paragraphs.

Most of the soils in the county have a moderate or low supply of basic plant nutrients. As a result, applications of lime and fertilizer are necessary. The amount to be applied depends on the kind of soil, the cropping history, the type of crop to be grown, and the desired level of yields and should be determined by the results of soil tests and analyses.

The content of organic matter is low in most cultivated soils. Increasing the content generally is not feasible. The content can be maintained, however, by adding farm manure, by returning crop residue to the soil, and by growing sod crops, cover crops, and green manure crops.

Tillage tends to break down soil structure. As a result, it should be kept to the minimum necessary to prepare a seedbed and control weeds. Maintaining the content of organic matter in the plow layer helps to maintain soil structure.

Runoff and erosion occur mainly while a cultivated crop is growing or soon after it has been harvested. If cultivated, all of the gently sloping and steeper soils are subject to erosion. A suitable cropping system that helps to control erosion is needed on these soils. The main management needs where such a system is applied are the proper crop rotation, conservation tillage, crop residue management, cover crops and green manure crops, and applications of lime and fertilizer. Other major erosion-control measures are contour farming, diversion of runoff, and grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another. Different combinations can be equally effective on the same soil.

Using the soils for pasture is effective in controlling erosion in most areas. A high level of pasture management, including applications of fertilizer, controlled grazing, and careful selection of pasture mixtures, is needed on some soils to provide enough ground cover to prevent excessive erosion. Grazing can be controlled by not allowing the plants to be grazed lower than 3 inches, by rotating the livestock from one pasture to another, and by providing rest periods, which allow for regrowth of the plants. On some soils the pasture species that require the least renovation are needed to maintain a good ground cover and to provide forage for grazing.

Many small areas in Boone County are used for home gardens. The soils that are best suited to garden crops are nearly level or gently sloping, are loamy, are moderately permeable, have a high available water capacity, and have less than 15 percent rock fragments in the surface layer. The pH should be between 6.0 and 7.0 for most garden plants. Most of the soils in the county are strongly acid to extremely acid and require applications of lime.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have slight limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, 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, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Charles L. Rowan, forester, Soil Conservation Service, helped prepare this section.

Virgin forest once covered almost all of the land in Boone County. Early settlers cleared the areas suitable for cultivation along the major streams. The vast majority of the forest land was cleared, however, when steam-driven sawmills and railroads became operative in the county between 1890 and 1930. Woodland now makes up about 297,700 acres, or more than 90 percent of the county *(5)*. Forest fires have been a serious problem in the county since the early days of lumbering. In recent years fire control has decreased the size of burned areas. The number of forest fires, however, has remained about the same.

Most of the forest land in the county has been cut over at least once. The second-growth timber is of low or average quality. The timber is sold for grade lumber. In many areas pole-sized timber is cut for mine props before the trees reach sawtimber size.

The oak-hickory commercial forest type makes up about 61 percent of the forest, the maple-beech-birch-cherry-ash-yellow-poplar type, 35 percent; other hardwoods, 3 percent; and the Virginia-shortleaf-pitch-white pine type and other softwood types, 1 percent *(8)*. The extent of yellow-poplar has increased considerably in the last 50 years, mainly as a result of regrowth on abandoned farmland. Surface mining, a major influence on forest land, has increased the extent of the pioneer species and decreased the extent of the climax species. Access for fire control has been improved in some remote areas because of the roads built to facilitate mining.

Thinning out the mature trees and removing the undesirable species can improve much of the existing commercial woodland. Culverts and water bars on haul roads, filter strips between haul roads and streams, protection from grazing, and control of fires, disease, and insects are needed to improve timber productivity and to control erosion.

Aspect affects the potential productivity of the more sloping soils. A north aspect faces any compass direction from 315 to 135 degrees. A south aspect faces any compass direction from 135 to 315 degrees. The soils on north aspects generally are moister than those on south aspects and have a higher site index. Aspect also affects the kind and number of tree species and the need for management practices.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species, such as northern red oak. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excess water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, a hardpan, or other restrictive layers; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or 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 and on the erosion factor K shown in table 16. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities. The proper construction and maintenance of roads, trails, landings, and fire lanes can reduce the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. If soil wetness is a factor, equipment use is restricted for a period of no more than 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment or the season of use. If soil wetness is a factor, equipment use is restricted for more than 3 months.Choosing the best suited equipment and deferring the use of harvesting equipment during wet periods help to overcome the equipment limitation.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil or topographic conditions. The factors considered 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, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary. Selection of special planting stock and special site preparation, such as bedding, furrowing, and a surface drainage system, can reduce the seedling mortality rate.

Plant competition ratings indicate the degree to which undesirable species are likely 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 of the soil. A rating of *slight* indicates that competition from unwanted plants is not likely to suppress the more desirable species or prevent their natural regeneration. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the natural regeneration of desirable species or of planted trees. 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 natural regeneration or restrict the growth of planted seedlings unless precautionary measures are applied. Adequate site preparation before the new crop is planted can help to control plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 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.

Average annual growth, which varies with stand rigor and other factors, is equal to the total volume growth at rotation divided by the rotation age. Yield data are calculated on the basis of site indices of natural stands at age 50 using the International ¼ Log Rule and standard rough cords. This information should be used for planning only.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public 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 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Gary A. Gwinn, state biologist, Soil Conservation Service, helped prepare this section.

More than 90 percent of Boone County is forested. The wildlife species that inhabit the county reflect this land use characteristic. The species adapted to woodland habitat, such as gray squirrel, gray fox, ruffed grouse, wood thrush, and red-eyed vireo, are commonly throughout the county. The species that prefer openland habitat, such as bobwhite quail and cottontail rabbit, are limited in number and distribution. Waterfowl and other species that depend on wetland habitat also are limited in number and distribution.

A well established population of white-tailed deer is throughout most of the county. Recently introduced turkeys are slowly becoming established, and another recently introduced species, the European wild boar, is thriving at the headwaters of Spruce Laurel Fork and Pond Fork. These three species as well as many others in Boone County would benefit from the development of additional quality openland habitat. Additional openings result in the creation of the "edge" habitat, or the transitional zone between major vegetative types, preferred by many types of wildlife.

Most of the openland habitat and edge habitat in Boone County are in or near surface-mined areas. Planned reclamation of such areas offers an excellent opportunity to create high-quality habitat that can increase both the numbers and kinds of wildlife in the county.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and 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, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggartick, aster, quackgrass, 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, yellow-poplar, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, mountainash, viburnum, 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, yew, redcedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerelweed, cordgrass, rushes, sedges, and cattails.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, 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, shore birds, muskrat, mink, beaver, and frogs.

Engineering

Michael M. Blaine, state conservation engineer, Soil Conservation Service, helped prepare this section.

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 kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to 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 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and 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, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for 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 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage 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 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help 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. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal 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 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for 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, 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, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to 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 or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

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 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under 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 *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter 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.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, 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 water movement 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,* more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter 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 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the 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 high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the estimated frequency of flooding. The frequency generally is expressed as *none, rare, occasional, common,* or *frequent*. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and 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 17 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 highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. 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.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors 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.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of two typical pedons in the survey area are given in table 18 and the results of chemical analysis in table 19. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(9)*.

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).

Cation-exchange capacity—sum of cations (5A3a).

Extractable bases—NH_4OAc, pH 7.0, automatic extractor, uncorrected (5B5a).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1f).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(7)*. 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 20 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 Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning light colored surface layer, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Dystrochrepts (*Dystr*, meaning low base saturation, plus *ochrept*, the suborder of the Inceptisols that has a light colored surface layer).

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 Dystrochrepts.

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 loamy-skeletal, mixed, mesic Typic Dystrochrepts.

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" *(6)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(7)*. 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."

Allegheny Series

The Allegheny series consists of very deep, well drained soils that formed in old alluvial material derived mostly from areas on uplands where the soils are underlain by sandstone and shale. The Allegheny soils are on terraces along the Big Coal River, the Little Coal River, Pond Fork, and Spruce Laurel Fork. Slope ranges from 3 to 8 percent.

Allegheny soils are near Chagrin, Kanawha, Lobdell, and Sensabaugh soils, all of which are subject to flooding. Lobdell soils are moderately well drained. Sensabaugh soils have a gravelly subsoil and a very gravelly substratum.

Typical pedon of Allegheny loam, 3 to 8 percent slopes, in an idle field; about 0.8 mile northwest of West Virginia Route 17 at Greenview:

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

BA—10 to 14 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

Bt—14 to 31 inches; yellowish brown (10YR 5/6) loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; clear wavy boundary.

BC—31 to 36 inches; yellowish brown (10YR 5/6) loam; moderate coarse subangular blocky structure; friable; about 5 percent gravel; strongly acid; gradual wavy boundary.

C1—36 to 46 inches; yellowish brown (10YR 5/4) loam; common light yellowish brown (2.5Y 6/4) and strong brown (7.5YR 5/8) mottles; massive; friable; about 10 percent gravel; strongly acid; clear wavy boundary.

C2—46 to 65 inches; light olive brown (2.5Y 5/4) loam; many strong brown (7.5YR 5/8) mottles; massive; friable; common medium black concretions; about 10 percent gravel; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. Rounded fragments of sandstone and shale make up 0 to 15 percent of the solum and 0 to 35 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout.

The Ap horizon has value of 3 or 4 and chroma of 2 to 4.

The BA and Bt horizons have hue of 7.5YR and 10YR, value of 4 or 5, and chroma of 4 to 8. The BA horizon is loam, and the Bt horizon is loam or clay loam in the fine-earth fraction. Both horizons have weak or moderate, fine to coarse subangular blocky structure.

The BC horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is loam or clay loam in the fine-earth fraction. Some pedons have a few gray mottles below a depth of 36 inches.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 8. It generally is mottled in shades of brown or gray. It is loam, fine sandy loam, or clay loam in the fine-earth fraction.

Berks Series

The Berks series consists of moderately deep, well drained soils that formed in material weathered from interbedded siltstone, shale, and fine grained sandstone. These soils are on side slopes and ridgetops throughout most of the county. Slope ranges from 35 to 80 percent.

Berks soils are associated on the landscape with the well drained Cedarcreek, Gilpin, Kaymine, Lily, and Shelocta soils and the moderately well drained Wharton soils. Berks soils are shallower over bedrock than Cedarcreek, Kaymine, Shelocta, Wharton, and Guyandotte soils and have a higher content of rock fragments in the subsoil than Gilpin and Lily soils.

Typical pedon of Berks very channery loam, in a wooded area of Berks-Shelocta association, very steep, extremely stony; about 350 yards southwest of the intersection of Low Gap Road and U.S. Route 119:

Oe—1 inch to 0; decomposed hardwood leaf litter.

A—0 to 2 inches; dark brown (10YR 3/3) very channery loam; weak fine granular structure; very friable; many fine roots; about 40 percent rock fragments; extremely acid; abrupt smooth boundary.

BA—2 to 6 inches; yellowish brown (10YR 5/4) very channery loam; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; about 45 percent rock fragments; extremely acid; clear wavy boundary.

Bw—6 to 16 inches; yellowish brown (10YR 5/6) very channery silt loam; weak medium subangular blocky structure; friable; common very fine roots; about 60 percent rock fragments; very strongly acid; clear wavy boundary.

BC—16 to 23 inches; yellowish brown (10YR 5/6) extremely channery silt loam; weak medium subangular blocky structure; firm; few very fine roots; about 75 percent rock fragments; very strongly acid; abrupt wavy boundary.

R—23 inches; fractured, gray and brown siltstone.

The thickness of the solum ranges from 18 to 40 inches. The depth to bedrock ranges from 20 to 40 inches. Fragments of siltstone, fine grained sandstone, and shale make up 10 to 35 percent of the A horizon, 15 to 75 percent of individual subhorizons of the B horizon, and 35 to 90 percent of the C horizon. The average content of rock fragments in the control section is 35 to 60 percent. The soils are extremely acid to slightly acid in the A horizon and extremely acid to moderately acid in the B and C horizons.

The A horizon has value of 3 or 4 and chroma of 2 or 3.

The BA, Bw, and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. In the fine-earth fraction, they are loam or silt loam. They have weak or moderate, fine or medium subangular blocky structure. They are friable or firm.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. In the fine-earth fraction, it is loam or silt loam. It is friable or firm.

Cedarcreek Series

The Cedarcreek series consists of very deep, well drained soils that formed in material partially weathered from sandstone, siltstone, shale, and some coal in surface-mined areas. These soils are on ridgetops, benches, and side slopes throughout the county. Slope ranges from 3 to 80 percent.

Cedarcreek soils are associated on the landscape with the well drained Berks, Dekalb, Gilpin, Kaymine, and Pineville soils and the somewhat excessively drained Fiveblock, Itmann, and Sewell soils. Cedarcreek soils are deeper than Berks, Dekalb, and Gilpin soils, are more acid than Fiveblock and Kaymine soils, contain more clay in the substratum than Itmann and Sewell soils, and have a higher content of rock fragments in the solum than Pineville soils.

