United States
Department of
Agriculture

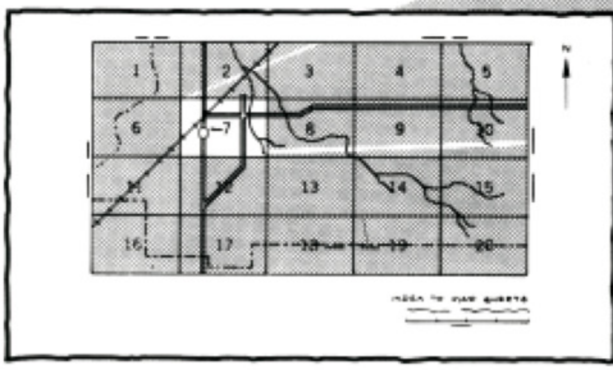
Soil
Conservation
Service

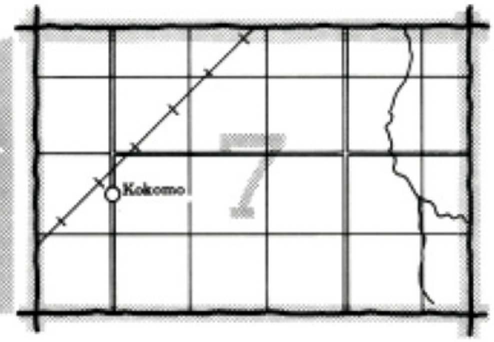
In cooperation with
Kentucky Natural Resources
and Environmental
Protection Cabinet and
the Kentucky Agricultural
Experiment Station

Soil Survey of Crittenden County, Kentucky

HOW TO USE

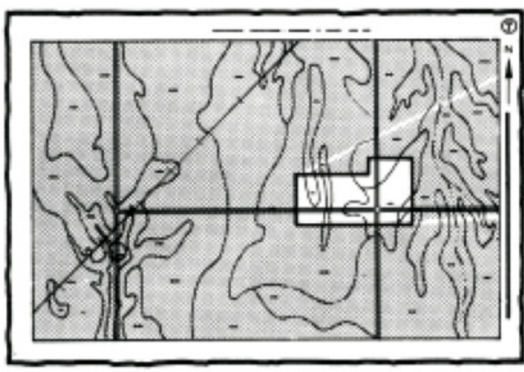
1. Locate your area of interest on the "Index to Map Sheets"

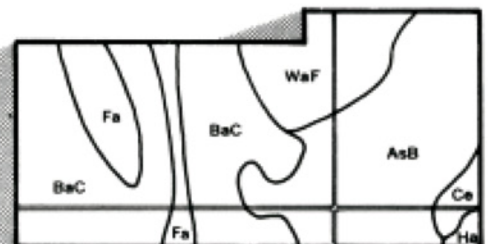




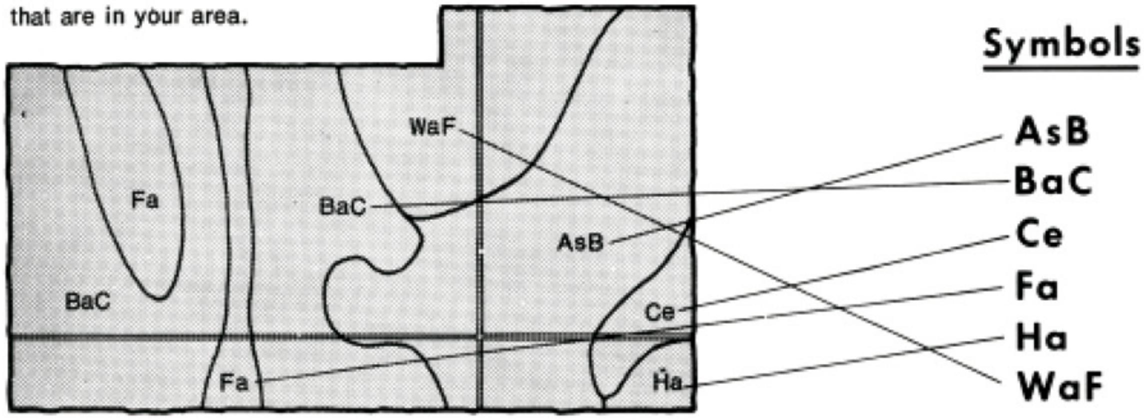
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



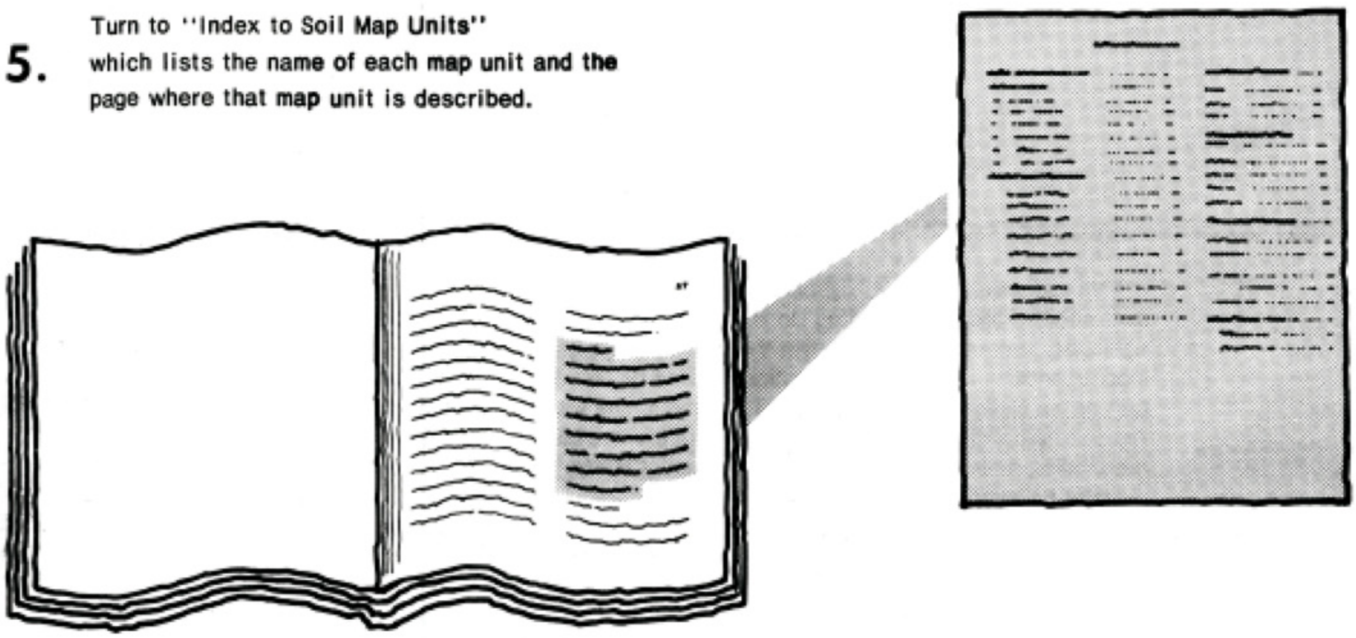


4. List the map unit symbols that are in your area.

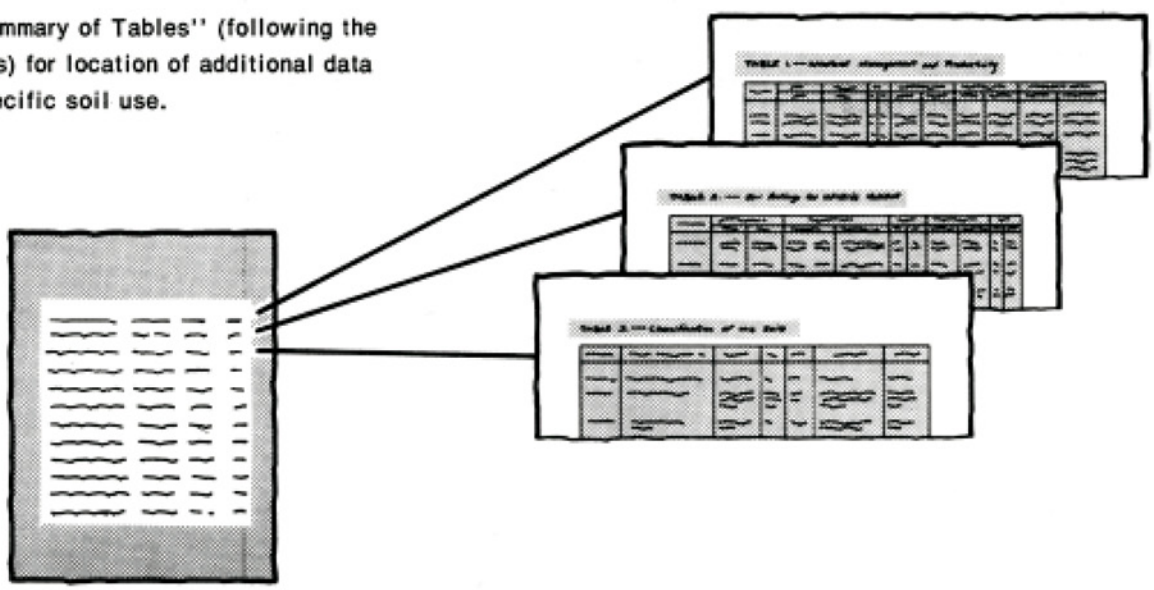


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in June 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Crittenden County 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.

Cover: The bottom land soils, Belknap silt loam, occasionally flooded, and Collins silt loam, occasionally flooded, are nearly level and are used for corn and soybeans. The woodland area in the background is on Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery.

Contents

Soil Series

Issued September 1988

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Summary of Tables

Foreword

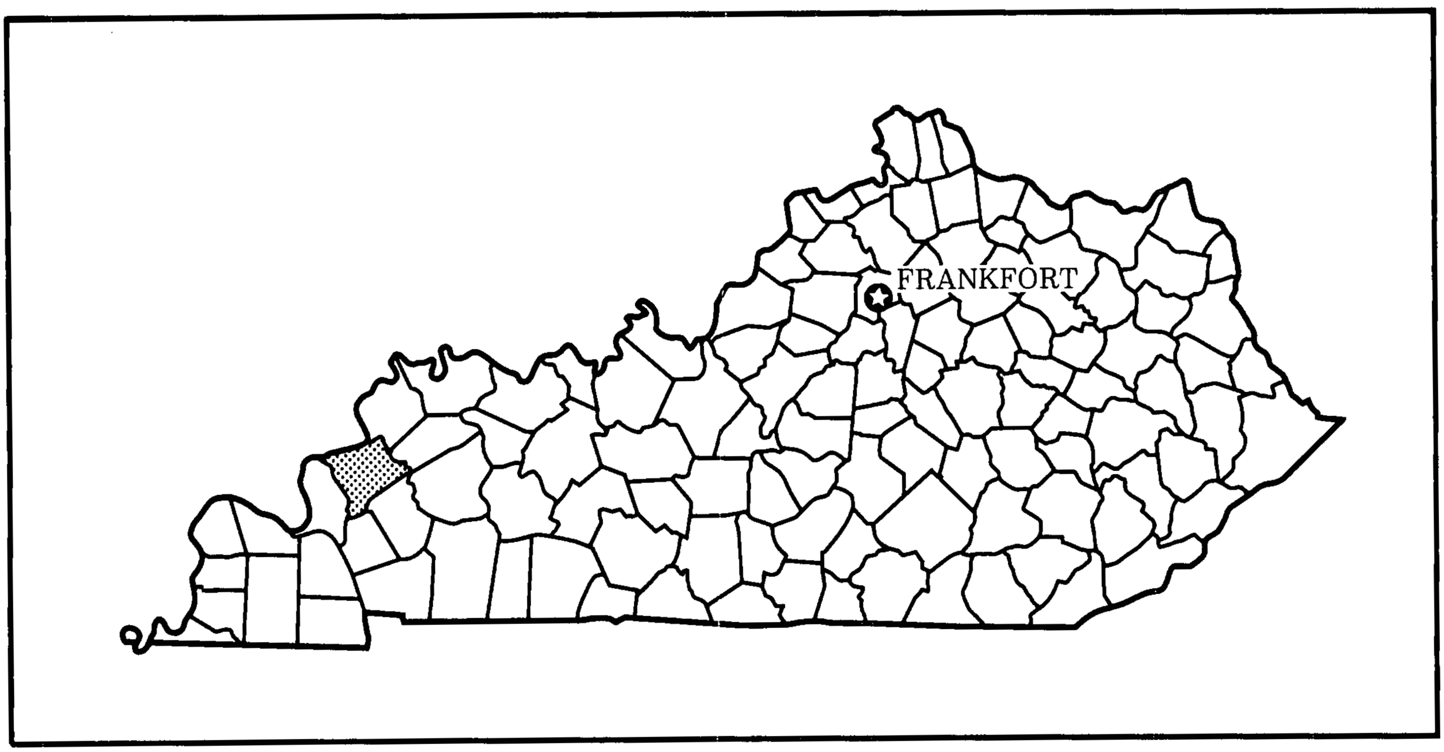
This soil survey contains information that can be used in land-planning programs in Crittenden County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, ranchers, 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 insure 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 Kentucky Cooperative Extension Service.