Typical pedon of Cedarcreek very channery loam, in a wooded area of Cedarcreek-Rock outcrop complex, very steep, extremely stony; about 3.2 miles northeast of U.S. Route 119 at the Little Hewitt Creek exit:

A—0 to 3 inches; brown (10YR 4/3) very channery loam; moderate fine granular structure; friable; many fine and medium roots; about 50 percent channers and stones (60 percent sandstone and 40 percent siltstone); strongly acid; clear wavy boundary.

C1—3 to 20 inches; mixed yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) very channery loam; few yellow, brown, and gray lithochromic mottles; massive; friable; few fine and very fine roots; about 40 percent channers and stones (40 percent sandstone, 55 percent siltstone, and 5 percent coal); very strongly acid; gradual wavy boundary.

C2—20 to 38 inches; mixed yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) very channery loam; few yellow, gray, and brown lithochromic mottles; massive; friable; about 50 percent channers and stones (40 percent sandstone, 55 percent siltstone, and 5 percent coal); very strongly acid; gradual wavy boundary.

C3—38 to 65 inches; mixed yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) very channery loam; few brown and gray lithochromic mottles; massive; friable; about 50 percent channers and stones (60 percent sandstone, 35 percent siltstone, and 5 percent coal); very strongly acid.

The depth to bedrock is more than 60 inches. Unless the surface layer has been limed, reaction ranges from extremely acid to strongly acid throughout the profile. The content of rock fragments ranges from 35 to 80 percent, by volume, throughout the profile. The rock fragments are sandstone, siltstone, shale, and coal. The percentage of each is less than 65 percent of the total content of rock fragments in the control section. The fragments are mostly channers, but some are stones and a few are boulders. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon is neutral in hue or has hue of 7.5YR to 5Y, value of 2 to 5, and chroma of 1 to 6. It is friable or very friable. In some pedons this horizon consists of soil material that was stockpiled and then spread over the surface. In these pedons the horizon is 4 to 20 inches thick and has 10 to 35 percent channers.

The C horizon is neutral in hue or has hue of 7.5YR to 5Y, value of 2 to 6, and chroma of 1 to 8. In the fine-earth fraction, it is dominantly loam or silt loam, but in some pedons it is sandy loam. It is friable to very firm.

Chagrin Series

The Chagrin series consists of very deep, well drained soils that formed in alluvial material washed from areas on uplands where the soils are underlain by sandstone and shale. The Chagrin soils are on low flood plains along the Big Coal and Little Coal Rivers and their tributaries. They are occasionally flooded. Slope ranges from 0 to 3 percent.

Chagrin soils are near the well drained Allegheny, Kanawha, and Sensabaugh soils; the moderately well drained Lobdell soils; and the somewhat excessively drained Potomac soils. Chagrin soils are more frequently flooded than Kanawha, Potomac, and Sensabaugh soils. They do not have an argillic horizon, which typifies Allegheny and Kanawha soils.

Typical pedon of Chagrin fine sandy loam, in a home garden about 150 feet west of West Virginia Route 17; about 0.3 mile north of Greenview:

Ap—0 to 10 inches; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; many fine and very fine roots; about 5 percent gravel; moderately acid; abrupt smooth boundary.

Bw1—10 to 24 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak fine subangular blocky structure; very friable; few fine and very fine roots; about 5 percent gravel; moderately acid; clear wavy boundary.

Bw2—24 to 33 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; few fine and medium roots; moderately acid; clear wavy boundary.

C1—33 to 48 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; friable; moderately acid; clear wavy boundary.

C2—48 to 65 inches; dark yellowish brown (10YR 4/4), stratified fine sandy loam and loamy fine sand; massive; very friable; moderately acid.

The thickness of the solum ranges from 24 to 48 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 10 percent in the solum and from 0 to 15 percent in the C horizon. In unlimed areas the soils are moderately acid to neutral throughout.

The A horizon has value of 3 or 4 and chroma of 2 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. In the fine-earth fraction, it is fine sandy loam, loam, or sandy loam. It has weak or moderate, medium or coarse subangular blocky structure. It is friable or very friable.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. In the fine-earth fraction, it is dominantly sandy loam, fine sandy loam, or loam. Below a depth of 40 inches, however, it generally is stratified with loamy fine sand. It may have high- and low-chroma mottles below a depth of 48 inches. It is friable or very friable.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in material weathered from sandstone and some interbedded siltstone and shale. These soils are on ridgetops and side slopes throughout the county. Slope ranges from 15 to 80 percent.

Dekalb soils are associated on the landscape with the well drained Cedarcreek, Guyandotte, Kaymine, Lily, and Pineville soils and the somewhat excessively drained Fiveblock and Sewell soils. Dekalb soils are shallower than Cedarcreek, Guyandotte, Kaymine, Pineville, Fiveblock, and Sewell soils and have a higher content of rock fragments in the subsoil than Lily and Pineville soils.

Typical pedon of Dekalb channery sandy loam, in a wooded area of Dekalb-Pineville-Guyandotte association, very steep, extremely stony; about 2.2 miles southwest of West Virginia Route 85 at Cazy:

Oi—2 inches to 1 inch; loose hardwood leaf litter.

Oe—1 inch to 0; partially decomposed hardwood leaf litter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 20 percent rock fragments; strongly acid; clear wavy boundary.

BA—3 to 9 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak medium subangular blocky structure; friable; many medium and coarse roots; about 45 percent rock fragments; strongly acid; clear wavy boundary.

Bw—9 to 19 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 40 percent rock fragments; strongly acid; clear wavy boundary.

BC—19 to 24 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine and medium subangular blocky structure; friable; common fine roots; about 55 percent rock fragments; very strongly acid; clear wavy boundary.

R—24 inches; hard, brown sandstone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Rock fragments make up 10 to 60 percent of individual horizons in the solum and 50 to 90 percent of the C horizon. The soils are extremely acid to slightly acid in the A horizon and extremely acid to strongly acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

Some pedons have a thin E horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. In the fine-earth fraction, it is sandy loam or loam. It has weak or moderate, fine or very fine granular structure.

The BA, Bw, and BC horizons have hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 4 to 8. In the fine-earth fraction, they are sandy loam, loam, or fine sandy loam. They have weak, fine to coarse subangular blocky structure. They are friable or very friable.

Some pedons have a C horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. In the fine-earth fraction, it is sandy loam or loamy sand. It is friable or very friable.

Fiveblock Series

The Fiveblock series consists of very deep, somewhat excessively drained soils that formed in material partially weathered from acid sandstone and some siltstone, shale, and coal in surface-mined areas. These soils are on ridgetops, mainly along Cherry Pond Mountain. Slope ranges from 35 to 80 percent.

Fiveblock soils are associated on the landscape with the well drained Cedarcreek, Dekalb, Guyandotte, Kaymine, and Lily soils and the somewhat excessively drained Sewell soils. Fiveblock soils are less acid than Cedarcreek, Dekalb, Guyandotte, Lily, and Sewell soils and are deeper than Dekalb, Gilpin, and Lily soils. They contain more sand in the textural control section than Cedarcreek and Kaymine soils.

Typical pedon of Fiveblock very channery sandy loam, very steep, extremely stony, in an area of grasses and legumes about 4.0 miles southeast of Lindytown; about 300 feet south of Bailey cemetery:

A—0 to 4 inches; dark brown (10YR 3/3) very channery sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 50 percent stones, channers, and boulders (95 percent sandstone and 5 percent coal); mildly alkaline; clear smooth boundary.

C1—4 to 14 inches; dark grayish brown (10YR 4/2) extremely channery sandy loam; common yellow and brown lithochromic mottles; single grain; very friable; common fine roots; about 60 percent stones, channers, and boulders (95 percent sandstone and 5 percent coal); mildly alkaline; gradual wavy boundary.

C2—14 to 65 inches; brown (10YR 4/3) extremely channery sandy loam that has zones of loamy sand; common yellow and brown lithochromic mottles; single grain; very friable; about 75 percent stones, channers, and boulders (90 percent sandstone and 10 percent siltstone); mildly alkaline.

The depth to bedrock is more than 60 inches. Reaction generally ranges from moderately acid to mildly alkaline throughout the profile. The surface layer generally is very strongly acid or strongly acid, however, where it consists of the original soil material that was stockpiled during mining. The content of rock fragments ranges from 35 to 80 percent, by volume, throughout the profile. The rock fragments are 65 percent or more gray, neutral sandstone and small amounts of siltstone, shale, and coal. They are mostly channers, but some are stones or boulders. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4.

The C horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 to 6. In the fine-earth fraction, it is dominantly sandy loam but has zones of loamy sand. It is friable or very friable.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in material weathered from interbedded shale, siltstone, and sandstone. These soils are on ridgetops throughout the northern half of the county. Slope ranges from 15 to 35 percent.

Gilpin soils are associated on the landscape with the well drained Berks, Cedarcreek, Dekalb, Kaymine, Lily, Pineville, and Shelocta soils and the moderately well drained Wharton soils. Gilpin soils have a lower content of rock fragments in the subsoil than Berks and Dekalb soils and have more silt in the Bt horizon than Lily soils. They are shallower over bedrock than Cedarcreek, Kaymine, Pineville, Shelocta, and Wharton soils.

Typical pedon of Gilpin silt loam, in a wooded area of Gilpin-Wharton silt loams, 15 to 35 percent slopes; about 1 mile northeast of Joes Creek; about 5 miles southeast of West Virginia Route 3 at Comfort:

A—0 to 1 inch; dark brown (10YR 3/3) silt loam; moderate medium granular structure; very friable; common fine and very fine roots; about 10 percent rock fragments; very strongly acid; abrupt smooth boundary.

E—1 to 5 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 10 percent rock fragments; very strongly acid; clear wavy boundary.

Bt—5 to 23 inches; strong brown (7.5YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common faint clay films on faces of peds; few fine and medium roots; about 15 percent rock fragments; very strongly acid; clear wavy boundary.

BC—23 to 30 inches; yellowish brown (10YR 5/6) channery silt loam; weak medium and coarse subangular blocky structure; friable; few faint clay films on faces of peds; few fine roots; about 25 percent rock fragments; strongly acid; clear wavy boundary.

C—30 to 36 inches; yellowish brown (10YR 5/6) very channery silty clay loam; few faint strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; massive; friable; few or common clay films on faces of rock fragments; few fine roots; about 35 percent

rock fragments; very strongly acid; gradual wavy boundary.
R—36 inches; fractured, hard, brown, fine grained sandstone.

The thickness of the solum ranges from 18 to 36 inches. The depth to bedrock ranges from 20 to 40 inches. Fragments of siltstone, shale, and sandstone make up 5 to 40 percent of individual horizons in the solum and 30 to 90 percent of the C horizon. In unlimed areas the soils are very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4.

The E horizon has weak or moderate, fine or medium subangular blocky structure.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. In the fine-earth fraction, they are silt loam or silty clay loam. The Bt horizon has moderate or strong, fine or medium subangular blocky structure. It is friable or firm. The BC horizon has weak or moderate, medium or coarse subangular blocky structure. It is friable or firm.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. In the fine-earth fraction, it is silty clay loam or silt loam. It is friable or firm. Some pedons have strong brown or pale brown mottles above the bedrock.

Guyandotte Series

The Guyandotte series consists of very deep, well drained soils that formed in colluvial material that moved downslope from areas on uplands where the soils are underlain mostly by sandstone and some siltstone. The Guyandotte soils are on north-facing side slopes and in coves. Slope ranges from 35 to 80 percent.

Guyandotte soils are associated on the landscape with the well drained Dekalb, Fiveblock, Kaymine, Lily, and Pineville soils. Guyandotte soils have a surface layer that is thicker and darker than that of all the associated soils.

Typical pedon of Guyandotte channery loam, in a wooded area of Dekalb-Pineville-Guyandotte association, very steep, extremely stony; about 2.5 miles southwest of West Virginia Route 85 at Cazy:

Oi—1 inch to 0; slightly decomposed yellow-poplar leaves.
A1—0 to 3 inches; very dark brown (10YR 2/2) channery loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; very friable; many fine, medium, and coarse roots; about 25 percent channers and stones; slightly acid; clear smooth boundary.
A2—3 to 10 inches; very dark grayish brown (10YR 3/2) channery loam, dark brown (10YR 3/3) dry; weak fine granular structure; very friable; many fine, medium, and coarse roots; about 25 percent channers and stones; slightly acid; clear smooth boundary.
BA—10 to 19 inches; brown (10YR 4/3) very channery loam; weak fine subangular blocky structure; friable; common fine, medium, and coarse roots; about 40 percent channers and stones; moderately acid; clear wavy boundary.
Bw1—19 to 38 inches; dark yellowish brown (10YR 4/4) very channery loam; weak medium subangular blocky structure; friable; about 55 percent rock fragments; strongly acid; gradual wavy boundary.
Bw2—38 to 65 inches; dark yellowish brown (10YR 4/4) very channery loam; weak coarse subangular blocky structure; friable; about 50 percent rock fragments; strongly acid.