Randall W. Giessler
State Conservationist
Soil Conservation Service



Location of Crittenden County in Kentucky.

Soil Survey of Crittenden County, Kentucky

By Eullas H. Jacobs, Soil Conservation Service

Soils surveyed by Eullas H. Jacobs and Donald W. Holbrook, Soil Conservation Service, and Kenneth E. Scott, Division of Conservation, Kentucky Natural Resources and Environmental Protection Cabinet

United States Department of Agriculture, Soil Conservation Service
In cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet
and the Kentucky Agricultural Experiment Station

CRITTENDEN COUNTY is in the northwestern part of Kentucky. It is bounded on the east by the Tradewater River, on the north by the Ohio River, on the west by the Cumberland River and Livingston County, and on the south by Livingston Creek and Caldwell County. The land area of the county is 230,208 acres. Marion is the county seat.

Elevations in the county range from about 310 feet to about 840 feet. Drainage is to the north and west.

Relief ranges from nearly level to steep. Most of the soils that are nearly level are on the flood plains. The soils that are gently sloping to steep are on the uplands. Faulting has been rather extensive in many areas of the county.

Farming has been a major enterprise since Crittenden County was first settled. Corn, grain sorghum, wheat, soybeans, hay, and pasture grasses are the main crops. Hogs and beef cattle are the most common livestock. Dairy cattle, horses, sheep, and goats are raised on a few farms.

Some fluorspar mining has taken place in the county. Coal mining in the adjoining counties to the east provides jobs for Crittenden County residents. Also, industrial development in the county dates from about 1965.

General Nature of the Survey Area

This section gives general information about climate, history, geology, natural resources, farming, and industry in Crittenden County.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Fords Ferry Dam in the period 1951 to 1980. 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 36 degrees F, and the average daily minimum temperature is 27 degrees. The lowest temperature on record, which occurred at Fords Ferry Dam on January 17, 1977, is -13 degrees. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Fords Ferry Dam on July 14, 1954, is 105 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 (50 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 42 inches. Of this, 22 inches, or about 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 17 inches. The heaviest

1-day rainfall during the period of record was 4.81 inches at Fords Ferry Dam on April 16, 1972. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 11 inches. The greatest snow depth at any one time during the period of record was 16 inches. On an average of 11 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 10 miles per hour, in spring.

History

In 1786, James Armstrong, a native of South Carolina, became the first settler in the area that is now Crittenden County. Between 1800 and 1840, the population grew rapidly. In 1842, Crittenden County was formed from a part of Livingston County.

Originally, most of the area was covered with dense hardwood forest. Some lowlands were covered with cane. The uplands were settled first because much of the bottom land was wet or swampy. Forests were cleared, and fruit trees and gardens were planted. Wheat, tobacco, corn, and soybeans became important crops.

After the upland areas were developed, the bottom lands were cleared, drained, and used for row crops. Some of the upland areas were gradually used as pasture and hayland. Other areas reverted to woodland, and some areas have been planted to pine trees.

Many small fluorspar mines operated in the county. Small amounts of oil and coal have also been produced.

Geology

Crittenden County is in the Western Coal Field and the Western Pennyroyal physiographic regions of Kentucky *(13)*. The soils in the county are underlain by sedimentary rocks of Pennsylvanian and Mississippian age. Rocks of Pennsylvanian age are mostly in the eastern part of the county, and rocks of Mississippian age are in other parts of the county.

Loess, wind-deposited material composed of silt particles, blankets most of the upland areas to a depth of 2 to 6 feet. Some steep areas have little or no loess.

Stream bottoms and terraces have sandy, silty, or clayey material of mixed mineralogy.

Natural Resources

The major natural resources in Crittenden County are soil, fluorspar, coal, limestone, petroleum, natural gas, sand, gravel, clay, and trees.

Fluorspar was mined rather extensively until 1967. Large reserves of fluorspar are still in the county, but the mining of those reserves is not an economical operation.

Large tracts of steep uplands and some wet lowlands are used as woodland. According to the Forest Resources of Kentucky, about 92,000 acres in the county is forested *(12)*. Mixed hardwoods are dominant, but several hundred acres has been planted to pine trees. A few sawmills are being operated in the area. A considerable volume of wood is shipped to Wickliffe and made into paper.

The Ohio River is used for transportation and recreation. Dams make the river navigable at all times. Manmade lakes provide water for Marion and some rural areas, but most rural residents obtain water from springs, wells, or cisterns. Ponds are used for the watering of livestock, for fishing and swimming, and for supplying water for residential uses.

Farming

Much of the income in Crittenden County is derived from the sale of farm products. In 1982, the principal crops were corn, soybeans, wheat, hay, and grain sorghum *(19)*. A small acreage was in tobacco. Corn, soybeans, and wheat still account for most of the income from cultivated crops. Alfalfa, red clover, lespedeza, timothy, and other grasses are used for hay. A large acreage of fescue is used for pasture and hay.

In 1982, most of the livestock income was derived from the sale of cattle and calves, hogs, pigs, and dairy products. Other livestock income was received from the sale of sheep and poultry.

There were 569 farms in Crittenden County in 1982. The size of the average farm was 239 acres. About 43 percent of the farms ranged from 50 to 179 acres, and about 30 percent ranged from 180 to 499 acres. The farm size has stayed about the same in recent years.

Industry

In 1984, residents of Crittenden County were employed on local farms and in the forestry, construction, manufacturing, and mining industries. Currently, in addition to these local industries, they are also employed in manufacturing plants in Evansville, Indiana, in Madisonville, Paducah, and Henderson, Kentucky, and in coal mines in the nearby counties.

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 from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

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

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

Map Unit Composition

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

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 soils on the landscape.

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

General Soil Map Units

The general soil map at the back of this publication shows 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, a map unit 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 other units 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 a 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.

1. Nicholson-Hammack-Crider

Gently sloping to moderately steep, deep, moderately well drained and well drained soils that have a loamy or clayey subsoil; on uplands

This map unit is in the southwestern part of Crittenden County. Broad upland ridges were dissected by a dendritic drainage system and formed a series of low hills and narrow valleys (fig. 1). Karst topography and sinkholes are common. The slopes range from 2 to 20 percent. The soils of this map unit are underlain by Mississippian age limestone. These soils formed in loess, and the residuum formed from limestone.

This map unit makes up about 6 percent of the county. It is about 42 percent Nicholson soils, 33 percent Hammack soils, 9 percent Crider soils, and 16 percent soils of minor extent.

Nicholson soils are gently sloping to moderately steep and moderately well drained. They are on broad ridgetops and upper hillsides. The surface layer and subsoil are silt loam. A firm, compact, and slowly permeable fragipan is at a depth of 16 to 30 inches.

Hammack soils are sloping to moderately steep and well drained. They are on ridgetops and hillsides. The surface layer is silt loam or silty clay loam. The upper part of the subsoil is silty clay loam, and the lower part is very gravelly silty clay and very gravelly clay. The permeability is moderate.

Crider soils are gently sloping to moderately steep and well drained. They are on broad ridgetops and upper hillsides. The surface layer is silt loam. The upper part of the subsoil is silt loam, and the lower part is silty clay loam. The permeability is moderate.

Of minor extent are Grenada soils on the uplands and Nolin, Newark, and Lindside soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops, hay, and pasture. Woodlands are generally on the steeper slopes.

The soils of this map unit are suited to agricultural use. The soils that are gently sloping and sloping are well suited to cultivated crops that are commonly grown in the county. The soils that are more sloping are better suited to use as hayland, pasture, or woodland. Erosion is a hazard. Slope and a moderately deep root zone are the main limitations. Wetness is a limitation to use of soils of minor extent for cropland, hayland, or pasture. Flooding is a hazard.

Most of the soils of this map unit are suited to urban uses. Slope, clayey subsoil, wetness, and slow permeability are the main limitations for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

The soils of this map unit are well suited to use as habitat for wildlife.

2. Baxter-Hammack-Nicholson

Gently sloping to very steep, deep, well drained and moderately well drained soils that have a clayey or loamy subsoil; on uplands

This map unit is in the northwestern and southwestern parts of Crittenden County. The upland ridges and valleys were formed by a dendritic drainage system (fig. 2). The slopes range from 2 to 50 percent. The soils of this map unit are underlain by cherty bedrock of Mississippian age. These soils formed in a layer of loess, and the underlying residuum formed from limestone. Sinkholes are in some areas.

This map unit makes up about 15 percent of the county. It is about 26 percent Baxter soils, 20 percent Hammack soils, 15 percent Nicholson soils, and 39 percent soils of minor extent.

Baxter soils are steep to very steep and well drained. They are on hillsides. The surface layer is gravelly silt loam. The upper part of the subsoil is very gravelly silt

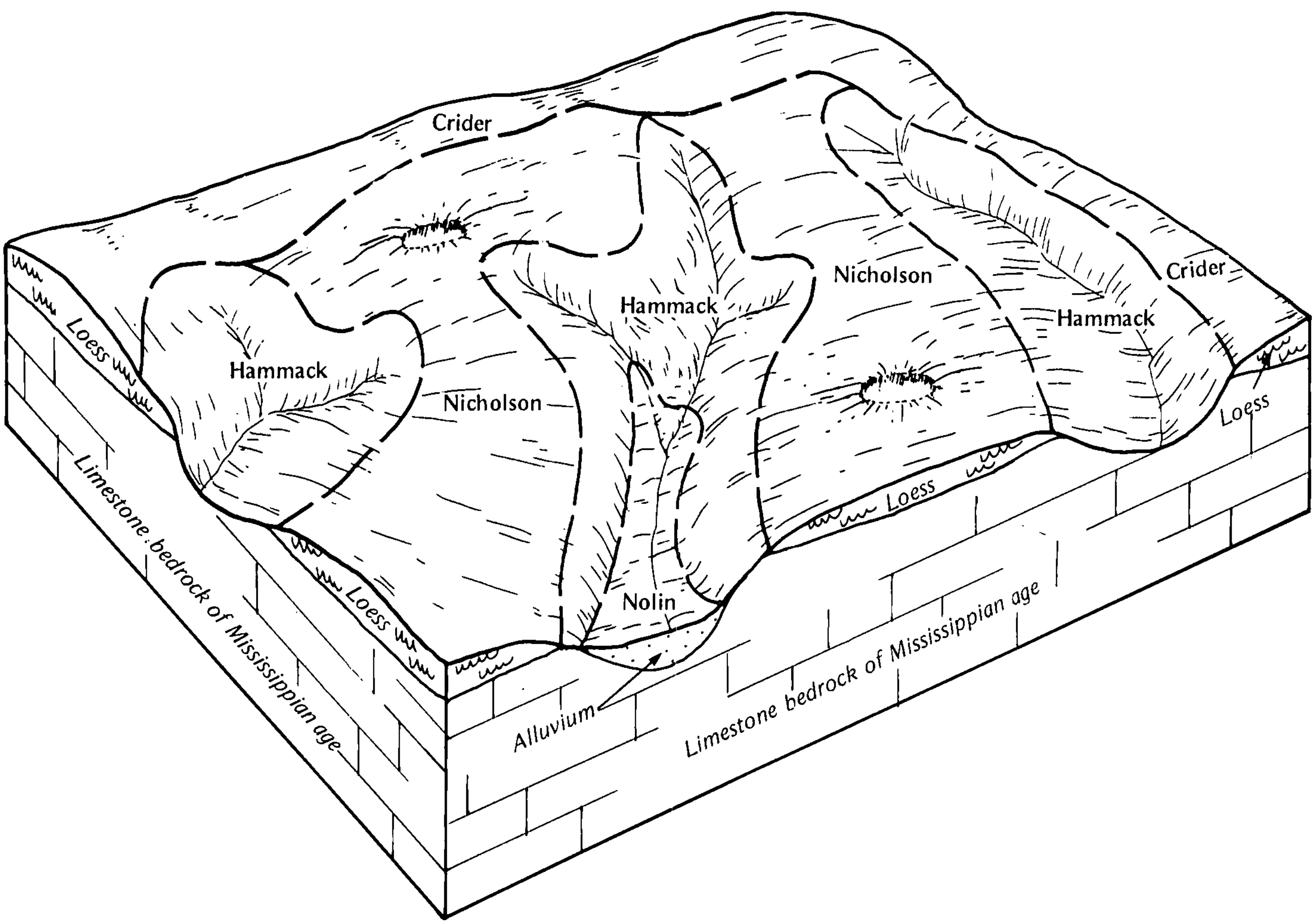


Figure 1.—Relationship of soils to topography and underlying material in the Nicholson-Hammack-Crider map unit.

loam and silty clay loam, and the lower part is gravelly clay. The permeability is moderate.