The thickness of the solum ranges from 50 to more than 70 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 15 to 70 percent in individual horizons, but it averages 35 percent or more in the control section. Reaction is very strongly acid to neutral in the A horizon and very strongly acid to moderately acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is 10 to 17 inches thick.

The BA, Bw, and BC horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. In the fine-earth fraction, they are sandy loam or loam. They have weak or moderate, fine to coarse subangular blocky structure. They are friable or firm. In some pedons the lower part of the B horizon has few thin silt or clay films on rock fragments.

The C horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In the fine-earth fraction, it is loam or sandy loam. It is firm or very firm.

Itmann Series

The Itmann series consists of very deep, somewhat excessively drained soils that formed in material weathered mainly from coal and high-carbon shale and from small amounts of siltstone and sandstone. These soils are on side slopes and in valleys near coal mines or coal-cleaning plants. Slope ranges from 3 to 80 percent. It is dominantly 5 to 80 percent.

Itmann soils are associated on the landscape with the well drained Cedarcreek, Dekalb, Kaymine, Guyandotte, and Pineville soils. Itmann soils have less clay than the associated soils and are darker in the substratum.

Typical pedon of Itmann extremely channery sandy loam, very steep; in a barren area about 0.35 mile southeast of the confluence of Spruce Laurel Fork and Skin Poplar Branch; about 2.0 miles south of Stark:

A—0 to 3 inches; black (N 2/0) extremely channery sandy loam; weak medium granular structure; loose; about 60 percent channers (45 percent carbolith, 35 percent siltstone, and 20 percent sandstone); extremely acid; clear wavy boundary.

C1—3 to 12 inches; black (N 2/0) extremely channery loam; single grain; loose; about 75 percent channers (40 percent carbolith, 50 percent siltstone, and 10 percent sandstone); extremely acid; clear wavy boundary.

C2—12 to 65 inches; black (N 2/0) extremely channery sandy loam; massive; friable; about 80 percent channers (55 percent carbolith, 35 percent siltstone, 5 percent sandstone, and 5 percent shale); common olive (5Y 5/4) coatings on channers; extremely acid.

The depth to bedrock is more than 60 inches. The content of carbolith, siltstone, sandstone, and shale channers ranges from 35 to 80 percent throughout the profile. Carbolith fragments make up more than 50 percent of the total content of rock fragments in the control section. Unless the surface layer has been limed, reaction ranges from extremely acid to strongly acid throughout the profile.

The A horizon is neutral in hue or has hue of 10YR. It generally has value of 2 or 3 and chroma of 1 or 2. In the fine-earth fraction, it is dominantly sandy loam. In some pedons this horizon consists of soil material that was stockpiled and then spread over the surface. In these pedons the horizon is 6 to 20 inches thick, has 10 to 35 percent channers, has value of 4 or 5 and chroma of 3 to 6, and is loam in the fine-earth fraction.

The C horizon is neutral in hue or has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. In the fine-earth fraction, it is dominantly sandy loam or loam, but it has thin layers or pockets of loamy sand or silt loam in some pedons. It is loose to firm.

Kanawha Series

The Kanawha series consists of very deep, well drained soils that formed in alluvial material derived mostly from areas on uplands where the soils are underlain by sandstone and shale. The Kanawha soils are on high bottom land along the Big Coal River, the Little Coal River, and Spruce Laurel Fork. They are subject to rare flooding. Slope ranges from 0 to 3 percent.

Kanawha soils are associated on the landscape with the well drained Allegheny, Chagrin, and Sensabaugh soils; the somewhat excessively drained Potomac soils; and the moderately well drained Lobdell soils. Allegheny soils are not subject to flooding, and Chagrin soils are occasionally flooded. Kanawha soils contain less gravel in the subsoil and substratum than Potomac and Sensabaugh soils.

Typical pedon of Kanawha loam, in a field of hay about 1,500 feet west of U.S. Route 119 in Julian; about 200 feet southwest of the Little Coal River:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium granular structure; very friable; many fine and medium roots; neutral; abrupt smooth boundary.

BA—10 to 14 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; common fine and medium roots; moderately acid; clear wavy boundary.

Bt1—14 to 28 inches; yellowish brown (10YR 5/4) loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—28 to 42 inches; yellowish brown (10YR 5/4) loam; moderate medium and coarse subangular blocky structure; friable; about 5 percent gravel; moderately acid; gradual wavy boundary.

BC—42 to 54 inches; yellowish brown (10YR 5/4) fine sandy loam; common very pale brown (10YR 7/3) mottles; weak medium subangular blocky structure; friable; moderately acid; gradual wavy boundary.

C—54 to 65 inches; yellowish brown (10YR 5/4) fine sandy loam; many light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; massive; friable; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 72 inches. Rounded fragments of sandstone and shale make up 0 to 10 percent of the solum and 0 to 20 percent of the C horizon. In unlimed areas the soils are strongly acid or moderately acid in the A and BA horizons and in the upper part of the Bt horizon and moderately acid to neutral in the lower part of the Bt horizon and in the BC and C horizons.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. In the fine-earth fraction, they are loam, fine sandy loam, or silt loam.

They have weak or moderate, fine, medium, or coarse subangular blocky structure.

The BC horizon has hue of 7.5YR to 10YR, value of 5, and chroma of 3 to 6. In the fine-earth fraction, it is loam or fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6 and may have high- and low-chroma mottles. It is dominantly fine sandy loam or loam, but in some pedons it has strata of loamy sand.

Kaymine Series

The Kaymine series consists of very deep, well drained soils that formed in material partially weathered from siltstone, sandstone, shale, and some coal in surface-mined areas. These soils are on benches and side slopes throughout the county. Slope ranges from 3 to 80 percent. It is dominantly 35 to 80 percent.

Kaymine soils are associated on the landscape with the well drained Berks, Cedarcreek, Dekalb, Guyandotte, Pineville, and Shelocta soils and the somewhat excessively drained Fiveblock and Itmann soils. Kaymine soils are deeper than Berks and Dekalb soils and contain less sand in the substratum than Fiveblock soils. They are less acid in the control section than Berks, Cedarcreek, Dekalb, Itmann, Pineville, and Shelocta soils.

Typical pedon of Kaymine very channery loam, in an area of area of grasses and legumes in the Kaymine-Rock outcrop complex, very steep, extremely stony; about 2.3 miles northwest of the junction of Rock Creek and West Virginia Route 3; about 1.0 mile northeast of the confluence of Bragg Fork and Big Horse Creek:

A—0 to 5 inches; dark gray (10YR 4/1) very channery loam; weak fine granular structure; very friable; many fine and very fine roots; about 45 percent channers and stones (60 percent siltstone, 30 percent sandstone, and 10 percent coal); neutral; clear smooth boundary.

C1—5 to 24 inches; dark gray (10YR 4/1) extremely channery loam; massive; friable; common fine and very fine roots; about 65 percent channers and stones (60 percent siltstone, 30 percent sandstone, and 10 percent coal); mildly alkaline; gradual wavy boundary.

C2—24 to 65 inches; dark gray (10YR 4/1) extremely channery loam; massive; friable; few fine and very fine roots to a depth of 30 inches; about 70 percent channers and stones (60 percent siltstone, 35 percent sandstone, and 5 percent coal); neutral.

The depth to bedrock is more than 60 inches. Reaction ranges from moderately acid to mildly alkaline throughout the profile. The content of rock fragments ranges from 35 to 80 percent, by volume, throughout the profile. The rock fragments are siltstone, sandstone, shale, and coal. The percentage of each is less than 65 percent of the total content of rock fragments in the control section. The fragments are mostly channers, but some are stones and a few are boulders. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon has hue of 7.5YR or 10YR and generally has value of 3 to 5 and chroma of 1 to 4. In some pedons this horizon consists of soil material that was stockpiled and then spread over the surface. In these pedons the horizon is 4 to 20 inches thick, has 10 to 35 percent channers, and has value of 5 or 6 and chroma of 4 to 8. This horizon is very friable or friable.

The C horizon has hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 8. In the fine-earth fraction, it is loam or silt loam. It is friable or firm.

Lily Series

The Lily series consists of moderately deep, well drained soils that formed in material weathered from sandstone and some interbedded siltstone. These soils are on ridgetops in the southern half of the county and on side slopes throughout the county. Slope ranges from 15 to 35 percent.

Lily soils are associated on the landscape with the well drained Dekalb, Guyandotte, and Pineville soils and the somewhat excessively drained Fiveblock and Sewell soils. Lily soils are shallower over bedrock than Guyandotte, Pineville, Fiveblock, and Sewell soils and have a lower content of rock fragments in the control section than Dekalb soils.

Typical pedon of Lily loam, in a wooded area of Lily-Dekalb complex, 15 to 35 percent slopes; about 2 miles southwest of West Virginia Route 85 at Cazy:

Oe—1 inch to 0; decomposed hardwood leaf litter.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; many fine, medium, and large roots; about 10 percent rock fragments; very strongly acid; abrupt smooth boundary.

BA—4 to 14 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine subangular blocky structure; friable; common fine, medium, and large roots; about 20 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—14 to 23 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; about 20 percent rock fragments; few clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—23 to 30 inches; yellowish brown (10YR 5/8) channery loam; moderate medium subangular blocky structure; friable; few fine and medium roots; about 30 percent rock fragments; common clay films on faces of peds; strongly acid; gradual wavy boundary.
R—30 inches; hard, brown sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Fragments of siltstone and sandstone make up 0 to 30 percent of individual horizons in the solum and 10 to 35 percent of the C horizon. In unlimed areas the soils are extremely acid to strongly acid throughout. Some pedons have high- and low-chroma mottles directly above the bedrock.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. In the fine-earth fraction, they are loam, sandy clay loam, or clay loam. They have weak or moderate, fine or medium subangular blocky structure. They are friable or firm.

Some pedons have a C horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. In the fine-earth fraction, it is loam, clay loam, or sandy loam. It is friable or firm.

Lobdell Series

The Lobdell series consists of very deep, moderately well drained soils that formed in loamy alluvial material washed from areas on uplands where the soils are underlain by siltstone and sandstone. The Lobdell soils are on high flood plains along small streams in the northern half of the county. Slope is 2 to 3 percent.

Lobdell soils are associated on the landscape with the well drained Sensabaugh soils. They are near the well drained Allegheny, Chagrin, and Kanawha soils and the somewhat excessively drained Potomac soils.

Typical pedon of Lobdell loam, in a cropped area of Sensabaugh-Lobdell loams, 2 to 8 percent slopes; about 500 feet west of West Virginia Route 17; about 0.8 mile south of Powell Creek:

Ap—0 to 8 inches; dark brown (10YR 3/3) loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; many fine and medium roots; moderately acid; abrupt smooth boundary.
Bw—8 to 22 inches; brown (10YR 5/3) loam; few fine pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; moderately acid; clear wavy boundary.
BC—22 to 27 inches; brown (10YR 5/3) loam; common fine yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; moderately acid; gradual wavy boundary.
Cg1—27 to 38 inches; light brownish gray (2.5Y 6/2) fine sandy loam; many medium strong brown (7.5YR 5/8) mottles; massive; friable; moderately acid; gradual wavy boundary.
Cg2—38 to 65 inches; light brownish gray (2.5Y 6/2) loam; many medium and coarse strong brown (7.5YR 5/8) mottles; massive; friable; common medium black concretions; moderately acid.

The thickness of the solum ranges from 24 to 50 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 5 percent in the A horizon and from 0 to 10 percent in the B and C horizons. In unlimed areas the soils are strongly acid to slightly acid in the A and B horizons and moderately acid or slightly acid in the C horizon.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The Bw and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. Low-chroma mottles are at a depth of 15 to 24 inches. In the fine-earth fraction, these horizons are loam or fine sandy loam. The Bw horizon has weak, medium or coarse subangular blocky structure.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 8. In the fine-earth fraction, it is dominantly loam or fine sandy loam, but some pedons are stratified with sandy loam, loamy sand, or fine sand below a depth of 40 inches.

Pineville Series

The Pineville series consists of very deep, well drained soils that formed in acid colluvial material that moved downslope from areas on uplands where the soils are underlain by sandstone, siltstone, and shale. The Pineville soils are in mountain coves, on the lower side slopes, and on foot slopes. Slope ranges from 15 to 35 percent on foot slopes and from 35 to 80 percent on side slopes and in coves.

Pineville soils are associated on the landscape with Cedarcreek, Dekalb, Kaymine, Guyandotte, and Lily soils. Pineville soils are deeper over bedrock than Dekalb and Lily soils. They have a lower content of rock fragments in the control section than Cedarcreek, Guyandotte, and Kaymine soils.