Hammack soils are sloping to moderately steep and well drained. They are on ridgetops and hillsides. The surface layer is silt loam or silty clay loam. The upper part of the subsoil is silty clay loam, and the lower part is very gravelly silty clay and very gravelly clay. The permeability is moderate.

Nicholson soils are gently sloping to moderately steep and moderately well drained. They are on broad ridgetops and upper hillsides. The surface layer and the subsoil are silt loam. A firm, compact, and slowly permeable fragipan is at a depth of 16 to 30 inches.

Of minor extent are Memphis and Loring soils on the uplands, Otwell and Weinbach soils on stream terraces, and Nolin, Newark, and Lindside soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops, hay, and as pasture. Woodlands are generally on the steeper slopes.

The soils of this map unit are moderately well suited to agricultural use. The soils that are gently sloping and sloping are well suited to cultivated crops that are commonly grown in the county. The soils that are more sloping are better suited to use as hayland, pasture, or woodland. Erosion is a hazard. Slope and a moderately deep root zone are the main limitations. Flooding is a hazard; and on flood plains, limits the use of the soils of minor extent for cropland, hayland, or pasture.

The soils of this map unit are poorly suited to urban uses. Slope, clayey subsoil, wetness, and slow permeability are the main limitations for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

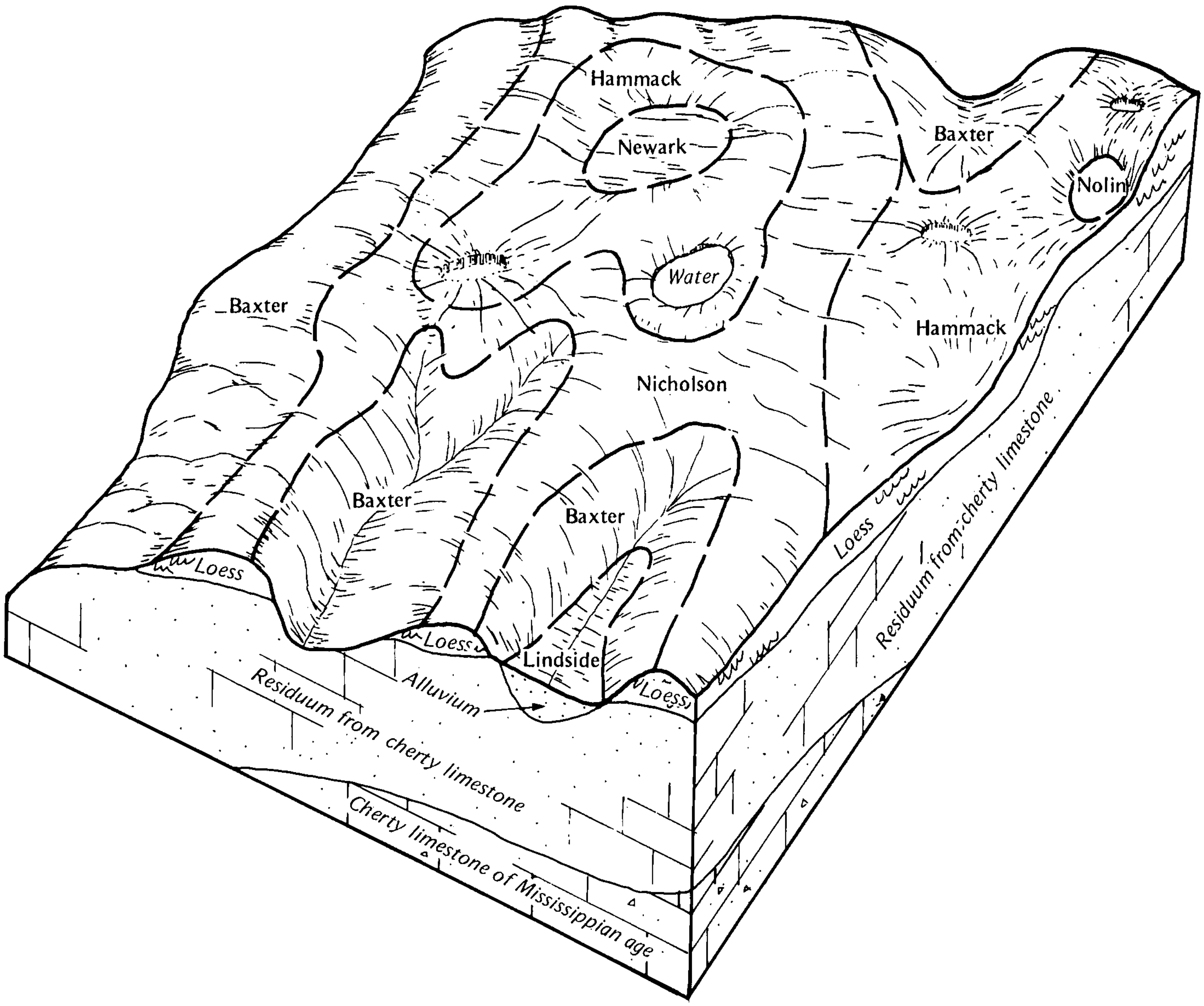


Figure 2.—Relationship of soils to topography and underlying material in the Baxter-Hammack-Nicholson map unit.

The soils of this map unit are well suited to use as habitat for wildlife.

3. Zanesville-Loring-Frondorf

Gently sloping to very steep, deep to moderately deep, moderately well drained and well drained soils that have a loamy subsoil; on uplands

This map unit is in the central part of Crittenden County on hilltops and side slopes. The broad upland ridges were dissected by a dendritic drainage system that formed a series of low hills and narrow valleys (fig. 3). The slopes range from 2 to 50 percent. The soils of this map unit formed in loess or in loess and residuum from sandstone, siltstone, or shale. These soils are underlain mainly by bedrock of Pennsylvanian age. A few soils are underlain by bedrock of Mississippian age.

This map unit makes up about 66 percent of the county. It is about 32 percent Zanesville soils, 19 percent Loring soils, 12 percent Frondorf soils, and 37 percent soils of minor extent.

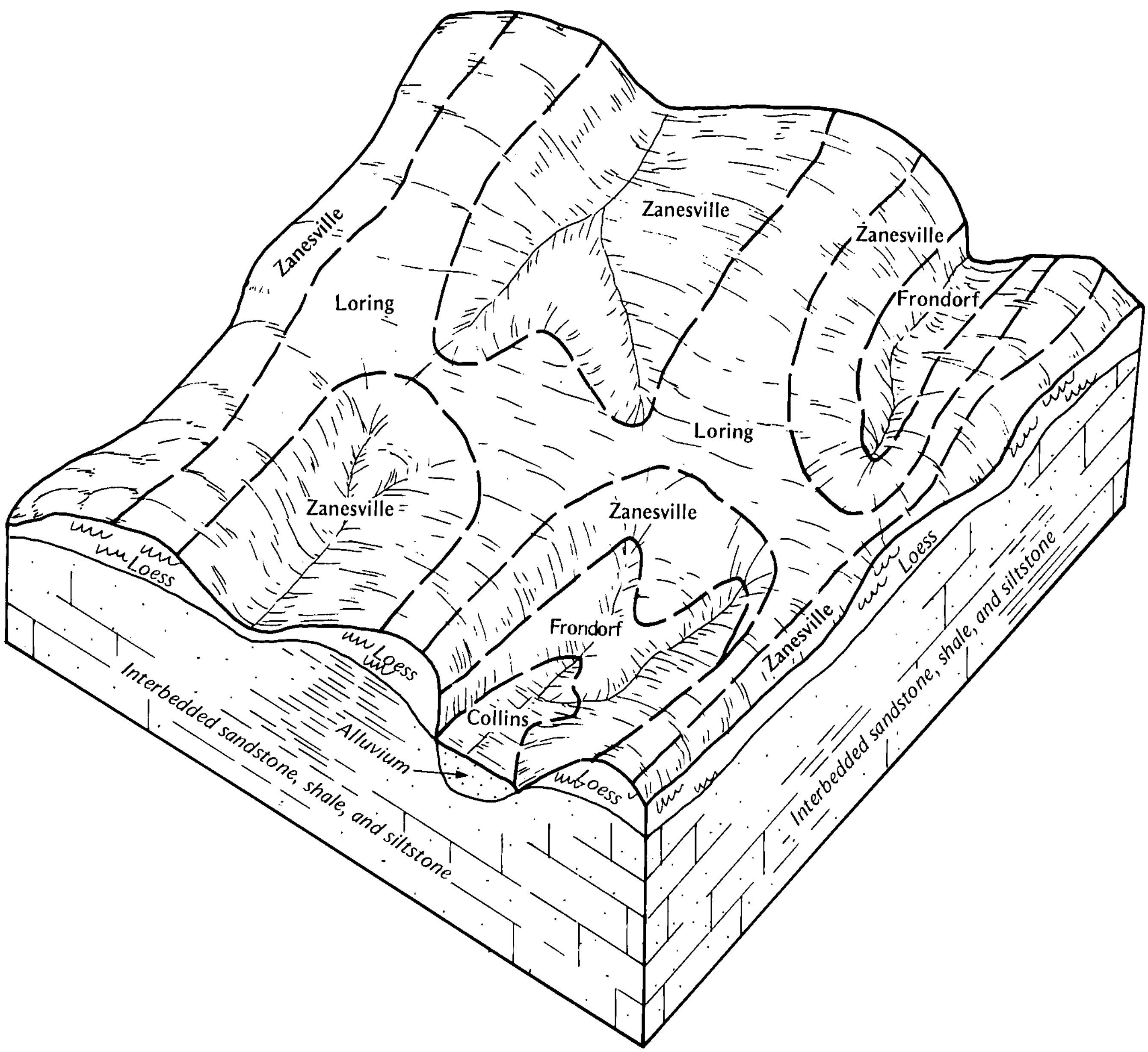


Figure 3.—Relationship of soils to topography and underlying material in the Zanesville-Loring-Frondorf map unit.

Zanesville soils are deep, sloping to moderately steep, and moderately well drained. They are on hillsides on the uplands. The surface layer and the subsoil are silt loam or silty clay loam. A firm, compact fragipan is at a depth of 18 to 30 inches. The permeability of the fragipan is slow.

Loring soils are deep, gently sloping and sloping, and moderately well drained. They are on broad ridgetops and upper hillsides. The surface layer and the subsoil are silt loam. A firm, compact, and slowly permeable fragipan is at a depth of 20 to 35 inches.

Frondorf soils are moderately deep, moderately steep to steep, and well drained. They are on hillsides, in areas of sandstone cliffs, and in areas that are stony and bouldery. The surface layer is silt loam or silty clay loam. The upper part of the subsoil is silt loam and silty clay loam, and the lower part is channery loam. The permeability is moderate.

Of minor extent are Memphis, Grenada, Calloway, Lenberg, Nicholson, Caneyville, Crider, Faywood, and Lowell soils on the uplands. Belknap, Collins, Waverly, Nolin, Lindside, and Newark soils are on the flood plains.

The soils of this map unit are used mainly for urban development, cultivated crops, and hay and pasture. The steeper areas are generally used as woodland.

The soils of this map unit are suited to agricultural use. The soils that are gently sloping and sloping are well suited to cultivated crops that are commonly grown in the county. The soils that are more sloping are better suited to use as hayland, pasture, and woodland. Erosion is a hazard. Slope and a moderately deep root zone are the main limitations. Wetness is a limitation to use of soils of minor extent on the flood plains for cropland, hayland, or pasture. Flooding is a hazard.