Typical pedon of Pineville very channery loam, in a wooded area of Dekalb-Pineville-Guyandotte association, very steep, extremely stony; about 300 yards east of the intersection of U.S. Route 119 and Armco Road:

Oi—1 inch to 0; slightly decomposed oak and yellow-poplar leaves.

A—0 to 3 inches; dark brown (10YR 3/3) very channery loam; moderate fine granular structure; very friable; many fine and medium roots; about 50 percent rock fragments; extremely acid; abrupt wavy boundary.

BA—3 to 10 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; many fine and medium roots; about 30 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; few discontinuous clay fines on faces of peds and in pores; about 25 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—20 to 33 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; many discontinuous clay films on faces of peds and in pores; about 20 percent rock fragments; very strongly acid; gradual wavy boundary.

Bt3—33 to 46 inches; yellowish brown (10YR 5/6) channery loam; weak medium subangular blocky structure; friable; few fine and very fine roots; many discontinuous clay films on faces of peds and in pores; about 25 percent rock fragments; very strongly acid; gradual wavy boundary.

BC—46 to 58 inches; brownish yellow (10YR 6/6) very channery loam; weak medium and coarse subangular blocky structure; friable; few fine and medium roots; few discontinuous clay films in pores; about 45 percent rock fragments; very strongly acid; gradual wavy boundary.

C—58 to 65 inches; brownish yellow (10YR 6/6) very channery loam; few faint strong brown (7.5YR 5/6) mottles and black (10YR 2/1) concretions; massive; firm; about 45 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 10 to 60 percent in individual horizons, but it averages 15 to 35 percent in the control section. Reaction is extremely acid to neutral in the A horizon and extremely acid to strongly acid in the B and C horizons.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. It is very friable or friable.

The BA, Bt, and BC horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. In the fine-earth fraction, they are loam, clay loam, or sandy loam. They have weak or moderate, fine to coarse subangular blocky structure. They are friable or firm.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. In the fine-earth fraction, it is loam, sandy loam, or clay loam. It is firm or friable. In some pedons it has brown, yellow, or gray mottles.

Potomac Series

The Potomac series consists of very deep, somewhat excessively drained soils that formed in alluvial material washed from upland soils underlain by sandstone, siltstone, and shale. The Potomac soils are on flood plains along small streams throughout the county. They are subject to rare flooding. Slope ranges from 0 to 3 percent.

Potomac soils are associated on the landscape with the well drained Chagrin, Kanawha, Pineville, and Sensabaugh soils and the moderately well drained Lobdell soils. Potomac soils contain more gravel in the control section than all of the associated soils.

Typical pedon of Potomac sandy loam; in a wooded area about 50 feet southwest of West Fork; about 3.5 miles southeast of Twilight:

Ap—0 to 7 inches; dark brown (10YR 3/3) sandy loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; very friable; many fine and medium roots; about 5 percent gravel; strongly acid; clear smooth boundary.

C1—7 to 15 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand; single grain; loose; common fine and medium roots; about 30 percent gravel; moderately acid; gradual wavy boundary.

C2—15 to 65 inches; yellowish brown (10YR 5/4) very gravelly loamy sand; single grain; loose; few fine and medium roots; about 55 percent rock fragments (30 percent gravel and 25 percent cobbles); moderately acid.

The depth to bedrock is more than 60 inches. The content of gravel and cobbles, dominantly sandstone, ranges from 0 to 50 percent in the A horizon and from 35 to 70 percent in the C horizon. In unlimed areas the soils are strongly acid to neutral throughout.

The A horizon has hue of 7.5YR or 10YR and value and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. In the fine-earth fraction, it is dominantly loamy sand or sand, but it has subhorizons of sandy loam or gravelly sandy loam in some pedons. It is very friable or loose.

Sensabaugh Series

The Sensabaugh series consists of very deep, well drained soils that formed in alluvial material and in some colluvial material washed from areas on uplands where the soils are underlain by sandstone and shale. The Sensabaugh soils are on high flood plains and alluvial fans along small streams and intermittent drainageways, mainly in the eastern part of the county. They are subject to rare flooding. Slope ranges from 2 to 8 percent.

Sensabaugh soils are associated on the landscape with the well drained Allegheny, Chagrin, and Kanawha soils; the somewhat excessively drained Potomac soils; and the moderately well drained Lobdell soils. Sensabaugh soils do not have an argillic horizon, which typifies Allegheny and Kanawha soils. Chagrin soils are occasionally flooded. Sensabaugh soils have less gravel in the substratum than Potomac soils.

Typical pedon of Sensabaugh loam, in a cropped area of Sensabaugh-Lobdell loams, 2 to 8 percent slopes; about 0.5 mile southeast of U.S. Route 119 on Dog Fork Road; about 100 feet north of Dog Fork:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; many fine and very fine roots; about 10 percent gravel; neutral; abrupt smooth boundary.

AB—6 to 11 inches; brown (10YR 4/3) gravelly loam; weak fine subangular blocky structure; very friable; common fine and medium roots; about 20 percent gravel; neutral; clear wavy boundary.

Bw—11 to 26 inches; dark yellowish brown (10YR 4/6) gravelly loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; about 15 percent gravel; slightly acid; clear wavy boundary.

BC—26 to 40 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak coarse subangular blocky structure; friable; about 25 percent gravel; slightly acid; clear wavy boundary.

C1—40 to 55 inches; dark yellowish brown (10YR 4/4) very gravelly loam; massive; friable; about 40 percent gravel; moderately acid; gradual wavy boundary.

C2—55 to 65 inches; dark yellowish brown (10YR 4/4) very gravelly loam; few fine strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; massive; friable; about 50 percent gravel; moderately acid.

The thickness of the solum ranges from 24 to 48 inches. The depth to bedrock is more than 60 inches. The content of gravel ranges from 5 to 25 percent in the A horizon, from 15 to 40 percent in individual subhorizons of the B horizon, and from 15 to 60 percent in the C horizon. In the control section it averages 15 to 35 percent, by volume. In unlimed areas the soils are moderately acid to neutral throughout.

The A and AB horizons have value of 3 or 4 and chroma of 2 or 3. When dry, they have value of 6.

The Bw and BC horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They may be mottled in shades of gray, brown, or yellow below a depth of about 24 inches. In the fine-earth fraction, they are loam, silt loam, or clay loam. They have weak or moderate, medium or coarse subangular blocky structure.

The C horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is fine sandy loam, loam, silt loam, or clay loam. It may have few or common high- and low-chroma mottles.

Sewell Series

The Sewell series consists of very deep, somewhat excessively drained soils that formed mostly in material partially weathered from sandstone and some siltstone, shale, and coal in surface-mined areas. These soils are on ridgetops and contour surface mines in the western part of the county. Slope ranges from 35 to 80 percent.

Sewell soils are associated on the landscape with the somewhat excessively drained Fiveblock soils and the well drained Cedarcreek, Kaymine, Dekalb, Pineville, and Lily soils. Sewell soils are deeper over bedrock than Dekalb, Gilpin, and Lily soils. They contain less clay in the substratum than Cedarcreek, Kaymine, and Pineville soils. They are more acid than Fiveblock soils.

Typical pedon of Sewell very channery sandy loam, very steep, extremely stony; in an area of grasses about 3.5 miles southwest of West Virginia Route 85 at Greenwood:

A—0 to 6 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine granular structure; very friable; few fine roots; about 40 percent channers, stones, and boulders (100 percent micaceous sandstone); very strongly acid; clear wavy boundary.

C1—6 to 31 inches; strong brown (7.5YR 5/6) very channery sandy loam; single grain; friable; about 45 percent channers, stones, and boulders (90 percent micaceous sandstone, 5 percent siltstone, and 5 percent coal); very strongly acid; gradual wavy boundary.

C2—31 to 65 inches; yellowish brown (10YR 5/6) extremely channery sandy loam; massive; friable; about 70 percent channers, stones, and boulders (95 percent micaceous sandstone and 5 percent siltstone); very strongly acid.

The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 35 to 80 percent, by volume, throughout the profile. The rock fragments in the control section are 65 percent or more sandstone and small amounts of siltstone, shale, and coal. They are mostly channers, but some are stones or boulders. In unlimed areas the soils are extremely acid to strongly acid throughout. Some pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6.

The C horizon has hue of 7.5YR and 10YR, value of 2 to 5, and chroma of 1 to 8. In the fine-earth fraction, it is dominantly sandy loam or loam. In some pedons it has thin layers or pockets of loamy sand or contains 1 to 20 percent coal fragments. It is friable or firm.

Shelocta Series

The Shelocta series consists of very deep, well drained soils that formed in acid colluvial material derived from areas on uplands where the soils are underlain by siltstone, shale, and sandstone. The Shelocta soils are in mountain coves, on the lower side slopes, and on foot slopes. Slope ranges from 35 to 80 percent.

Shelocta soils are associated on the landscape with the well drained Berks, Gilpin, Kaymine soils and the moderately well drained Wharton soils. Shelocta soils are deeper over bedrock than Berks and Gilpin soils. Unlike Wharton soils, they do not have a seasonal high water table. They have a lower content of rock fragments in the control section than Kaymine soils.

Typical pedon of Shelocta channery silt loam, in a wooded area of Berks-Shelocta association, very steep, extremely stony; about 400 yards southwest of the intersection of U.S. Route 119 and Low Gap Road:

A—0 to 3 inches; dark brown (10YR 3/3) channery silt loam; moderate fine and medium granular structure; very friable; few fine and medium roots; about 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

BA—3 to 12 inches; dark yellowish brown (10YR 4/6) channery silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 15 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—12 to 25 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few discontinuous clay films in root channels and in pores; about 20 percent rock fragments; strongly acid; gradual wavy boundary.

Bt2—25 to 37 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; few fine roots; discontinuous clay films on faces of peds; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—37 to 57 inches; yellowish brown (10YR 5/4) channery silty clay loam; few fine faint light gray (10YR 7/1) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine roots; discontinuous clay films on faces of peds and in pores; about 30 percent rock fragments; very strongly acid; gradual wavy boundary.

BC—57 to 65 inches; yellowish brown (10YR 5/4) very channery silty clay loam; common medium distinct light gray (10YR 7/1) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; about 40 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 35 percent in the A horizon and from 5 to 45 percent in the individual subhorizons of the B horizon. It averages 15 to 35 percent in the control section. It ranges from 5 to 60 percent in the C horizon. In unlimed areas the soils are very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. It is very friable or friable.

The BA, Bt, and BC horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. In the fine-earth fraction, they are silt loam or silty clay loam. They have weak or moderate, fine to coarse subangular blocky structure. They are friable or firm.

The C horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. In the fine-earth fraction, it is silt loam, silty clay loam, or clay loam. It is firm or friable. In some pedons this horizon has brown, yellow, or gray mottles in the lower part.

Udorthents

Udorthents consist of a mixture of soil and rock fragments in areas that have been excavated, graded, or filled. These soils are mostly along the Big Coal River, the Little Coal River, Pond Fork, Spruce Laurel Fork, and U.S. Route 119.

Udorthents differ greatly from place to place. Thus, a typical pedon is not given. The depth to bedrock generally is more than 40 inches. Rock fragments range widely in kind, size, and amount. The soils have hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 2 to 8. In the fine-earth fraction, they are sandy loam, loam, silt loam, or clay loam.

Wharton Series

The Wharton series consists of deep, moderately well drained soils that formed in material weathered from interbedded shale, siltstone, and fine grained sandstone. These soils are on ridgetops in the northern half of the county. Slope ranges from 15 to 35 percent.

Wharton soils are associated on the landscape with the well drained Gilpin, Berks, Cedarcreek, Dekalb, Guyandotte, Kaymine, Pineville, and Shelocta soils. Unlike the associated soils, they have a seasonal high water table.

Typical pedon of Wharton silt loam, in a wooded area of Gilpin-Wharton silt loams, 15 to 35 percent slopes; about 1.1 miles northeast of Joes Creek; about 5 miles southeast of West Virginia Route 3 at Comfort:

Oi—1 inch to 0; slightly decomposed hardwood leaf litter.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; many very fine, fine, and medium roots; about 5 percent rock fragments; strongly acid; clear smooth boundary.

BA—2 to 8 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—8 to 16 inches; yellowish brown (10YR 5/8) silt loam; strong medium subangular blocky structure; firm; common distinct clay films on faces of peds; common fine and medium roots; about 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—16 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/8) mottles; strong medium angular blocky structure; firm; common distinct clay films on faces of peds; few very fine and fine roots; about 5 percent rock fragments; very strongly acid; clear wavy boundary.

Btg3—29 to 34 inches; light brownish gray (10YR 6/2) silty clay loam; common coarse distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure parting to weak thick platy; firm; few clay films on faces of peds; few fine and very fine roots; about 5 percent rock fragments; very strongly acid; gradual wavy boundary.

Cg—34 to 44 inches; light brownish gray (10YR 6/2) channery silty clay loam; common medium distinct strong brown (7.5YR 5/8) and brown (7.5YR 5/2) mottles; moderate thick platybedrock-controlled structure; firm; few very fine roots; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

Cr—44 inches; pinkish gray (7.5YR 6/2), rippable siltstone bedrock.

The thickness of the solum ranges from 30 to more than 50 inches. The depth to bedrock ranges from 40 to more than 72 inches. Fragments of siltstone, shale, and fine grained sandstone make up 0 to 20 percent of the solum and 20 to 60 percent of the C horizon. In unlimed areas the soils are extremely acid to strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3.

The BA and Bt horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. The Bt horizon has high- and low-chroma mottles in the upper 24 inches. The fine-earth fraction is silt loam, silty clay loam, or clay loam. The average content of clay in the upper 20 inches of the argillic horizon ranges from 25 to 35 percent. Some pedons have a BC horizon, which is silty clay or clay.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. In the fine-earth fraction, it is silt loam, silty clay loam, silty clay, or clay.

The Cr horizon is rippable shale, siltstone, or fine grained sandstone.

Formation of the Soils

The origin and development of the soils in Boone County are explained in this section. The five major factors of soil formation are identified, and their influence on the soils in the county is described. Also described are the morphology of the soils as related to horizon nomenclature, the processes involved in horizon development, and the geologic characteristics of the county.

Factors of Soil Formation

The soils in Boone County formed as a result of the interaction of five major factors of soil formation—parent material, time, climate, living organisms, and topography. Each factor modifies the effect of the others. Parent material, topography, and time have resulted in the major differences among the soils in the county. Climate and living organisms generally influence soil formation uniformly over broad areas.

Parent Material, Time, and Climate

The character of the parent material strongly influences the time required for soil formation and the nature of the soil that forms. The soils in the county formed in residual, colluvial, and alluvial material.

Most of the soils formed in material weathered from interbedded shale, siltstone, and sandstone. For example, Berks soils formed in material weathered from interbedded siltstone, shale, and fine grained sandstone, and Dekalb soils formed in material weathered from sandstone and some interbedded siltstone and shale. Residuum is the oldest parent material in the county. Most of the soils that formed in residuum, however, are not so well developed as some of the soils that formed in younger material, mainly because the soil-forming processes have been slowed in some areas by resistant rock, the slope, and erosion.

Colluvial material is on the lower side slopes, on foot slopes, and in coves. This material moved downslope from areas of the residual soils. Guyandotte, Pineville, and Shelocta soils formed in colluvial material.

Alluvial material on terraces and flood plains has washed from areas of soils on uplands. The soil-forming processes have had considerable time to act on the material on the terraces. Many additions, losses, and alterations have taken place. The resulting soils, such as Allegheny soils, are strongly leached and moderately well developed. The alluvium on the flood plains is the youngest parent material in the county. Most of the soils on flood plains are poorly developed because the soil-forming processes have had little time to act. Chagrin, Potomac, and Lobdell are examples of soils on flood plains.

Climate generally is uniform throughout the county. Slight climatic differences occur between the northern and southern parts of the county, but they are not significant enough to affect soil formation. Therefore, climate is not responsible for major differences among the soils in the county. Rainfall and temperature, however, have a general influence on the development of layers in the soil profile. A detailed description of the climate is given in the section "General Nature of the County."

Living Organisms

Living organisms, including plants, animals, bacteria, fungi, and humans, affect soil formation. The kind and amount of vegetation are generally responsible for the content of organic matter and color of the surface layer and are partly responsible for the content of plant nutrients. Earthworms and burrowing animals help to keep the soil open and porous. They mix organic material with mineral material by moving the soil to the surface. Bacteria and fungi decompose organic matter, thus releasing plant nutrients.

Human activities also influence soil formation. The characteristics of the surface layer are affected by activities that disturb the surface, such as clearing the forest, plowing, burning, and mining. Human activities have added fertilizer, mixed some of the soil horizons, and moved soil from place to place.

Topography

Topography affects soil formation through its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion.

Large amounts of water move through gently sloping and strongly sloping soils. As a result, these soils tend to be deep and moderately developed or well developed. On the steep and very steep hillsides, less water moves through the soil and the amount and rate of runoff are greater. Also, the soil material may be washed away almost as rapidly as a soil forms. Thus, the soils on the steeper, upper side slopes are likely to be shallower over bedrock than the soils in coves, on the lower side slopes, and on foot slopes.

The topography in Boone County favors the formation of soils on flood plains. These soils are forming at a rapid rate. They are weakly developed, however, mainly because too little time has elapsed since the parent material was deposited.

Morphology of the Soils

The results of the soil-forming processes are evident in the different layers, or horizons, in the soil profile. The profile extends from the surface downward to material that is little changed by the soil-forming processes. Most soils have three major horizons, called the A, B, and C horizons.

The A horizon is the surface layer. It is the layer that has the maximum accumulation of organic matter. It also is the layer of maximum leaching, or eluviation, of clay and iron.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. It commonly has blocky structure and is more firm and lighter in color than the A horizon.

The C horizon is below the A and B horizons. It consists of material that has been modified by weathering but has been altered little by the soil-forming processes.

In Boone County many processes have been involved in the formation of soil horizons. The more important of these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation and translocation of clay minerals, and the formation of structure. The processes are continuous and have been active for thousands of years.

Most of the soils on uplands in the county have a yellowish brown or strong brown B horizon. This color is caused mainly by iron oxides. The B horizon has blocky structure and in some soils has translocated clay minerals.

Geology

Gordon B. Bayles, state geologist, Soil Conservation Service, helped prepare this section.

All of the surface rocks in Boone County are sedimentary in origin and consist of sandstone, siltstone, shale, and coal of Pennsylvanian age *(3)*. Little local folding has taken place, and the rocks tend to have a regional dip to the northwest. The valleys along the Big Coal and Little Coal Rivers are characterized by a general northwest-to-southeast trend.

Nearly all of the county is in the Pottsville Group, except for some areas on the ridgetops in the southern, eastern, and northern parts of the county, which are in the Allegheny Formation, and a few small areas in the northwestern part, along the boundary of Lincoln County, which are in the lower Conemaugh Group. The Pottsville Group dominates the rugged terrain in most of the county. This formation is mostly sandstone, which has a strong influence on the topography. The more erosion resistant sandstone generally is at the higher elevations, but it occurs throughout the stratigraphy in the deeper valleys along the Big Coal and Little Coal Rivers and their tributaries. Some kinds of coal, most notably the No. 5 Block in the Allegheny Formation, Stockton-Lewiston, Coalburg, Winifrede, Chilton, Hernshaw, Dorothy, Cedar Grove, Alma, Peerless, Campbell Creek (No. 2 Gas), and Eagle, have been extensively surface mined and deep mined in these areas. The major soils in these areas are those of the Dekalb, Pineville, and Guyandotte series.

The western part of the county and much of the central part are dominated by the Kanawha Formation. In these areas, the formation is a mixture of sandstone and siltstone and relief is less pronounced than in other areas dominated by the Kanawha Formation. A few kinds of coal, most notably Campbell Creek, Peerless, Alma, and Cedar Grove, have been surface mined and deep mined in these areas but not so extensively as in other areas of the county. The major soils are those of the Berks, Shelocta, Gilpin, and Wharton series.

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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 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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.

Carbolith. Dark sedimentary rocks that crush to a black or very dark (Munsell value of 3 or less) streak or powder. Carbolith includes coal, bone coal, high-carbon shale, and high-carbon mudstone. In general, it has at least 25 percent carbonaceous material that is oxidizable at 350 to 400 degrees C.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

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.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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, 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 and planting system in which crop residue covers at least 30 percent of the surface after planting. Where soil blowing is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

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 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.

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.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of 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.

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.

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 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.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithochromic mottles. Mottles that have inherited their color from the parent rocks.

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.

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).

Mudstone. An indurated mud having the texture and composition of shale but lacking the fine lamination of fissility; a blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately the same.

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.

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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

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.

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.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter 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.

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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. 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 (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material 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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

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 1951-81 at Madison, West Virginia)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	42.1	21.8	32.0	72	-7	66	3.40	1.99	4.64	9	8.6
February	46.7	23.1	34.9	74	-1	80	3.12	1.72	4.36	8	5.9
March	56.6	31.1	43.9	84	11	200	4.11	2.69	5.39	10	3.1
April	68.9	40.3	54.6	90	23	438	3.82	2.61	4.93	9	.0
May	76.9	49.5	63.2	92	31	719	4.17	2.40	5.73	9	.0
June	83.0	58.3	70.7	94	43	921	4.15	2.38	5.71	8	.0
July	86.2	63.2	74.7	96	50	1,076	4.88	3.13	6.46	9	.0
August	85.3	62.3	73.8	95	49	1,048	3.75	1.98	5.30	7	.0
September	80.2	55.3	67.8	94	38	834	3.50	1.70	5.05	6	.0
October	69.3	41.9	55.6	86	23	484	2.66	1.07	3.98	6	.1
November	56.7	31.8	44.3	80	13	161	2.95	1.68	4.07	7	1.3
December	45.8	25.2	35.5	74	4	85	3.32	1.66	4.75	7	3.9
Yearly:											
Average	66.5	42.0	54.3	---	---	---	---	---	---	---	---
Extreme	---	---	---	97	-7	---	---	---	---	---	---
Total	---	---	---	---	---	6,112	43.83	38.32	49.13	95	22.9

* 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 1951-81 at Madison, West Virginia)

Probability	Temperature: 24 °F or lower	Temperature: 28 °F or lower	Temperature: 32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 12	Apr. 28	May 9
2 years in 10 later than--	Apr. 7	Apr. 23	May 5
5 years in 10 later than--	Mar. 27	Apr. 13	Apr. 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 25	Oct. 15	Oct. 5
2 years in 10 earlier than--	Oct. 29	Oct. 20	Oct. 10
5 years in 10 earlier than--	Nov. 6	Oct. 28	Oct. 19

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-81 at Madison, West 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	201	176	156
8 years in 10	209	183	162
5 years in 10	224	197	174
2 years in 10	239	211	186
1 year in 10	247	218	192

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AgB	Allegheny loam, 3 to 8 percent slopes	575	0.2
BSF	Berks-Shelocta association, very steep, extremely stony	36,375	11.3
CeB	Cedarcreek very channery loam, 3 to 8 percent slopes, very stony	820	0.3
CgF	Cedarcreek-Rock outcrop complex, very steep, extremely stony	5,535	1.7
Ch	Chagrin fine sandy loam	2,635	0.8
DPF	Dekalb-Pineville-Guyandotte association, very steep, extremely stony	213,100	66.2
FvF	Fiveblock very channery sandy loam, very steep, extremely stony	1,295	0.4
GwE	Gilpin-Wharton silt loams, 15 to 35 percent slopes	6,305	1.9
ImE	Itmann channery loam, steep	340	0.1
ItF	Itmann extremely channery sandy loam, very steep	1,125	0.3
Ka	Kanawha loam	880	0.3
Kc	Kanawha-Urban land complex	2,820	0.9
KeB	Kaymine very channery loam, 3 to 8 percent slopes, very stony	1,065	0.3
KmF	Kaymine-Cedarcreek-Dekalb complex, very steep, extremely stony	19,705	6.1
KrF	Kaymine-Rock outcrop complex, very steep, extremely stony	3,485	1.1
LdE	Lily-Dekalb complex, 15 to 35 percent slopes	10,325	3.2
PnE	Pineville-Lily complex, 15 to 35 percent slopes	4,825	1.5
Po	Potomac sandy loam	1,565	0.5
SeB	Sensabaugh-Lobdell loams, 2 to 8 percent slopes	4,705	1.5
SwF	Sewell very channery sandy loam, very steep, extremely stony	1,485	0.5
Ud	Udorthents, smoothed	2,475	0.7
	Water	560	0.2
	Total	322,000	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AgB	Allegheny loam, 3 to 8 percent slopes
Ch	Chagrin fine sandy loam
Ka	Kanawha loam
SeB	Sensabaugh-Lobdell loams, 2 to 8 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Kentucky bluegrass
		Bu	Bu	Tons	AUM*
AgB: Allegheny	IIe	115	45	3.5	4.5
BSF:					
Berks	VIIs	---	---	---	---
Shelocta	VIIs	---	---	---	---
CeB**: Cedarcreek	VIs	---	---	---	3.0
CgF: Cedarcreek-Rock outcrop	VIIs	---	---	---	---
Ch: Chagrin	IIw	125	---	---	5.5
DPF: Dekalb-Pineville-Guyandotte	VIIs	---	---	---	---
FvF: Fiveblock	VIIs	---	---	---	---
GwE: Gilpin-Wharton	VIe	---	---	---	3.5
ImE: Itmann	VIIs	---	---	---	---
ItF: Itmann	VIIIs	---	---	---	---
Ka: Kanawha	I	135	50	3.5	5.5
Kc. Kanawha-Urban land	---	---	---	---	---
KeB***: Kaymine	VIs	---	---	---	3.0
KmF: Kaymine-Cedarcreek-Dekalb	VIIs	---	---	---	---
KrF: Kaymine-Rock outcrop	VIIs	---	---	---	---
LdE: Lily-Dekalb	VIe	---	---	---	3.0
PnE: Pineville-Lily	VIe	---	---	---	3.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Kentucky bluegrass
		Bu	Bu	Tons	AUM*
Po------------------ Potomac	IVs	---	---	2.5	3.5
SeB----------------- Sensabaugh-Lobdell	IIe	125	---	---	---
SwF----------------- Sewell	VIIs	---	---	---	---
Ud. Udorthents	---	---	---	---	---

* 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.