Most of the soils of this map unit are well suited to urban development. Slope, wetness, depth to bedrock, and slow permeability are the main limitations for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

The soils of this map unit are well suited to use as habitat for wildlife.

4. McGary-Belknap-Otwell

Nearly level to sloping, deep, somewhat poorly drained and moderately well drained soils that have a clayey or loamy subsoil; on flood plains and stream terraces

This map unit is in the eastern part of Crittenden County along the Tradewater River. The soils that are nearly level border the flood plain and those that are nearly level to sloping are on stream terraces that are in positions about 3 to 10 feet higher on the landscape (fig. 4). The slopes range from 0 to 12 percent. The soils of this map unit are underlain by sandstone, siltstone, and shale bedrock of Pennsylvanian age. This map unit has a few creeks or perennial streams and many intermittent streams.

This map unit makes up about 4 percent of the county. It is about 18 percent McGary soils, 15 percent Belknap soils, 14 percent Otwell soils, and 53 percent soils of minor extent.

McGary soils are nearly level and somewhat poorly drained. They are on stream terraces and are generally in higher positions on the landscape than Belknap soils. The surface layer and subsurface layer are silty clay loam, and the subsoil is silty clay. The permeability is moderately slow in the upper part of the subsoil and slow or very slow in the lower part.

Belknap soils are nearly level and somewhat poorly drained. They are in valleys adjacent to the smaller streams. The surface layer and underlying material are silt loam. The permeability is moderately slow or slow.

Otwell soils are nearly level to sloping and moderately well drained. They are on stream terraces and are generally in higher positions on the landscape than Belknap soils. The surface layer is silt loam. The subsoil is silty clay loam. A firm and compact fragipan is at a depth of 18 to 30 inches. The permeability is moderate above the fragipan and slow in the fragipan.

Of minor extent are Weinbach soils on stream terraces and Collins and Waverly soils on the flood plains. In areas of Crittenden County that join Union County are Uniontown and Henshaw soils on stream terraces and Lindside soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops and as pasture and woodland. The row crops are mainly corn and soybeans. McGary soils are used mainly as woodland.

The soils of this map unit are suited to agricultural use. Wetness is the main limitation, and flooding is a hazard. In addition, slope is a limitation and erosion is a hazard on Otwell soils that have slope of 2 to 12 percent.

Most of the soils of this map unit are poorly suited to urban uses. Flooding is a hazard, and wetness, shrink-swell potential, and slow permeability are the main limitations for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

The soils of this map unit are suited to use as habitat for wildlife.

5. Lindside-Newark-Nolin

Nearly level, deep, somewhat poorly drained to well drained soils that have a loamy subsoil; on flood plains

This map unit is in the northwestern and southwestern parts of Crittenden County along perennial streams. The soils that are nearly level border the flood plains and those that are nearly level to sloping are on stream terraces in slightly higher positions on the landscape. The soils of this map unit are underlain by Mississippian age limestone. Many intermittent streams dissect this map unit.

This map unit makes up about 4 percent of the county. It is about 28 percent Lindside soils, 25 percent Newark soils, 20 percent Nolin soils, and 27 percent soils of minor extent.

Lindside soils are nearly level and moderately well drained. They are on flood plains of the major streams that drain into the Cumberland and Ohio Rivers. The surface layer and the subsoil are silt loam or silty clay loam. The permeability is moderate.

Newark soils are nearly level and somewhat poorly drained. They are on flood plains of the major streams that drain into the Cumberland and Ohio Rivers. The surface layer and the subsoil are silt loam or silty clay loam. The permeability is moderate.

Nolin soils are nearly level and well drained. They are on the flood plains of the major streams that drain into the Cumberland and Ohio Rivers. The surface layer and the subsoil are silt loam or silty clay loam. The permeability is moderate.

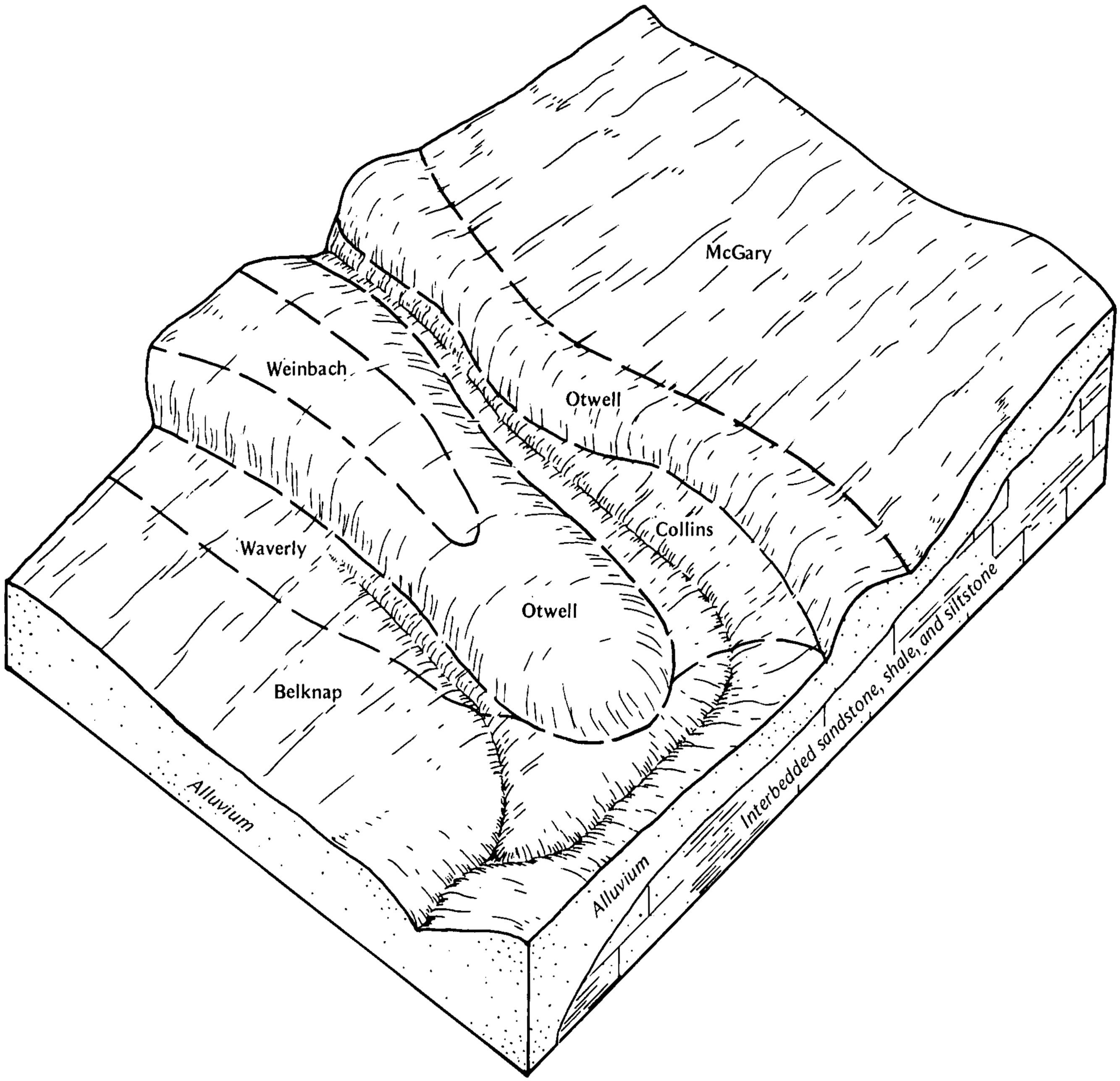


Figure 4.—Relationship of soils to topography and underlying material in the McGary-Belknap-Otwell map unit.

Of minor extent are Otwell and Weinbach soils on stream terraces and Melvin soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops and as pasture and woodland. The row crops are mainly corn and soybeans.

The soils of this map unit are well suited to agricultural use. Flooding is a hazard. Wetness is the main limitation.

The soils of this map unit are poorly suited to urban uses. Flooding is a hazard, and wetness is the main limitation for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

The soils of this map unit are suited to use as habitat for wildlife.

6. Belknap-Collins-Waverly

Nearly level, deep, moderately well drained to poorly drained soils that have a loamy subsoil; on flood plains

This map unit is in the southeastern part of the Crittenden County along Piney Creek. The soils that are nearly level border the flood plains, and those that are nearly level to gently sloping are on stream terraces that are in slightly higher positions on the landscape (fig. 5).

This map unit makes up about 2 percent of the county. It is about 30 percent Belknap soils, 24 percent Collins soils, 14 percent Waverly soils, and 32 percent soils of minor extent.

Belknap soils are nearly level and somewhat poorly drained. They are on flood plains adjacent to the smaller streams. The surface layer and the underlying material are silt loam. The permeability is moderately slow or moderate.

Collins soils are nearly level and moderately well drained. They are on flood plains along small streams. The surface layer and the underlying material are silt loam. The permeability is moderate.

Waverly soils are nearly level and poorly drained. They are on flood plains. The surface layer, the subsoil, and the substratum are silt loam. The permeability is moderate.

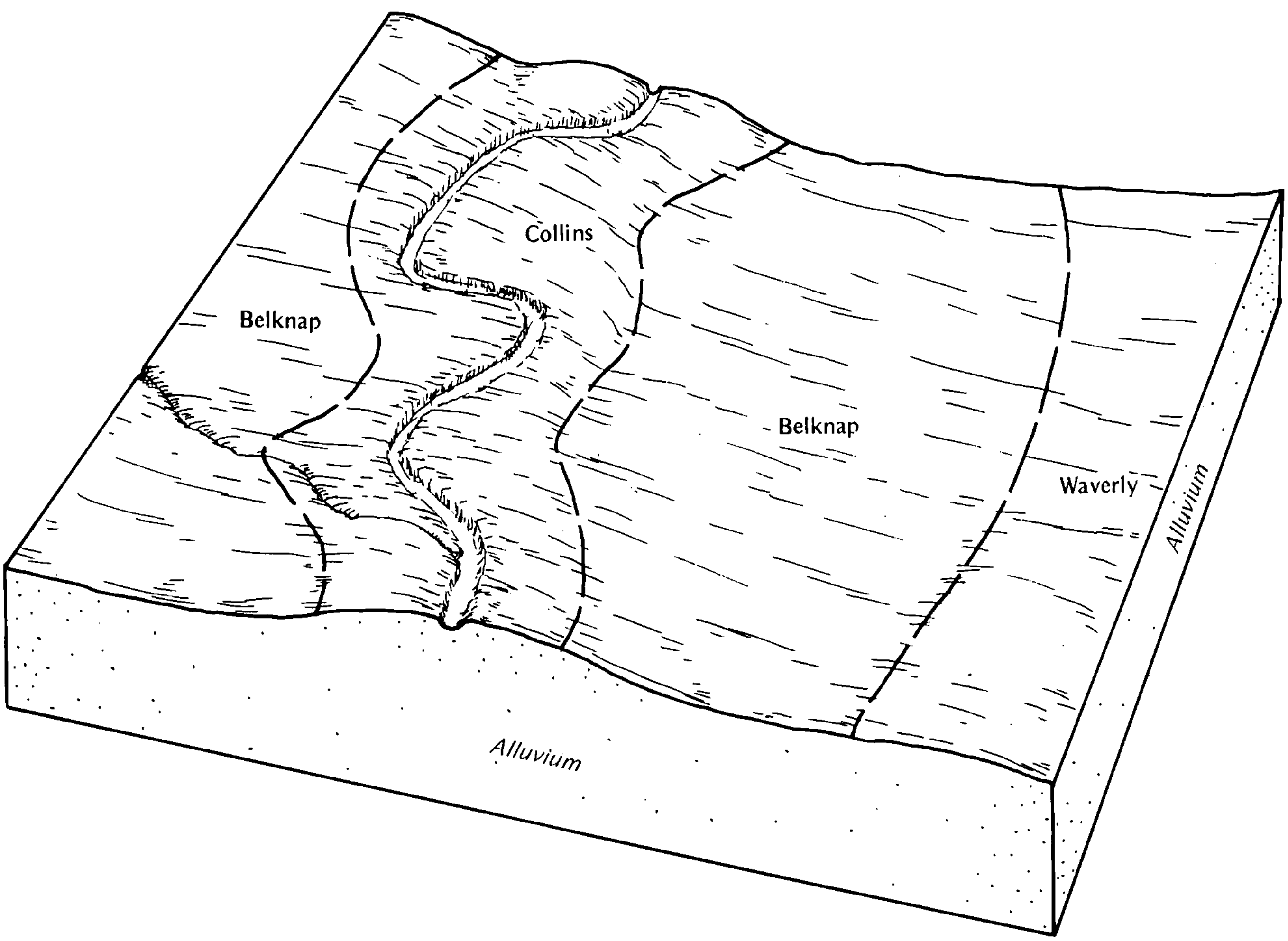


Figure 5.—Relationship of soils to topography and underlying material in the Belknap-Collins-Waverly map unit.