** Bluegrass pasture yield estimated from data for Kaymine soils.

*** Bluegrass pasture yield estimated from average grass-legume hay yield of 2.0 tons per acre in 1987 and 1988.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	880	---	---	---
II	7,915	5,280	2,635	---
III	---	---	---	---
IV	1,565	---	---	1,565
V	---	---	---	---
VI	23,340	21,455	---	1,885
VII	281,320	---	---	281,320
VIII	1,125	---	---	1,125

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
AgB------------- Allegheny	4A	Slight	Slight	Slight	Severe	Northern red oak----	80	62	250	0.80
						Yellow-poplar-------	93	95	480	1.10
						Red maple-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						Black oak-----------	78	---	---	---
						White oak-----------	---	---	---	---
BSF*:										
Berks---------- (north aspect)	4R	Moderate	Severe	Moderate	Moderate	Northern red oak----	75	57	215	0.75
						Black oak-----------	73	55	200	0.70
						Yellow-poplar-------	103	112	620	1.30
						Hickory-------------	---	---	---	---
Shelocta------- (north aspect)	5R	Severe	Severe	Slight	Severe	Northern red oak----	86	68	290	0.90
						Yellow-poplar-------	108	121	690	1.40
						Black oak-----------	85	67	285	0.90
						Basswood------------	---	---	---	---
						Hickory-------------	---	---	---	---
BSF*:										
Berks---------- (south aspect)	3R	Severe	Severe	Moderate	Slight	Northern red oak----	67	49	159	0.60
						Black oak-----------	75	46	130	0.60
						White oak-----------	73	55	200	0.70
						Scarlet oak---------	73	55	200	0.70
						American beech------	---	---	---	---
Shelocta------- (south aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	81	63	255	0.80
						Yellow-poplar-------	91	92	455	1.05
						White oak-----------	75	57	215	1.05
						Black oak-----------	83	65	270	0.85
						American beech------	---	---	---	---
CeB------------- Cedarcreek	4X	Slight	Slight	Severe	Moderate	Northern red oak----	80	62	250	0.80
						Eastern white pine--	94	174	780	---
						Yellow-poplar-------	105	115	650	1.30
						American sycamore---	90	---	---	---
						Black locust--------	100	---	---	---
CgF*:										
Cedarcreek-----	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.80
						Eastern white pine--	94	174	780	---
						Yellow-poplar-------	105	115	650	1.30
						American sycamore---	90	---	---	---
						Black locust--------	100	---	---	___
Rock outcrop.										
Ch-------------- Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	290	0.90
						Yellow-poplar-------	96	100	525	1.10
						White oak-----------	---	---	---	---
						American sycamore---	---	---	---	---
						American beech------	---	---	---	---
						Black walnut--------	---	---	---	---
						River birch---------	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
DPF*:										
Dekalb---------- (north aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	73	55	200	0.70
						Black oak-----------	71	53	185	0.70
						Scarlet oak---------	74	56	205	0.75
						Sugar maple---------	---	---	---	---
						Black cherry--------	---	---	---	---
						Hickory-------------	---	---	---	---
Pineville------ (north aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak----	86	68	290	0.90
						Yellow-poplar-------	108	121	690	1.40
						Black oak-----------	85	67	285	0.90
						Basswood------------	---	---	---	---
						Hickory-------------	---	---	---	---
Guyandotte----- (north aspect)	5R	Severe	Severe	Severe	Severe	Northern red oak----	92	74	335	1.00
						American basswood---	99	---	---	---
						Yellow-poplar-------	110	124	720	1.25
						Black cherry--------	86	---	---	---
						Black locust--------	85	---	---	---
						Cucumbertree--------	101	---	---	---
DPF*:										
Dekalb---------- (south aspect)	3R	Severe	Severe	Moderate	Moderate	Northern red oak----	66	48	150	0.60
						Black oak-----------	71	53	185	0.70
						Scarlet oak---------	71	53	185	0.70
						Chestnut oak--------	59	42	105	0.50
						Black locust--------	---	---	---	---
						Blackgum------------	---	---	---	---
Pineville------ (south aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	81	63	255	0.80
						Yellow-poplar-------	91	92	455	1.05
						White oak-----------	75	57	215	0.75
						Black oak-----------	83	64	265	0.85
						Hickory-------------	---	---	---	---
Guyandotte----- (south aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak----	87	69	300	0.90
						Basswood------------	99	---	---	---
						Yellow-poplar-------	104	114	635	1.30
						Black cherry--------	86	---	---	---
						Black locust--------	85	---	---	---
						White oak-----------	---	---	---	---
						Cucumbertree--------	---	---	---	---
FvF------------- Fiveblock	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.80
						Eastern white pine--	94	174	780	---
						Yellow-poplar-------	105	115	635	1.30
						American sycamore---	90	---	---	---
						Black locust--------	---	---	---	---
						Sassafrass----------	---	---	---	---
GwE*:										
Gilpin---------- (north aspect)	5R	Moderate	Moderate	Slight	Severe	Northern red oak----	84	66	280	0.85
						Yellow-poplar-------	92	93	470	1.40
						Black oak-----------	82	64	265	0.85
						Scarlet oak---------	81	63	255	0.80
						White oak-----------	75	57	215	0.75
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth: Cubic feet/ac	Board feet/ac	Cords/ac
GwE*:										
Wharton (north aspect)	4R	Severe	Moderate	Slight	Severe	Northern red oak	76	58	220	0.75
						Yellow-poplar	90	91	450	1.00
						White oak	---	---	---	---
						Chestnut oak	---	---	---	---
GwE*:										
Gilpin (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	74	56	210	0.75
						Black oak	71	53	185	0.70
						White oak	68	50	165	0.65
						Scarlet oak	72	54	195	0.70
						Hickory	---	---	---	---
						Black locust	---	---	---	---
Wharton (south aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak	70	52	180	0.65
						White oak	65	48	145	0.60
						Scarlet oak	---	---	---	---
						Black oak	---	---	---	---
						Chestnut oak	63	46	130	0.55
ImE, ItF Itmann	---	Severe	Severe	Severe	Slight	Sweet birch	---	---	---	---
						Black locust	---	---	---	---
						Red maple	---	---	---	---
						Eastern white pine	---	---	---	---
						Virginia pine	---	---	---	---
						Shortleaf pine	---	---	---	---
Ka Kanawha	5A	Slight	Slight	Slight	Severe	Northern red oak	80	62	250	0.80
						Black oak	80	62	250	0.80
						Yellow-poplar	90	91	450	1.00
						Black walnut	---	---	---	---
						Black locust	---	---	---	---
						American sycamore	---	---	---	---
Kc*:										
Kanawha	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	250	0.80
						Black oak	80	62	250	0.80
						Yellow-poplar	90	91	450	1.00
						Black walnut	---	---	---	---
						Black locust	---	---	---	---
						American sycamore	---	---	---	---
Urban land.										
KeB Kaymine	4X	Slight	Slight	Severe	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---
KmF*:										
Kaymine	4R	Severe	Severe	Severe	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth: Cubic feet/ac	Board feet/ac	Cords/ac
KmF*:										
Cedarcreek-----	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.80
						Eastern white pine--	94	174	780	---
						Yellow-poplar-------	105	115	650	1.30
						American sycamore---	90	---	---	---
						Black locust--------	100	---	---	---
						Red maple-----------	---	---	---	---
						Sourwood------------	---	---	---	---
Dekalb---------	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	73	55	200	0.70
						Black oak-----------	71	53	185	0.70
						Scarlet oak---------	74	56	205	0.75
						Sugar maple---------	---	---	---	---
						Black cherry--------	---	---	---	---
						Hickory-------------	---	---	---	---
KrF*:										
Kaymine--------	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.80
						Eastern white pine--	94	174	780	---
						Yellow-poplar-------	105	115	650	1.30
						American sycamore---	90	---	---	---
						Black locust--------	100	---	---	---
						Red maple-----------	---	---	---	---
Rock outcrop.										
LdE*:										
Lily----------- (north aspect)	5R	Moderate	Moderate	Slight	Severe	Northern red oak----	84	66	280	0.85
						Black oak-----------	85	67	285	0.90
						White oak-----------	85	72	285	0.90
						Chestnut oak--------	76	58	220	0.75
						Yellow-poplar-------	95	109	595	1.25
						Scarlet oak---------	90	82	320	0.95
Dekalb--------- (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	73	55	200	0.70
						Black oak-----------	71	53	185	0.70
						Scarlet oak---------	74	56	205	0.75
						Sugar maple---------	---	---	---	---
						Black cherry--------	---	---	---	---
						Hickory-------------	---	---	---	---
LdE*:										
Lily----------- (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	74	56	210	0.75
						White oak-----------	69	51	175	0.65
						Scarlet oak---------	75	57	215	0.75
						Black oak-----------	---	---	---	---
						Chestnut oak--------	63	46	130	0.55
Dekalb--------- (south aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	66	48	150	0.60
						Black oak-----------	71	53	185	0.70
						Scarlet oak---------	71	53	185	0.70
						Chestnut oak--------	59	42	105	0.50
						Black locust--------	---	---	---	---
						Blackgum------------	---	---	---	---
PnE*:										
Pineville------ (north aspect)	5R	Moderate	Moderate	Slight	Severe	Northern red oak----	86	68	290	0.90
						Yellow-poplar-------	115	127	750	1.45
						Black oak-----------	85	67	285	0.90
						Basswood------------	---	---	---	---
						Eastern hemlock-----	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
PnE*:										
Lily (north aspect)	5R	Moderate	Moderate	Slight	Severe	Northern red oak	84	66	280	0.85
						Black oak	85	67	285	0.90
						Chestnut oak	76	58	220	0.75
						Yellow-poplar	95	98	510	1.15
						Scarlet oak	90	72	445	1.05
						Black locust	103	---	---	---
PnE*:										
Pineville (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak	81	63	255	0.80
						Yellow-poplar	91	92	455	1.05
						White oak	75	57	270	0.85
						Black oak	83	65	265	0.85
						Hickory	---	---	---	---
Lily (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak	74	56	210	0.75
						White oak	69	51	175	0.65
						Scarlet oak	75	57	215	0.75
						Black oak	---	---	---	---
						Chestnut oak	63	46	130	0.55
Po Potomac	5F	Slight	Slight	Moderate	Severe	Northern red oak	85	67	285	0.90
						Black walnut	---	---	---	---
						American sycamore	---	---	---	---
						Eastern hemlock	---	---	---	---
						Yellow-poplar	107	---	---	---
						River birch	---	---	---	---
						Yellow birch	---	---	---	---
SeB*:										
Sensabaugh	5A	Slight	Slight	Moderate	Severe	Northern red oak	85	67	285	0.90
						Yellow-poplar	100	107	580	1.25
						White oak	80	62	250	0.80
						Black oak	83	65	265	0.85
Lobdell	5A	Slight	Slight	Slight	Severe	Northern red oak	87	69	300	0.90
						Yellow-poplar	96	100	525	1.10
						Red maple	---	---	---	---
						River birch	---	---	---	---
						Black walnut	---	---	---	---
						Black cherry	---	---	---	---
						American sycamore	---	---	---	---
SwF Sewell	4R	Severe	Severe	Severe	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	---	---	---	---
						Sourwood	---	---	---	---
						Red maple	---	---	---	---
						Sassafras	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AgB------------------- Allegheny	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
BSF*:					
Berks----------------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
Shelocta-------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
CeB------------------- Cedarcreek	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
CgF*:					
Cedarcreek-----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Rock outcrop.					
Ch-------------------- Chagrin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
DPF*:					
Dekalb---------------	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
Pineville------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Guyandotte-----------	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones, large stones.
FvF------------------- Fiveblock	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
GwE*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wharton--------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
ImE, ItF-------------- Itmann	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Ka-------------------- Kanawha	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Kc*:					
Kanawha	Severe: flooding.	Slight	Slight	Slight	Slight.
Urban land.					
KeB Kaymine	Variable	Variable	Variable	Variable	Variable.
KmF*:					
Kaymine	Variable	Variable	Variable	Variable	Variable.
Cedarcreek	Variable	Variable	Variable	Variable	Variable.
Dekalb	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
KrF*:					
Kaymine	Variable	Variable	Variable	Variable	Variable.
Rock outcrop.					
LdE*:					
Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
PnE*:					
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Po Potomac	Severe: flooding.	Moderate: large stones, small stones, too sandy.	Severe: large stones, small stones.	Moderate: too sandy.	Moderate: large stones, droughty.
SeB*:					
Sensabaugh	Severe: flooding.	Slight	Moderate: small stones, slope.	Slight	Slight.
Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
SwF Sewell	Variable	Variable	Variable	Variable	Variable.
Ud. Udorthents					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AgB---------------- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BSF*:										
Berks-------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Shelocta----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CeB---------------- Cedarcreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
CgF*:										
Cedarcreek--------	Very poor.	Poor	Good	Good	Good	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.
Ch----------------- Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DPF*:										
Dekalb------------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Pineville---------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Guyandotte--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
FvF---------------- Fiveblock	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GwE*:										
Gilpin------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Wharton-----------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ImE, ItF----------- Itmann	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Ka----------------- Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kc*:										
Kanawha-----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
KeB: Kaymine	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
KmF*:										
Kaymine	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Cedarcreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
KrF*:										
Kaymine	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
LdE*:										
Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
PnE*:										
Pineville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Po: Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
SeB*:										
Sensabaugh	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
SwF: Sewell	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ud. Udorthents										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgB: Allegheny	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
BSF*:						
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CeB: Cedarcreek	Variable	Variable	Variable	Variable	Variable	Variable.
CgF*:						
Cedarcreek	Variable	Variable	Variable	Variable	Variable	Variable.
Rock outcrop.						
Ch: Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
DPF*:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Guyandotte	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.
FvF: Fiveblock	Variable	Variable	Variable	Variable	Variable	Variable.
GwE*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wharton	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
ImE, ItF: Itmann	Variable	Variable	Variable	Variable	Variable	Variable.
Ka: Kanawha	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Kc*:						
Kanawha	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Urban land.						
KeB Kaymine	Variable	Variable	Variable	Variable	Variable	Variable.
KmF*:						
Kaymine	Variable	Variable	Variable	Variable	Variable	Variable.
Cedarcreek	Variable	Variable	Variable	Variable	Variable	Variable.
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
KrF*:						
Kaymine	Variable	Variable	Variable	Variable	Variable	Variable.
Rock outcrop.						
LdE*:						
Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
PnE*:						
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Po Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, large stones.	Moderate: large stones, droughty.
SeB*:						
Sensabaugh	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Lobdell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: frost action.	Slight.
SwF Sewell	Variable	Variable	Variable	Variable	Variable	Variable.
Ud. Udorthents						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," 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
AgB------------------ Allegheny	Slight-----------	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
BSF*:					
Berks--------------	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, depth to rock.
Shelocta-----------	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
CeB----------------- Cedarcreek	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
CgF*:					
Cedarcreek---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Rock outcrop.					
Ch------------------ Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: thin layer.
DPF*:					
Dekalb-------------	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
Pineville----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Guyandotte---------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
FvF----------------- Fiveblock	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
GwE*:					
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.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GwE*:					
Wharton	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
ImE, ItF Itmann	Variable	Variable	Variable	Variable	Variable.
Ka Kanawha	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
Kc*:					
Kanawha	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
Urban land.					
KeB Kaymine	Variable	Variable	Variable	Variable	Variable.
KmF*:					
Kaymine	Variable	Variable	Variable	Variable	Variable.
Cedarcreek	Variable	Variable	Variable	Variable	Variable.
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
KrF*:					
Kaymine	Variable	Variable	Variable	Variable	Variable.
Rock outcrop.					
LdE*:					
Lily	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, slope.
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, depth to rock.
PnE*:					
Pineville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.
Lily	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, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Po----------------- Potomac	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: seepage, small stones.
SeB*:					
Sensabaugh---------	Moderate: flooding, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: small stones.
Lobdell------------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness.
SwF----------------- Sewell	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Ud. Udorthents					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgB------------------- Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
BSF*:				
Berks	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CeB------------------- Cedarcreek	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CgF*:				
Cedarcreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
Ch-------------------- Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
DPF*:				
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Severe: small stones, slope.
Guyandotte	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
FvF------------------- Fiveblock	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
GwE*:				
Gilpin	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GwE*:				
Wharton	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
ImE, ItF Itmann	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Ka Kanawha	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Kc*:				
Kanawha	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Urban land.				
KeB Kaymine	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
KmF*:				
Kaymine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Cedarcreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
KrF*:				
Kaymine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
LdE*:				
Lily	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PnE*:				
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lily	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Po Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
SeB*:				
Sensabaugh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SwF Sewell	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Ud. Udorthents				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "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	Terraces and diversions	Grassed waterways
AgB: Allegheny	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
BSF*:					
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, depth to rock, large stones.	Depth to rock, large stones, slope.
Shelocta	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
CeB: Cedarcreek	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones, droughty.
CgF*:					
Cedarcreek	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.					
Ch: Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing	Favorable.
DPF*:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Guyandotte	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Slope, large stones.
FvF: Fiveblock	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
GwE*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Wharton	Severe: slope.	Moderate: thin layer, piping, wetness.	Percs slowly, frost action, slope.	Wetness, slope, percs slowly.	Slope, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
ImE, ItF: Itmann	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope	Slope, droughty.
Ka: Kanawha	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Kc*:					
Kanawha	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Urban land.					
KeB: Kaymine	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones, droughty.
KmF*:					
Kaymine	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Cedarcreek	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
KrF*:					
Kaymine	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.					
LdE*:					
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
PnE*:					
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Po: Potomac	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, too sandy.	Large stones, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
SeB*:					
Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones.
Lobdell	Severe: seepage.	Severe: piping.	Frost action	Erodes easily, wetness.	Erodes easily.
SwF Sewell	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Ud. Udorthents					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AgB: Allegheny	0-10	Loam	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	10-65	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
BSF*:											
Berks	0-2	Extremely stony loam.	GM, SM, GC, SC	A-2, A-4	15-30	40-80	35-70	30-60	25-45	25-36	5-10
	2-23	Very channery loam, very channery silt loam, extremely channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
Shelocta	0-3	Extremely stony silt loam.	ML, CL-ML, SM, GM	A-4	15-30	55-95	50-80	40-70	36-65	<35	NP-10
	3-57	Silty clay loam, channery 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
	57-65	Channery silt loam, very 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
CeB: Cedarcreek	0-3	Very stony loam	GC	A-2, A-4, A-6	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Extremely channery loam, very channery loam, very channery sandy loam.	GC	A-2, A-4	5-30	30-55	25-50	20-45	15-40	25-35	7-12
CgF*:											
Cedarcreek	0-3	Extremely stony loam.	GC	A-2, A-4, A-6	30-55	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Extremely channery loam, very channery loam, very channery sandy loam.	GC	A-2, A-4	5-30	30-55	25-50	20-45	15-40	25-35	7-12
Rock outcrop.											
Ch: Chagrin	0-10	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	95-100	85-100	55-85	35-55	<25	NP-5
	10-33	Silt loam, loam, fine sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	33-65	Stratified silt loam to gravelly fine sand.	ML, SM, SP-SM	A-4, A-2	0	75-100	65-100	40-85	10-80	20-40	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DPF*:											
Dekalb----------	0-3	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	3-24	Channery sandy loam, channery 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
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pineville-------	0-3	Extremely stony loam.	ML, CL-ML, SM, SC-SM	A-2, A-4	15-30	55-90	50-85	45-80	30-75	25-35	4-10
	3-58	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	58-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SC-SM	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Guyandotte------	0-10	Extremely stony loam.	GM-GC, SC-SM, CL-ML, ML	A-1, A-2, A-4	20-50	25-65	20-60	15-55	10-55	20-30	NP-8
	10-65	Very channery sandy loam, very channery loam, extremely channery sandy loam.	GM-GC, SC-SM, CL-ML, ML	A-1, A-2, A-4	5-35	25-65	20-60	15-55	10-55	20-30	NP-8
FvF-------------- Fiveblock	0-4	Extremely stony sandy loam.	SM, SC-SM, GM-GC, GM	A-1, A-2	30-55	55-70	50-65	35-50	10-25	15-25	NP-7
	4-65	Extremely channery sandy loam, very stony sandy loam, very channery sandy loam.	SM, SC-SM, GM-GC, GM	A-1, A-2	5-30	45-65	25-50	15-35	10-20	15-25	NP-7
GwE*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-30	Channery loam, channery 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
	30-36	Channery loam, very channery silt loam, very channery 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
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
GwE*:											
Wharton	0-2	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
	2-44	Silt loam, channery silty clay loam, channery silt loam.	ML, CL	A-7, A-6	0-25	75-100	70-100	65-95	60-90	35-45	10-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
ImE Itmann	0-9	Channery loam	ML, CL, SM, SC	A-2, A-4	0-10	65-85	60-80	50-75	30-60	20-30	NP-8
	9-65	Very channery sandy loam, extremely channery loam, extremely channery sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	20-45	10-35	15-25	NP-7
ItF Itmann	0-3	Extremely channery sandy loam.	GM, GM-GC	A-1, A-2	0-10	40-55	35-50	25-45	15-35	15-25	NP-7
	3-65	Very channery sandy loam, extremely channery loam, extremely channery sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	20-45	10-35	15-25	NP-7
Ka Kanawha	0-10	Loam	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	10-42	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
	42-65	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
Kc*:											
Kanawha	0-10	Loam	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	10-42	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
	42-65	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
Urban land.											
KeB Kaymine	0-5	Very stony loam	GC	A-2, A-4, A-6	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	5-65	Extremely channery loam, very stony silt loam, very channery loam.	GC	A-2, A-4, A-6	5-30	30-55	25-50	20-45	15-40	25-35	7-12

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
KmF*:											
Kaymine---------	0-5	Extremely stony loam.	GC	A-2, A-4, A-6	30-55	45-60	40-55	30-50	20-40	25-35	7-12
	5-65	Extremely channery loam, very stony silt loam, very channery loam.	GC	A-2, A-4, A-6	5-30	30-55	25-50	20-45	15-40	25-35	7-12
Cedarcreek------	0-3	Extremely stony loam.	GC	A-2, A-4, A-6	30-55	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Extremely channery loam, very channery loam, very channery sandy loam.	GC	A-2, A-4	5-30	30-55	25-50	20-45	15-40	25-35	7-12
Dekalb----------	0-3	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	3-24	Channery sandy loam, channery 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
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
KrF*:											
Kaymine---------	0-5	Extremely stony loam.	GC	A-2, A-4, A-6	30-55	45-60	40-55	30-50	20-40	25-35	7-12
	5-65	Extremely channery loam, very stony silt loam, very channery loam.	GC	A-2, A-4, A-6	5-30	30-55	25-50	20-45	15-40	25-35	7-12
Rock outcrop.											
LdE*:											
Lily------------	0-4	Loam------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-80	<35	NP-10
	4-30	Clay loam, channery sandy loam, channery loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	75-100	70-100	40-80	<35	3-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dekalb----------	0-3	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
	3-24	Channery sandy loam, channery 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
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
PnE*:											
Pineville-------	0-3	Channery loam----	ML, CL-ML, SM, SC-SM	A-2, A-4	0-10	60-80	55-75	50-70	30-65	25-35	4-10
	3-58	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	58-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SC-SM	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Lily------------	0-4	Loam-------------	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-80	<35	NP-10
	4-30	Clay loam, channery sandy loam, channery loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	75-100	70-100	40-80	<35	3-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Po--------------- Potomac	0-7	Sandy loam-------	SM, ML, SC-SM, CL-ML	A-2, A-4	0-10	85-100	80-100	50-85	30-60	<20	NP-5
	7-65	Gravelly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<15	NP-3
SeB*:											
Sensabaugh------	0-6	Loam-------------	CL-ML, CL, ML	A-4	0-5	90-100	75-95	65-85	55-75	16-29	3-9
	6-11	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SC-SM, GC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	11-40	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SC-SM, SC, GM-GC, GC	A-4, A-6	5-25	70-90	55-75	45-65	35-55	22-36	6-15
	40-65	Very gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SC-SM, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15
Lobdell---------	0-8	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	8-27	Loam, silt loam	ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	27-65	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	80-100	65-85	40-80	15-35	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SwF-------------- Sewell	0-6	Extremely stony sandy loam.	SM, SC-SM, GM-GC, GM	A-1, A-2	30-55	55-70	50-65	35-50	10-25	15-25	NP-7
	6-65	Very channery sandy loam, very stony sandy loam, extremely channery sandy loam.	GM, GP-GM, GM-GC	A-1, A-2	5-30	30-50	25-45	15-35	10-20	15-25	NP-7
Ud. Udorthents											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AgB----------------	0-10	15-27	1.20-1.40	0.6-2.0	0.12-0.22	4.5-5.5	Low-----------	0.32	4	1-4
Allegheny	10-65	18-35	1.20-1.50	0.6-2.0	0.13-0.18	4.5-5.5	Low-----------	0.28		
BSF*:										
Berks------------	0-2	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low-----------	0.17	3	.5-3
	2-23	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.0	Low-----------	0.17		
	23	---	---	0.2-20	---	---	--------------	----		
Shelocta---------	0-3	10-25	1.15-1.30	0.6-2.0	0.10-0.16	4.5-5.5	Low-----------	0.24	4	.5-5
	3-57	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	57-65	15-34	1.30-1.55	0.6-2.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
CeB----------------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32	5	<.5
Cedarcreek	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32		
CgF*:										
Cedarcreek-------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32		
Rock outcrop.										
Ch-----------------	0-10	8-20	1.20-1.40	0.6-2.0	0.13-0.18	5.6-7.3	Low-----------	0.32	5	2-4
Chagrin	10-33	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low-----------	0.32		
	33-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low-----------	0.32		
DPF*:										
Dekalb-----------	0-3	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low-----------	0.17	2	2-4
	3-24	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low-----------	0.17		
	24	---	---	2.0-6.0	---	---	--------------	----		
Pineville--------	0-3	15-25	1.00-1.30	0.6-2.0	0.10-0.16	3.6-7.3	Low-----------	0.20	4	.5-5
	3-58	18-30	1.30-1.60	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.15		
	58-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	3.6-5.5	Low-----------	0.15		
Guyandotte-------	0-10	5-27	1.00-1.30	0.6-6.0	0.10-0.16	4.5-7.3	Low-----------	0.10	4	2-10
	10-65	5-27	1.30-1.60	0.6-6.0	0.05-0.15	4.5-6.0	Low-----------	0.17		
FvF----------------	0-4	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low-----------	0.32	5	<.5
Fiveblock	4-65	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low-----------	0.32		
GwE*:										
Gilpin-----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	4.5-5.5	Low-----------	0.32	3	.5-4
	5-30	18-35	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.24		
	30-36	15-35	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low-----------	0.24		
	36	---	---	0.2-2.0	---	---	--------------	----		
Wharton----------	0-2	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.0-5.5	Low-----------	0.37	3	1-4
	2-44	15-35	1.20-1.50	0.06-0.6	0.12-0.16	4.0-5.5	Moderate------	0.24		
	44	---	---	0.06-2.0	---	---	--------------	----		
ImE----------------	0-9	10-20	1.00-1.30	0.6-6.0	0.08-0.15	3.6-5.5	Low-----------	0.32	5	<.5
Itmann	9-65	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low-----------	0.32		
ItF----------------	0-3	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low-----------	0.32	5	<.5
Itmann	3-65	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low-----------	0.32		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ka----------------- Kanawha	0-10	10-20	1.20-1.40	0.6-2.0	0.16-0.22	5.1-6.0	Low-----------	0.32	4	2-4
	10-42	18-35	1.30-1.50	0.6-2.0	0.14-0.18	5.1-7.3	Low-----------	0.28		
	42-65	15-30	1.30-1.50	0.6-6.0	0.10-0.18	5.6-7.3	Low-----------	0.24		
Kc*:										
Kanawha----------	0-10	10-20	1.20-1.40	0.6-2.0	0.16-0.22	5.1-6.0	Low-----------	0.32	4	2-4
	10-42	18-35	1.30-1.50	0.6-2.0	0.14-0.18	5.1-7.3	Low-----------	0.28		
	42-65	15-30	1.30-1.50	0.6-6.0	0.10-0.18	5.6-7.3	Low-----------	0.24		
Urban land.										
KeB--------------- Kaymine	0-5	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32	5	<.5
	5-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32		
KmF*:										
Kaymine----------	0-5	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32	5	<.5
	5-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32		
Cedarcreek-------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low-----------	0.32		
Dekalb-----------	0-3	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low-----------	0.17	2	2-4
	3-24	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low-----------	0.17		
	24	---	---	2.0-6.0	---	---	-------------	----		
KrF*:										
Kaymine----------	0-5	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32	5	<.5
	5-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32		
Rock outcrop.										
LdE*:										
Lily-------------	0-4	7-27	1.20-1.40	0.6-6.0	0.13-0.18	3.6-5.5	Low-----------	0.28	2	.5-4
	4-30	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low-----------	0.28		
	30	---	---	0.0-0.2	---	---	-------------	----		
Dekalb-----------	0-3	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low-----------	0.17	2	2-4
	3-24	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low-----------	0.17		
	24	---	---	2.0-6.0	---	---	-------------	----		
PnE*:										
Pineville--------	0-3	15-25	1.00-1.30	0.6-2.0	0.10-0.16	3.6-7.3	Low-----------	0.20	4	.5-5
	3-58	18-30	1.30-1.60	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.15		
	58-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	3.6-5.5	Low-----------	0.15		
Lily-------------	0-4	7-27	1.20-1.40	0.6-6.0	0.13-0.18	3.6-5.5	Low-----------	0.28	2	.5-4
	4-30	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low-----------	0.28		
	30	---	---	0.0-0.2	---	---	-------------	----		
Po---------------- Potomac	0-7	5-15	1.20-1.40	0.6-6.0	0.10-0.14	5.1-7.3	Low-----------	0.24	3	0-2
	7-65	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.3	Low-----------	0.17		
SeB*:										
Sensabaugh-------	0-6	8-25	1.25-1.40	0.6-6.0	0.12-0.18	5.6-7.3	Low-----------	0.24	5	1-3
	6-11	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.3	Low-----------	0.20		
	11-40	12-35	1.30-1.50	0.6-6.0	0.10-0.15	5.6-7.3	Low-----------	0.17		
	40-65	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.3	Low-----------	0.17		
Lobdell----------	0-8	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.37	5	1-3
	8-27	18-30	1.25-1.60	0.6-2.0	0.17-0.22	5.1-7.3	Low-----------	0.37		
	27-65	15-30	1.20-1.60	0.6-6.0	0.12-0.18	5.6-7.3	Low-----------	0.37		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SwF--------------	0-6	5-18	1.35-1.65	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32	5	<.5
Sewell	6-65	5-18	1.35-1.65	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32		
Ud.										
Udorthents										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "occasional," "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	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
AgB: Allegheny	B	None	>6.0	---	---	>60	---	Moderate	Low	High.
BSF*:										
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.
Shelocta	B	None	>6.0	---	---	>60	Hard	Moderate	Low	High.
CeB: Cedarcreek	C	None	>6.0	---	---	>60	---	Moderate	Moderate	High.
CgF*:										
Cedarcreek	C	None	>6.0	---	---	>60	---	Moderate	Moderate	High.
Rock outcrop.										
Ch: Chagrin	B	Occasional	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low	Moderate.
DPF*:										
Dekalb	C	None	>6.0	---	---	20-40	Hard	Low	Low	High.
Pineville	B	None	>6.0	---	---	>60	---	Moderate	Low	High.
Guyandotte	B	None	>6.0	---	---	>60	---	Low	Low	High.
FvF: Fiveblock	C	None	>6.0	---	---	>60	---	Moderate	Low	Low.
GwE*:										
Gilpin	C	None	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Wharton	C	None	1.5-3.0	Perched	Nov-Mar	>40	Soft	High	High	High.
ImE, ItF: Itmann	C	None	>6.0	---	---	>60	---	Moderate	High	High.
Ka: Kanawha	B	Rare	>6.0	---	---	>60	---	Moderate	Low	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
Kc*:										
Kanawha----------	B	Rare------------	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
Urban land.										
KeB--------------- Kaymine	C	None------------	>6.0	---	---	>60	---	Moderate	Low------	Low.
KmF*:										
Kaymine----------	C	None------------	>6.0	---	---	>60	---	Moderate	Low------	Low.
Cedarcreek-------	C	None------------	>6.0	---	---	>60	---	Moderate	Moderate	High.
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	Low------	High.
KrF*:										
Kaymine----------	C	None------------	>6.0	---	---	>60	---	Moderate	Low------	Low.
Rock outcrop.										
LdE*:										
Lily-------------	B	None------------	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	Low------	High.
PnE*:										
Pineville--------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Lily-------------	B	None------------	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Po---------------- Potomac	A	Rare------------	4.0-6.0	Apparent	---	>60	---	Moderate	Low------	Moderate.
SeB*:										
Sensabaugh-------	B	Rare------------	4.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Low.
Lobdell----------	B	Rare------------	2.0-3.5	Apparent	Dec-Apr	>60	---	High-----	Low------	Moderate.
SwF--------------- Sewell	C	None------------	>6.0	---	---	>60	---	Moderate	Moderate	High.
Ud. Udorthents										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL DATA FOR SELECTED SOILS