Of minor extent are Otwell, Weinbach, and McGary soils on stream terraces and Clifty soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops and as pasture and woodland. The row crops are mainly corn and soybeans.

The soils of this map unit are moderately well suited to agricultural use. The main limitation is wetness. Flooding is a hazard.

The soils of this map unit are poorly suited to urban uses. Flooding is a hazard, and wetness and slow permeability are the main limitations for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

These soils are suited to use as habitat for wildlife.

7. Huntington-Robinsonville-Nolin

Nearly level, deep, well drained soils that have a loamy subsoil; on flood plains

This map unit is in the northern part of Crittenden County along the Ohio River. The difference in elevation (fig. 6) of these soils is very slight. A few perennial streams dissect this map unit.

This map unit makes up about 3 percent of the county. It is about 32 percent Huntington soils, 21 percent Robinsonville soils, 18 percent Nolin soils, and 29 percent soils of minor extent.

Huntington soils are nearly level and well drained. They are on flood plains of the Ohio River that are generally adjacent to the river. The surface layer is silt loam, and the subsoil is silt loam and silty clay loam. The permeability is moderate.

Robinsonville soils are nearly level and well drained. They are on flood plains of the Ohio River. The surface layer is fine sandy loam. The subsoil is stratified loam, fine sandy loam, and loamy fine sand. The permeability is moderate or moderately rapid.

Nolin soils are nearly level and well drained. They are on flood plains of the Ohio River. The surface layer and the subsoil are silt loam or silty clay loam. The permeability is moderate.

Of minor extent are Lindside, Newark, and Melvin soils on the flood plains.

The soils of this map unit are used for cultivated crops and as woodland. The row crops are mainly corn and soybeans.

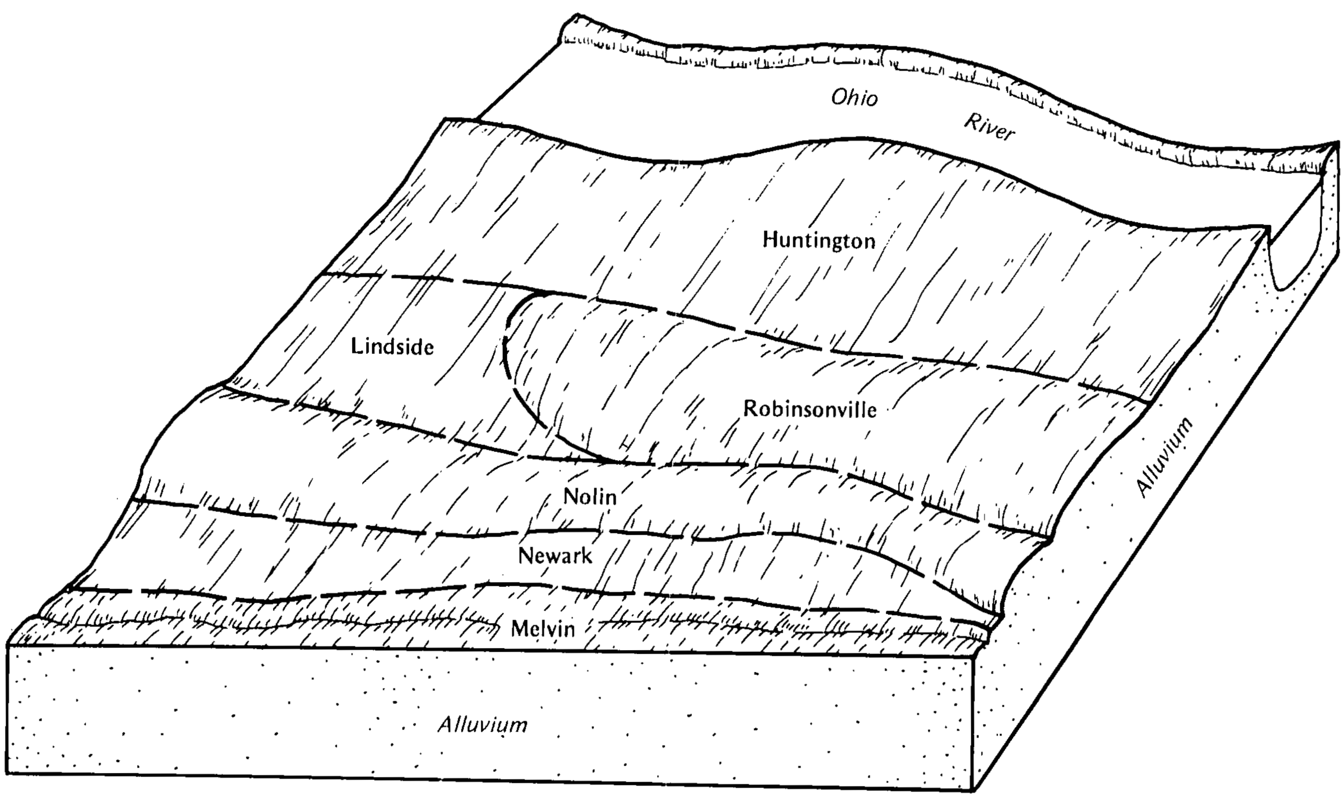


Figure 6.—Relationship of soils to topography and underlying material in the Huntington-Robinsonville-Nolin map unit.

The soils of this map unit are well suited to cultivated crops. Flooding is a hazard. These soils are poorly suited to pasture and hay crops that are subject to damage by flooding.

The soils of this map unit are poorly suited to urban uses. Flooding is a hazard, and wetness is the main limitation for housing developments and other urban uses. Low strength is a limitation to use for local roads and streets.

The soils of this map unit are suited to use as habitat for wildlife.

Detailed Soil Map Units

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

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

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

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

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

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

A *soil complex* consists of two or more soils 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. Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery, is an example.

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

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

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

BaE—Baxter gravelly silt loam, 20 to 50 percent slopes. This soil is deep and well drained. It formed in residuum from cherty limestone. This soil is on uplands dissected by intermittent drainageways. The mapped areas range from 5 to 380 acres.

Typically, the surface layer is dark grayish brown gravelly silt loam about 2 inches thick. The subsurface layer, to a depth of about 8 inches, is brown gravelly silt loam. The upper part of the subsoil, to a depth of about 14 inches, is yellowish brown very gravelly silt loam. The next layer, to a depth of about 22 inches, is strong brown very gravelly silty clay loam. The next layer, to a depth of about 32 inches, is red gravelly clay that has yellowish red mottles. The next layer, to a depth of about 48 inches, is red gravelly clay. The lower part to a depth of about 68 inches is yellowish red gravelly clay.

The natural fertility of this soil is medium, and the organic matter content is moderate. Reaction ranges from strongly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate in the clayey subsoil. Soil tilth is fair because of chert fragments in the soil. The root zone is deep.

Included with this soil in mapping are some small areas of Hammack soils on the uplands. Also included are some soils that are similar to Baxter soil but have more than 35 percent gravel and some areas of soils that are severely eroded. The included soils make up less than 20 percent of this map unit. Individual areas generally are less than 3 acres.

Most of the acreage of this Baxter soil is used as woodland. In some areas, it is used for pasture.

This soil is suited to use for pasture, but it is poorly suited to cultivated crops. Steepness of slope is the main limitation, and, in addition, the hazard of erosion is severe. A good fertilization program helps to maintain good stands of grasses and legumes, which help control erosion in areas that are used for pasture.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 63 cubic feet per acre. Yellow poplar, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, and loblolly pine are the preferred trees to plant. The hazard of erosion, use of equipment, and plant competition are concerns in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses because of steepness of slope and the clayey texture of the soil. Low soil strength is a limitation for local roads and streets.

This Baxter soil is in capability subclass VIIe, and the woodland ordination symbol is 4R.

Be—Belknap silt loam, occasionally flooded. This soil is deep, nearly level, and somewhat poorly drained. It is in valleys on the flood plains along small streams. Many areas of this map unit are dissected by drainage ditches and small streams. The slopes range from 0 to 2 percent. The mapped areas range from 5 to 325 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the underlying material, to a depth of about 17 inches, is brown silt loam that has light brownish gray mottles. The lower part to a depth of about 60 inches is light brownish gray silt loam that has brown mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid except where the surface layer has been limed. The permeability is moderate or moderately slow. The available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep but is somewhat restricted by a seasonal high water table. A seasonal high water table is at a depth of 1 foot to 3 feet. This soil is subject to occasional flooding.

Included with this soil in mapping are some small areas of Collins and Waverly soils. Also included are some soils that are similar to Belknap soil but have a higher clay content. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Belknap soil is used for cultivated crops. In a few areas, it is used as woodland. This soil is seldom used for winter crops because of the seasonal high water table and the hazard of flooding.

This Belknap soil is suited to row crops. High yields can be obtained with proper management. Flooding is a hazard, and a seasonal high water table is the main limitation to use of this soil for row crops. A tile drainage system is needed to obtain maximum yields of crops commonly grown in the area. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 90 cubic feet per acre. Eastern cottonwood, American sycamore, sweetgum, and baldcypress are suitable trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Wetness and the moderate or moderately slow permeability of this soil are limitations for urban uses.

This Belknap soil is in capability subclass IIw, and the woodland ordination symbol is 6A.

Ca—Calloway silt loam, 0 to 2 percent slopes. This soil is deep and somewhat poorly drained. It is on broad upland divides and old stream terraces. The mapped areas range from 3 to 90 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is light olive brown silt loam that has light brownish gray mottles. The next layer, to a depth of about 29 inches, is light brownish gray silt loam that has brownish yellow mottles. The lower part to a depth of about 60 inches is firm and compact. It has a light brownish gray and yellowish brown silty clay loam fragipan mottled in shades of brown and gray.

The natural fertility and the organic matter content of this soil are low. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. This soil is wet for long periods in winter and early in the spring. The root zone is moderately deep. Root penetration and the vertical movement of air and water are restricted by the fragipan. This soil is easily tilled within a wide range of moisture content. A seasonal high water table is at a depth of 1 foot to 2 feet.

Included with this soil in mapping are some small areas of Grenada and Belknap soils. These soils have texture and slope similar to those of Calloway soil. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 1 acre.

In most areas, this Calloway soil is used for agriculture.

This soil is suited to most cultivated crops commonly grown in the area. Grasses and legumes should be selected that can tolerate wetness and withstand flooding for short periods. The main limitations are wetness in winter and early in spring and dryness late in summer and early in fall. Because of the fragipan, this soil is not suited to deep-rooted crops. Surface drainage is needed to effectively remove excess water.

This soil is suited to woodland. At the point of highest annual growth, loblolly pine should produce a volume of 110 cubic feet per acre. Sweetgum and loblolly pine are the preferred trees to plant. The use of equipment and plant competition are concerns in management.

This soil is poorly suited to most urban uses because of wetness and slow permeability. Wetness is a severe limitation to use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets. Some areas near streams are subject to flooding.

This Calloway soil is in capability subclass IIw, and the woodland ordination symbol is 8W.

CcE—Caneyville-Crider-Rock outcrop complex, 15 to 40 percent slopes. The soils in this complex are moderately deep and deep and are well drained. They are on upland hillsides dissected by intermittent drainageways. The mapped areas range from 5 to 220 acres.

Caneyville soil makes up about 42 percent of this complex, Crider soil about 21 percent, Rock outcrop about 14 percent, and included soils about 23 percent. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Caneyville soil is brown silt loam about 2 inches thick. The subsurface layer, to a depth of about 5 inches, is light yellowish brown silt loam. The upper part of the subsoil, to a depth of about 11 inches, is yellowish red silty clay. The middle part, to a depth of about 24 inches, is reddish brown silty clay. The lower part, to a depth of about 34 inches, is reddish brown silty clay with pale brown mottles. Limestone bedrock is at a depth of about 34 inches.

The natural fertility of Caneyville soil is medium, and the organic matter content is moderate. Reaction ranges from very strongly acid to neutral. The permeability is moderately slow, and the available water capacity is moderate. The shrink-swell potential is moderate in the clayey subsoil. The rooting depth and depth to bedrock range from 20 to 40 inches.

Typically, the surface layer of Crider soil is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 19 inches, is yellowish brown silt loam. The next layer, to a depth of about 31 inches, is strong brown silt loam. The next layer, to a depth of about 70 inches, is yellowish red silt loam. The lower part to a depth of about 82 inches is dark red silty clay loam.

The natural fertility of Crider soil is high, and the organic matter content is moderate. Reaction is strongly acid or medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate in the lower part of the subsoil. The root zone is deep and is easily penetrated by plant roots.

Rock outcrop consists of exposures of limestone bedrock and areas of limestone bedrock that protrudes as high as 6 feet above the surface. It is mostly attached bedrock and is difficult and expensive to remove. Scattered loose stones and boulders also are on the surface.

Included in this complex are some small areas of Memphis and Frondorf soils. Also included are some areas of soils that are similar to the soils in this complex but have more clay in the subsoil, some areas of soils that have a darker silty clay surface layer, and some areas of soils that are less than 20 inches deep to bedrock.

In most areas, these soils are in native hardwoods.

These soils are poorly suited to agricultural uses because of depth to bedrock, Rock outcrops, steepness of slope, and a clayey subsoil.

These soils are suited to woodland. At the point of highest annual growth, black oak should produce a volume of 53 cubic feet per acre on the north slopes of Caneyville soil and on the south slopes, a volume of 47 cubic feet per acre. On Crider soil, yellow poplar should produce a volume of 110 cubic feet per acre. On the north slopes of Caneyville soil, white oak, yellow poplar, white ash, and eastern white pine are the preferred trees to plant, and on the south slopes, Virginia pine and eastern redcedar. On Crider soil, eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. The hazard of erosion, use of equipment, and plant competition are concerns in management.

These soils are poorly suited to urban uses. Depth to bedrock, Rock outcrops, steepness of slope, and a clayey subsoil are the main limitations for urban uses.

Caneyville and Crider soils are in capability subclass VIe. Rock outcrop is in capability subclass VIIIs. The woodland ordination symbol of Caneyville soil on the north slope is 4R and 3R on the south slope; and for Crider soil, it is 8R; a woodland ordination symbol has not been designated for Rock outcrop.

Cl—Clifty silt loam, occasionally flooded. This soil is deep, nearly level, and well drained. It is in narrow valleys on the flood plains along the upper reaches of small streams. The slopes range from 0 to 2 percent. The mapped areas range from 5 to 80 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is brown gravelly silt loam. The lower part, to a depth of about 32 inches, is dark yellowish brown gravelly fine sandy loam. The substratum, to a depth of about 62 inches, is yellowish brown gravelly silt loam that has grayish brown mottles. Sandstone bedrock is at a depth of 62 inches.

The natural fertility of this soil is moderately low, and the organic matter content is low. Reaction is strongly acid throughout except where the surface layer has been limed. The permeability is moderately rapid, and the available water capacity is moderate. This soil is subject to brief periods of flooding mostly in winter or spring.

Included with this soil in mapping are some small areas of Collins soils. Also included are some areas of soils that are similar to Clifty soil but have a gravelly loam surface layer. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Clifty soil is used for crops, such as corn, hay, or pasture. Some areas are used as woodland or are left idle.

This soil is well suited to crops or pasture. Coarse fragments interfere with tillage in some places. Keeping cover crops on the surface and returning crop residue to the soil increase the content of organic matter and improve tilth.

This soil is suited to woodland. At the point of highest annual growth, shortleaf pine should produce a volume of 122 cubic feet per acre. Sweetgum, white ash, shortleaf pine, eastern white pine, northern red oak, and white oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to urban uses because of the hazard of flooding. Seepage limits the use of this soil as septic tank absorption fields.

This Clifty soil is in capability subclass IIs, and the woodland ordination symbol is 8A.

Co—Collins silt loam, occasionally flooded. This soil is deep, nearly level, and moderately well drained. It is in valleys on the flood plains along small streams. Most areas of this map unit are dissected by small streams and drainage ditches. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 3 to 340 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The upper part of the underlying material, to a depth of about 26 inches, is yellowish brown silt loam that has light brownish gray mottles between depths of 18 and 26 inches. The lower part to a depth of about 60 inches is brown silt loam that has yellowish brown and light brownish gray mottles between depths of 26 and 45 inches and has light gray mottles between depths of 45 and 60 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 2 to 5 feet. This soil is subject to brief periods of occasional flooding in winter or spring.

Included with this soil in mapping are some small areas of Belknap soils. Also included are some areas of soils that are similar to Collins soil but have higher clay content and some areas of soils that have gravelly loam at a depth of more than 40 inches. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Collins soil is used for crops, such as corn (fig. 7) and soybeans.

This soil is well suited to row crops. Because of flooding and wetness during the winter, this soil is poorly suited to small grains. Grasses and legumes that can tolerate wetness and brief periods of flooding in winter and spring are better adapted to this soil. Erosion is not a problem on this soil. Good tilth can be maintained by returning crop residue to the soil. A tile drainage system is not needed for crops commonly grown in the area.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 102 cubic feet per acre. Green ash, eastern cottonwood, and cherrybark oak are the preferred trees to plant. Plant competition is a concern in management.

Wetness is a severe limitation for most urban uses. Flooding is a hazard on this soil.

This Collins soil is in capability subclass IIw, and the woodland ordination symbol is 8A.

CrB—Crider silt loam, 2 to 6 percent slopes. This soil is deep and well drained. It is on the uplands in areas of karst topography. The mapped areas range from 3 to 72 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 19 inches, is yellowish brown and dark yellowish brown silt loam. The next layer, to a depth of about 31 inches, is strong brown silt loam. The next layer, to a depth of about 70 inches, is yellowish red silt loam. The lower part to a depth of about 82 inches is dark red silty clay loam.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction is strongly acid or medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Nicholson, Hammack, Loring, and Memphis soils that are on the uplands and Lindside soils that are in small basins. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Crider soil is used for crops, such as corn, soybeans, tobacco, pasture, or hay.

Figure 7.—This corn is growing in an area of Collins silt loam, occasionally flooded. The woodland area in the background is on Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery.

This soil is well suited to the crops commonly grown in the area. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to pasture and hay crops. High yields can be obtained with proper management. Lime and fertilizer applications, weed control, and controlled grazing increase productivity of the stand.

This soil is well suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 110 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope and the clayey texture in the lower part of the subsoil are the main limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Crider soil is in capability subclass IIe, and the woodland ordination symbol is 8A.

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded. This soil is deep and well drained. It is on upland side slopes in areas of karst topography. The mapped areas range from 5 to 150 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 19 inches, is yellowish brown and dark yellowish brown silt loam. The next layer, to a depth of about 31 inches, is strong brown silt loam. The next layer, to a depth of about 70 inches, is yellowish red silt loam. The lower part to a depth of about 82 inches is dark red silty clay loam.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction is medium acid to very strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Memphis and Loring soils that are on the uplands and Lindside soils that are in small basins. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Crider soil is used for crops, such as corn, soybeans, tobacco, pasture, or hay.

This soil is suited to the crops commonly grown in the area. Conservation tillage, contour cultivation, and the use of grasses and legumes in the rotation system help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to use as pasture. Applying lime and fertilizer, controlling weeds, controlling grazing, and selecting and establishing proper plants can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 110 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope and the clayey texture in the lower part of the subsoil are the main limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Crider soil is in capability subclass IIIe, and the woodland ordination symbol is 8A.

CrC3—Crider silt loam, 6 to 12 percent slopes, severely eroded. This soil is deep and well drained. It is on upland side slopes in areas of karst topography. The mapped areas range from 5 to 156 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 28 inches, is brown silt loam. The lower part to a depth of about 72 inches is yellowish red silty clay loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is medium acid to very strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has poor tilth, and it tends to crust if cultivated when it is too wet. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Memphis and Loring soils that are on the uplands and Lindside soils that are in small basins. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Crider soil is used for crops, such as corn, soybeans, tobacco, pasture, or hay.

With proper management, this soil is suited to most crops commonly grown in the area. Erosion is a hazard. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Soil tilth can be improved by returning crop residue to the soil.

This soil is suited to pasture. Applying lime and fertilizer, controlling weeds, controlling grazing, and selecting and establishing proper plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 110 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope and the clayey texture in the lower part of the subsoil are the main limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Crider soil is in capability subclass IVe, and the woodland ordination symbol is 8A.

CrD2—Crider silt loam, 12 to 20 percent slopes, eroded. This soil is deep and well drained. It is on upland side slopes in areas of karst topography. The mapped areas range from 5 to 65 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of about 19 inches, is yellowish brown and dark yellowish brown silt loam. The next layer, to a depth of about 31 inches, is strong brown silt loam. The next layer, to a depth of about 70 inches, is yellowish red silt loam. The lower part to a depth of about 82 inches is dark red silty clay loam.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction is very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Hammack and Memphis soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Crider soil has been cleared and is used for crops, such as corn and soybeans, pasture, or hay.

This soil is poorly suited to row crops because of the hazard of erosion. Erosion control practices are needed if this soil is used for row crops. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is suited to use as pasture. Lime and fertilizer application, weed control, controlled grazing, and proper selection and establishment of plants increase forage production and reduce erosion.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 110 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. Plant competition, the hazard of erosion, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope is the main limitation for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Crider soil is in capability subclass IVe, and the woodland ordination symbol is 8R.

CrD3—Crider silt loam, 12 to 20 percent slopes, severely eroded. This soil is deep and well drained. It is on upland side slopes in areas of karst topography. The mapped areas range from 6 to 30 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 28 inches, is brown silt loam. The lower part to a depth of 72 inches is yellowish red silty clay loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has poor tilth, and it tends to crust if cultivated when the soil is too wet. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Hammack and Memphis soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Crider soil has been cleared and is used for pasture or hay.

This soil is suited to pasture and hay plants commonly grown in the area. Erosion control measures are needed during seedbed preparation. This soil is poorly suited to cultivated crops because of the steepness of slope and the hazard of erosion.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 110 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, and shortleaf pine are the preferred trees to plant. Plant competition, the hazard of erosion, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope is the main limitation for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Crider soil is in capability subclass VIe, and the woodland ordination symbol is 8R.

FIE—Faywood-Lowell-Rock outcrop complex, 15 to 40 percent slopes. The soils in this complex are moderately deep and deep and are well drained. These soils are on upland hillsides dissected by intermittent drainageways. The mapped areas range from 5 to 200 acres.

Faywood soil makes up about 45 percent of this complex, Lowell soil about 20 percent, Rock outcrop about 14 percent, and included soils about 21 percent. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Faywood soil is dark grayish brown and dark brown silty clay loam about 5 inches thick. The subsoil, to a depth of about 23 inches, is yellowish brown clay. The substratum, to a depth of about 38 inches, is light olive brown clay. Limestone bedrock is at a depth of about 38 inches.

The natural fertility of Faywood soil is medium and the organic matter content is moderate. Reaction ranges from strongly acid to mildly alkaline throughout. The permeability is moderately slow or slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The rooting depth and depth to bedrock range from 20 to 40 inches.

Typically, the surface layer of Lowell soil is dark grayish brown silt loam about 2 inches thick. The upper part of the subsoil, to a depth of about 5 inches, is brown silt loam. The next layer, to a depth of about 18 inches, is yellowish brown silty clay loam. The next layer, to a depth of about 30 inches, is brown silty clay loam. The lower part, to a depth of about 48 inches, is brown silty clay. Limestone bedrock is at a depth of 48 inches.

The natural fertility of Lowell soil is medium, and the organic matter content is moderate. Reaction ranges from very strongly acid to slightly acid in the upper 30 inches. The permeability is moderately slow, and the available water capacity is high. The shrink-swell potential is moderate.

Rock outcrop consists of exposures of limestone bedrock and areas of limestone bedrock that protrudes as high as 6 feet above the surface. It is mostly attached bedrock and is difficult and expensive to remove. Scattered loose stones and boulders also are on the surface.

Included in this complex are some small areas of Frondorf soils that are near the top of the slopes. Also included are some areas of soils that are similar to the soils in this complex but are less than 20 inches to bedrock and small areas of alluvial soils that are along the drainageways.

These soils are used mostly as woodland. In a few areas, they are used for pasture.