(Analysis made by Soil Survey Laboratory, Lincoln, Nebraska)

Soil, sample number, and location	Horizon	Depth	Particle-size distribution: Very coarse sand (1 to 2 mm)	Coarse sand (0.5 to 1 mm)	Medium sand (0.25 to 0.5 mm)	Fine sand (0.1 to 0.25 mm)	Very fine sand (0.05 to 0.1 mm)	Total sand (0.05 to 2 mm)	Silt (0.002 to 0.05 mm)	Clay (less than 0.002 mm)	Fine clay (less than 0.0002 mm)
		In	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct
Berks:	A	0-2	3.5	3.0	9.1	13.2	8.9	37.7	46.6	15.7	3.6
S86WV-005-006	BA	2-6	1.6	2.5	9.6	12.5	8.1	34.3	49.3	16.4	3.1
350 yards south-	Bw	6-16	2.6	3.9	8.1	10.4	8.1	33.1	51.3	15.6	2.2
west of the	BC	16-23	4.3	3.9	5.6	7.6	9.4	30.8	52.2	17.0	2.2
intersection of											
U.S. Route 119											
and Low Gap Road											
Pineville:	A	0-3	12.2	6.3	7.1	9.2	7.9	42.7	44.0	13.3	2.7
S86WV-005-003	BA	3-10	8.2	4.6	7.0	8.5	7.4	35.7	48.3	16.0	2.9
300 yards east	Bt1	10-20	3.2	3.9	6.8	9.2	7.5	30.6	49.3	20.1	4.6
of the	Bt2	20-33	2.6	4.6	6.4	8.1	6.5	28.2	46.9	24.9	6.7
intersection of	Bt3	33-46	3.5	4.6	7.0	8.7	6.7	30.5	47.3	22.2	5.5
U.S. Route 119	BC,C	46-65	3.4	7.0	10.6	11.1	7.4	39.5	45.3	15.2	4.5
and Armco Road											

TABLE 19.--CHEMICAL DATA FOR SELECTED SOILS

(Analysis made by Soil Survey Laboratory, Lincoln, Nebraska. TR means trace. Dashes indicate that no determination was made)

Soil, sample number, and location	Horizon	Depth	pH 1:1 water	Organic matter	Exchangeable cations in milliequivalents per 100 grams of soil: H	Na	Ca	Mg	K	Sum of exchange-able cations	Sum of bases	Base saturation
				Pct								Pct
Berks:												
S86WV-005-006	A	0-2	4.1	3.61	16.7	0.3	0.9	0.3	0.3	18.5	1.8	9.7
350 yards southwest	BA	2-6	4.0	1.34	11.5	TR	TR	0.1	0.1	11.7	0.2	1.7
of the intersection	Bw	6-16	4.5	0.61	6.8	0.3	TR	0.2	0.1	7.4	0.6	8.1
of U.S. Route 119	BC	16-23	4.6	0.48	6.7	TR	0.1	0.4	0.2	7.4	0.7	9.5
and Low Gap Road												
Pineville:	A	0-3	4.1	5.63	18.5	---	2.7	0.4	0.4	22.0	3.5	15.9
S86WV-005-003	BA	3-10	4.6	0.80	6.7	---	0.4	0.1	0.2	7.4	0.7	9.5
300 yards east of	Bt1	10-20	4.7	0.29	5.6	---	0.4	0.4	0.2	6.6	1.0	15.2
the intersection of	Bt2	20-33	4.8	0.19	6.4	---	0.3	1.1	0.3	8.1	1.7	20.9
U.S. Route 119 and	Bt3	33-46	4.8	0.16	6.5	---	0.1	1.2	0.3	8.1	1.6	19.8
Armco Road	BC,C	46-65	4.7	0.11	5.4	---	0.1	0.9	0.2	6.6	1.2	18.2

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Cedarcreek	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guyandotte	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Itmann	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Kanawha	Fine-loamy, mixed, mesic Typic Hapludalfs
Kaymine	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Pineville	Fine-loamy, mixed, mesic Typic Hapludults
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Sewell	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Udorthents	Udorthents
Wharton	Fine-loamy, mixed, mesic Aquic Hapludults

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