These soils are poorly suited to agricultural uses. Steepness of slope, moderately slow and slow permeability, Rock outcrop, and depth to bedrock are severe limitations for agricultural uses.

These soils are suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 52 cubic feet per acre on Faywood soil, and Virginia pine should produce a volume of 119 cubic feet per acre on Lowell soil. White oak, eastern white pine, white ash, and northern red oak are the preferred trees to plant on Faywood and Lowell soils. In addition, yellow poplar is a preferred tree to plant on Lowell soil. The hazard of erosion, use of equipment, and plant competition are concerns in management.

These soils are poorly suited to urban uses. Steepness of slope, moderately slow and slow permeability, Rock outcrop, and depth to bedrock are severe limitations. Low soil strength is a limitation for local roads and streets.

Faywood and Lowell soils are in capability subclass VIe. Rock outcrop is in capability subclass VIIIs. The woodland ordination symbol is 4R for Faywood soil and 8R for Lowell soil. A woodland ordination symbol has not been designated for Rock outcrop.

FrD—Frondorf silt loam, 12 to 20 percent slopes. This soil is moderately deep and well drained. It is on upland side slopes. Most areas of this map unit are dissected by intermittent drainageways. The slopes are irregular and convex. The mapped areas range from 8 to 163 acres.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer, to a depth of about 6 inches, is brown silt loam. The upper part of the subsoil, to a depth of about 10 inches, is yellowish brown silt loam. The middle part, to a depth of about 21 inches, is strong brown silty clay loam. The lower part, to a depth of about 28 inches, is yellowish brown channery loam. Sandstone bedrock is at a depth of 28 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid throughout except where lime has been added. The permeability and the available water capacity are moderate. This soil has good tilth. The rooting depth and depth to bedrock ranges from 20 to 40 inches. If the vegetation cover is removed, the hazard of erosion is very severe.

Included with this soil in mapping are some small areas of Zanesville soils. Also included are some areas of soils that are similar to Frondorf soil but have a more clayey subsoil. The included soils make up less than 15 percent of this map unit. Individual areas are long and narrow and generally are less than 3 acres.

In most areas, this Frondorf soil is used as woodland. In a few small areas, it is used for pasture or hay.

This soil is poorly suited to row crops and small grains because of the steepness of slope and the hazard of erosion.

This soil is suited to hay and pasture if proper management practices are used. These include proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 119 cubic feet per acre on the north slopes and 109 cubic feet per acre on the south slopes. Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, and northern red oak are the preferred trees to plant on the north slopes. Eastern white pine, loblolly pine, shortleaf pine, and white oak are the preferred trees to plant on the south slopes. The hazard of erosion, use of equipment, and plant competition are concerns in management. Seedling mortality is also a concern in management on the south slopes.

This soil is well suited to use as habitat for woodland wildlife.

This soil is poorly suited to urban uses because of steepness of slope and depth to bedrock. Steepness of slope also is a limitation for recreational uses.

This Frondorf soil is in capability subclass IVe, and the woodland ordination symbol is 8R.

FrE—Frondorf silt loam, 20 to 30 percent slopes. This soil is moderately deep and well drained. It is on upland side slopes. Most areas of this map unit are dissected by intermittent drainageways. The slopes are irregular and convex. The mapped areas range from 5 to 160 acres.

Typically, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer, to a depth of about 6 inches, is brown silt loam. The upper part of the subsoil, to a depth of about 10 inches, is yellowish brown silt loam. The middle part, to a depth of about 21 inches, is strong brown silty clay loam. The lower part, to a depth of about 28 inches, is yellowish brown channery loam. Sandstone bedrock is at a depth of 28 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid throughout except where lime has been added. The permeability and the available water capacity are moderate. This soil has good tilth. The rooting depth and depth to bedrock ranges from 20 to 40 inches. If the vegetation cover is removed, the hazard of erosion is very severe.

Included with this soil in mapping are some small areas of soils that are similar to Frondorf soil but are more shallow. Also included are some areas of soils that have a more clayey subsoil than this Frondorf soil. The included soils make up less than 15 percent of this map unit. Individual areas are long and narrow and generally are less than 3 acres.

In most areas, this Frondorf soil is used as woodland. In a few small areas, it is used for pasture or hay.

This soil is not suited to row crops and small grains because of the steepness of slope and the hazard of erosion.

This soil is suited to hay and pasture if proper management practices are used. These include proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 119 cubic feet per acre on the north slopes and 109 cubic feet per acre on the south slopes. Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, and northern red oak are the preferred trees to plant on the north slopes. Eastern white pine, loblolly pine, shortleaf pine, and white oak are the preferred trees to plant on the south slopes. The hazard of erosion, use of equipment, and plant competition are concerns in management. Seedling mortality is also a concern in management on the south slopes.

This soil is well suited to use as habitat for woodland wildlife.

This soil is poorly suited to urban uses because of steepness of slope and depth to bedrock. Steepness of slope also is a limitation for recreational uses.

This Frondorf soil is in capability subclass VIe, and the woodland ordination symbol is 8R.

FsD3—Frondorf silty clay loam, 12 to 20 percent slopes, severely eroded. This soil is moderately deep and well drained. It is on upland side slopes. Most areas of this map unit are dissected by intermittent drainageways. The slopes are irregular and convex. The mapped areas range from 4 to 125 acres.

Typically, the surface layer is yellowish brown silty clay loam about 7 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 16 inches, is strong brown silty clay loam. The lower part, to a depth of about 23 inches, is yellowish brown channery loam. Sandstone bedrock is at a depth of 23 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid throughout except where lime has been added. The permeability and the available water capacity are moderate. This soil has fair tilth. The rooting depth and depth to bedrock range from 20 to 40 inches. If the vegetation cover is removed, the hazard of erosion is very severe.

Included with this soil in mapping are some small areas of Zanesville soils. Also included are some areas of soils that are similar to Frondorf soil but have a more clayey subsoil. The included soils make up less than 15 percent of this map unit. Individual areas are long and narrow and generally are less than 3 acres.

In most areas, this Frondorf soil is used as woodland. In a few small areas, it is used for pasture or hay.

This soil is not suited to row crops and small grains because of the steepness of slope and the hazard of erosion.

This soil is suited to pasture and hay if proper management practices are used. These include proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 119 cubic feet per acre on the north slopes and 109 cubic feet per acre on the south slopes. Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, and northern red oak are the preferred trees to plant on the north slopes. Eastern white pine, loblolly pine, shortleaf pine, and white oak are the preferred trees to plant on the south slopes. The hazard of erosion, use of equipment, and plant competition are concerns in management. Seedling mortality is also a concern in management on the south slopes.

This soil is well suited to use as habitat for woodland wildlife.

This soil is poorly suited to urban uses because of steepness of slope and depth to bedrock. Steepness of slope also is a limitation for recreational uses.

This Frondorf soil is in capability subclass VIe, and the woodland ordination symbol is 8R.

GrB—Grenada silt loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on broad upland divides. The slopes are smooth, and small drainageways are common. The mapped areas range from 4 to 360 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 23 inches, is yellowish brown silt loam. The next layer, to a depth of about 25 inches, is light gray silt. The lower part of the subsoil, to a depth of about 46 inches, is a firm and compact yellowish brown and brown silt loam fragipan that has mottles in shades of brown and gray. The substratum to a depth of about 60 inches is brown silt loam that has light gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from very strongly acid to medium acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. The root zone is moderately deep. Root penetration and vertical movement of air and water is restricted by the fragipan. This soil is easily tilled within a wide range of moisture content. This soil is wet for long periods late in winter and early in the spring. A perched water table is between depths of 1.5 and 2.5 feet.

Included with this soil in mapping are some small areas of Loring and Calloway soils. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Grenada soil is used for agriculture (fig. 8).

This soil is suited to row crops, such as corn, soybeans, and tobacco, but it is not suited to deep-rooted crops. In some years, wetness late in winter and early in spring and dryness late in summer or early in fall are limitations to use of this soil for row crops. The hazard of erosion is moderate. If this soil is used for cultivated crops, erosion must be controlled.

This soil is well suited to use for pasture and hay. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, loblolly pine should produce a volume of 120 cubic feet per acre. Cherrybark oak, loblolly pine, white oak, shortleaf pine, and sweetgum are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses. Wetness and steepness of slope are the main limitations. The slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. A few low-lying areas are subject to rare flooding. Low soil strength is a limitation for local roads and streets.

This Grenada soil is in capability subclass IIe, and the woodland ordination symbol is 8A.

HaC2—Hammack silt loam, 6 to 12 percent slopes, eroded. This soil is deep and well drained. It is on the uplands. This soil formed on ridgetops and side slopes in a mantle of loess underlain by residuum from cherty limestone. The mapped areas range from 5 to 70 acres.

Typically, the surface layer is yellowish brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 24 inches, is strong brown silty clay loam. The middle part, to a depth of about 40 inches, is brown very gravelly silty clay loam that has light gray silt coatings. The lower part to a depth of about 80 inches is red very gravelly clay that has brown mottles.

The natural fertility of this soil is medium to high, and the organic matter content is moderate. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate at a depth of more than 40 inches. Soil tilth is good. The root zone is deep.

Included with this soil in mapping are some small areas of Nicholson, Crider, and Baxter soils that are on the uplands and Nolin, Lindside, and Newark soils that are in depressions and along small streams. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Hammack soil is used for row crops, pasture, or hay. A few areas are used as woodland.

This soil is suited to row crops. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Good tilth can be maintained by returning crop residue to the soil. Crops respond favorably to fertilizer and lime.

This soil is well suited to use for pasture and hay. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 86 cubic feet per acre. Yellow poplar, white oak, northern red oak, loblolly pine, and shortleaf pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot

Figure 8.—The baled wheat in the foreground is on Grenada silt loam, 2 to 6 percent slopes. In the background, soybeans is on Belknap silt loam, occasionally flooded.

traffic. The high content of clay in the subsoil and steepness of slope are the main limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Hammack soil is in capability subclass IIIe, and the woodland ordination symbol is 6A.

HaD2—Hammack silt loam, 12 to 20 percent slopes, eroded. This soil is deep and well drained. It is on upland side slopes. This soil formed in a mantle of loess underlain by residuum from cherty limestone. The mapped areas range from 4 to 140 acres.

Typically, the surface layer is yellowish brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 24 inches, is strong brown silty clay loam. The middle part, to a depth of about 40 inches, is brown very gravelly silty clay loam that has light gray silt coatings. The lower part to a depth of about 80 inches is red very gravelly clay that has brown mottles.

The natural fertility of this soil is medium to high, and the organic matter content is moderate. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate at a depth of more than 40 inches. Soil tilth is good. The root zone is deep.

Included with this soil in mapping are some small areas of Nicholson, Crider, and Baxter soils that are on the uplands and Nolin, Lindside, and Newark soils that are in depressions and along small streams. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Hammack soil is used as woodland or for pasture and hay. In a few small areas, this soil is used for row crops.

This soil is poorly suited to row crops because of the hazard of erosion. Crops respond favorably to fertilizer and lime.

This soil is well suited to use for pasture and hay if erosion control practices are used. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is well suited to woodland if erosion control practices are used. At the highest point of annual growth, yellow poplar should produce a volume of 86 cubic feet per acre. Yellow poplar, white oak, northern red oak, loblolly pine, and shortleaf pine are the preferred trees to plant. The hazard of erosion, use of equipment, and plant competition are concerns in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The high content of clay in the subsoil and steepness of slope are limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Hammack soil is in capability subclass IVe, and the woodland ordination symbol is 6R.

HmC3—Hammack silty clay loam, 6 to 12 percent slopes, severely eroded. This soil is deep and well drained. It is on ridgetops and upland side slopes. This soil formed in a mantle of loess underlain by residuum from cherty limestone. The mapped areas range from 5 to 170 acres.

Typically, the surface layer is yellowish brown silty clay loam about 8 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 16 inches, is strong brown silty clay loam. The middle part, to a depth of about 32 inches, is brown very gravelly silty clay that has light gray silt coatings. The lower part to a depth of about 72 inches is red very gravelly clay.

The natural fertility of this soil is medium to high, and the organic matter content is low. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate at a depth of more than 40 inches. Soil tilth is fair. The root zone is deep.

Included with this soil in mapping are some small areas of Nicholson, Crider, and Baxter soils that are on the uplands and small areas of Nolin, Lindside, and Newark soils that are in depressions and along small streams. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Hammack soil is used for pasture or hay crops. In some areas, this soil is used for row crops, mainly corn and soybeans.

This soil is poorly suited to cultivated crops because of the eroded condition of the soil. Erosion is a continuing hazard unless erosion control practices are used. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Returning crop residue to the soil improves tilth. Crops respond favorably to fertilizer and lime.

This soil is suited to use for pasture or hay (fig. 9). However, in places, the potential of this soil for production of these crops has been reduced because of the eroded condition of the soil. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, southern red oak should produce a volume of 52 cubic feet per acre. Eastern white pine, shortleaf pine, loblolly pine, and white oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The shrink-swell potential, a high content of clay, and steepness of slope are the main limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Hammack soil is in capability subclass IVe, and the woodland ordination symbol is 4A.

Figure 9.—Baled hay harvested in an area of Hammack silty clay loam, 6 to 12 percent slopes, severely eroded.

HmD3—Hammack silty clay loam, 12 to 20 percent slopes, severely eroded. This soil is deep and well drained. It is on upland side slopes. This soil formed in a mantle of loess underlain by residuum from cherty limestone. The mapped areas range from 4 to 240 acres.

Typically, the surface layer is yellowish brown silty clay loam about 8 inches thick. Most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 16 inches, is strong brown silty clay loam. The middle part, to a depth of about 32 inches, is brown very gravelly silty clay that has light gray silt coatings. The lower part to a depth of about 72 inches is red very gravelly clay.

The natural fertility of this soil is medium to high, and the organic matter content is moderate. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. The shrink-swell potential is moderate at a depth of more than 40 inches. Soil tilth is fair. The root zone is deep.

Included with this soil in mapping are some small areas of Nicholson, Crider, and Baxter soils that are on the uplands and Nolin, Lindside, and Newark soils that are in depressions and along small streams. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Hammack soil is used as woodland and for pasture or hay. In a few small areas, this soil is used for row crops.

Crops respond favorably to fertilizer and lime, but this soil generally is not suited to row crops because of the hazard of erosion.

This soil is suited to use for pasture and hay if erosion control practices are used, such as maintaining a good grass cover. Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants help to maintain good grass cover and increase forage production.

This soil is suited to woodland. At the point of highest annual growth, southern red oak should produce a volume of 52 cubic feet per acre. Eastern white pine, shortleaf pine, loblolly pine, and white oak are the preferred trees to plant. The hazard of erosion, use of equipment, and plant competition are concerns in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The high content of clay and steepness of slope are limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Hammack soil is in capability subclass VIe, and the woodland ordination symbol is 4R.

Hn—Henshaw silt loam, rarely flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on stream terraces along the Tradewater River. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 8 to 69 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 26 inches, is light olive brown silty clay loam. The lower part, to a depth of about 42 inches, is yellowish brown silty clay loam. Light brownish gray mottles are throughout the subsoil. The substratum to a depth of about 60 inches is light brownish gray silty clay loam that has yellowish brown mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Unless limed, reaction ranges from strongly acid to neutral in the surface layer and subsoil. The permeability is moderately slow, and the available water capacity is high. The soil has good tilth and can be easily cultivated within a wide range of moisture content. This soil is easily penetrated by plant roots. A seasonal high water table is at a depth of 1 foot to 2 feet.

Included with this soil in mapping are some small areas of Uniontown and Weinbach soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Henshaw soil is used as cropland.

This soil is suited to use as cropland. Corn, soybeans, small grains, and hay are commonly grown on this soil. Maximum yields can be obtained with proper management, but yields can be decreased because of slow runoff and a seasonal high water table. Most crops respond favorably to improved drainage. Good tilth can be maintained by returning crop residue to the soil. Erosion is not a hazard.

This soil is suited to use for pasture and hay; however, wetness is a problem during the winter. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper plant selection increase forage production.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 92 cubic feet per acre. Green ash, sweetgum, eastern cottonwood, yellow poplar, and eastern white pine are the preferred trees to plant. Plant competition and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Seasonal wetness and moderately slow permeability are severe limitations to use of the soil as sites for buildings and as septic tank absorption fields. In addition, the hazard of flooding is severe. Low soil strength is a limitation for local roads and streets.

This Henshaw soil is in capability subclass IIw, and the woodland ordination symbol is 6W.

Hu—Huntington silt loam, frequently flooded. This soil is deep, nearly level, and well drained. It is on the flood plains of the Ohio, Cumberland, and Tennessee Rivers. Some areas of this map unit are dissected by ditches and small streams. The slopes are uniform and range from 0 to 2 percent. The mapped areas range from 8 to 302 acres.

Typically, the surface layer is very dark grayish brown silt loam about 11 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is dark grayish brown silt loam. The middle part, to a depth of about 44 inches, is brown silt loam. The lower part to a depth of about 60 inches is brown silty clay loam.

The natural fertility and organic matter content of this soil are high. Reaction is slightly acid to mildly alkaline throughout. The permeability is moderate, and the available water capacity is high. This soil has good tilth. The root zone is deep. This soil is subject to brief periods of frequent flooding.

Included with this soil in mapping are some small areas of Nolin and Robinsonville soils. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Huntington soil is used for crops, such as corn and soybeans.

This soil is well suited to row crops and small grains. Maximum yields can be obtained with proper management. Good tilth can be maintained by returning crop residue to the soil.

This soil is suited to use for hay and pasture. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of

98 cubic feet per acre. Yellow poplar, black walnut, black locust, eastern white pine, and white ash are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding.

This Huntington soil is in capability subclass IIw, and the woodland ordination symbol is 7A.

Ka—Karnak silty clay loam, occasionally flooded. This soil is deep, nearly level, and poorly drained. It is on the flood plains. This soil formed in clayey slack water deposits. Some areas of this map unit are dissected by ditches or small streams. Slopes range from 0 to 2 percent. The mapped areas range from 6 to 70 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 8 inches thick. The subsoil, to a depth of about 46 inches, is dark gray silty clay that has yellowish brown mottles. The substratum to a depth of about 60 inches is gray silty clay that has yellowish brown mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to neutral. The permeability is very slow or slow, and the available water capacity is moderate. The shrink-swell potential is high. This soil has poor tilth. It is plastic and sticky when wet and tends to crust and pack if cultivated when too wet. A seasonal high water table is between the surface and 3 feet. This soil is subject to long periods of occasional flooding.

Included with this soil in mapping are some small areas of Weinbach, McGary, and Belknap soils that have a silt loam surface layer. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Karnak soil is used for agriculture.

This soil is suited to row crops, and maximum yields can be obtained with proper management. Wetness, the seasonal high water table, and the clayey surface layer can reduce yields. The poor soil tilth can be improved by returning crop residue to the soil. If a drainage system is installed, row crops can be planted earlier and harvested later.

This soil is suited to use for hay and pasture. Flooding, wetness, and compaction are the main limitations. Installing a drainage system and proper management practices, such as controlled grazing, weed control, and proper application of fertilizer and lime, can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 86 cubic feet per acre. Pin oak, swamp white oak, eastern cottonwood, green ash, baldcypress, sweetgum, and pecan are the preferred trees to plant. The use of equipment, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to urban uses. Flooding is a severe hazard. The very slow or slow permeability, high shrink-swell potential, and wetness are severe limitations to use of this soil as sites for buildings and as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This Karnak soil is in capability subclass IIIw, and the woodland ordination symbol is 6W.

LfE—Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery. The soils in this complex are moderately deep and well drained. They are on steep hillsides. Many areas of this map unit are dissected by small drainageways. Prominent rock cliffs are common. The mapped areas range from 3 to 500 acres.

Lenberg soil makes up about 40 percent of this map unit and Frondorf soil makes up about 25 percent. Boulders make up 1 to 5 percent of the surface. The included soils make up about 35 percent. The individual areas of the soils in this map unit are too small or too mixed to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer of Lenberg soil is brown silt loam about 4 inches thick. The upper part of the subsoil, to a depth of about 12 inches, is yellowish brown channery silty clay loam. The lower part, to a depth of about 26 inches, is yellowish brown channery silty clay. The substratum, to a depth of about 37 inches, is olive brown very channery silty clay that has light brownish gray mottles. Shale bedrock is at a depth of about 37 inches.

The natural fertility of Lenberg soil is medium, and the organic matter content is low. Reaction is very strongly acid or strongly acid. The permeability is moderately slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The root zone is moderately deep.

Typically, the surface layer of Frondorf soil is dark grayish brown silt loam about 3 inches thick. The subsurface layer, to a depth of about 6 inches, is brown silt loam. The upper part of the subsoil, to a depth of about 10 inches, is yellowish brown silt loam. The middle part, to a depth of about 21 inches, is strong brown silty clay loam. The lower part, to a depth of about 28 inches, is yellowish brown channery loam. Sandstone bedrock is at a depth of about 28 inches.

The natural fertility of this Frondorf soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid throughout except where lime has been added. The permeability and the available water capacity are moderate. This soil has good tilth. The root zone is moderately deep.

Included in this complex are some small areas of Zanesville, Caneyville, Collins, and Clifty soils. Zanesville and Caneyville soils are on upland hillsides, and Collins and Clifty soils are along small draws. Also included in this complex are sandstone cliffs and areas of rock outcrops; and also some areas of soils that are similar to the soils in this map unit except they are deeper or more shallow to bedrock.

In most areas, these Lenberg and Frondorf soils are in native hardwoods.

These soils are not suited to row crops, hay, or pasture because of the steepness of slope.

These soils are well suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 93 cubic feet per acre on Lenberg soil and should produce a volume of 119 cubic feet per acre on the north slopes of Frondorf soil and 93 cubic feet per acre on the south slopes. Shortleaf pine, Virginia pine, loblolly pine, and white oak are the preferred trees to plant on Lenberg soil. Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, and northern red oak are the preferred trees to plant on the north slopes of Frondorf soil. Eastern white pine, loblolly pine, shortleaf pine, and white oak are the preferred trees to plant on the south slopes. The hazard of erosion, use of equipment, and plant competition on Frondorf soil are concerns in management. Seedling mortality is also a concern in management on the south slopes. The hazard of erosion and use of equipment on Lenberg soil are concerns in management.

These soils are best suited to use as habitat for woodland wildlife.

These soils are poorly suited to most urban uses because of steepness of slope and moderate depth to bedrock.

Lenberg and Frondorf soils are in capability subclass VIIe. The woodland ordination symbol is 6R for Lenberg soil and 8R for Frondorf soil.

Ld—Lindside silt loam, occasionally flooded. This soil is deep, nearly level, and moderately well drained. It is on the flood plains of streams that drain into the Cumberland and Ohio Rivers. This soil formed in mixed alluvium. Some areas of this map unit are dissected by ditches and small streams. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 3 to 275 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil, to a depth of about 44 inches, is brown silt loam mottled in shades of brown and gray. The substratum to a depth of about 60 inches is brown silt loam that has gray mottles.

The natural fertility of this soil is high, and the organic matter content is low. Reaction is slightly acid or neutral throughout. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily tilled within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 1.5 to 3 feet. This soil is subject to brief periods of occasional flooding.

Included with this soil in mapping are some small areas of Newark soils. The included soils make up less than 2 percent of this map unit. Individual areas generally are less than 1 acre.

In most areas, this Lindside soil is used for crops, such as corn and soybeans. In some areas, it is used for pasture.

This soil is well suited to row crops. It is not as suited to small grains and hay because of flooding. Good tilth is easily maintained by returning crop residue to the soil.

This soil is suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 68 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, northern red oak, shortleaf pine, white ash, and white oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding and of wetness.

This Lindside soil is in capability subclass IIw, and the woodland ordination symbol is 4A.

Ln—Lindside silty clay loam, frequently flooded. This soil is deep, nearly level, and moderately well drained. It is on the Ohio River flood plain. This soil formed in mixed alluvium. Some areas of this map unit are dissected by ditches and small streams. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 3 to 60 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 9 inches thick. The subsoil, to a depth of about 34 inches, is brown silty clay loam mottled in shades of dark grayish brown and grayish brown. The substratum to a depth of about 60 inches is brown silty clay loam that has gray and brown mottles.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction is slightly acid or neutral throughout. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily tilled within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 1.5 to 3 feet. This soil is subject to frequent flooding.

Included with this soil in mapping are some small areas of Huntington and Nolin soils. Also included are some areas of soils that are similar to Lindside soil but have a fine sandy loam or silt loam surface layer. The included soils make up about 5 percent of this map unit. Individual areas generally are less than 6 acres.

In most areas, this Lindside soil is used for crops, such as corn and soybeans.

This soil is well suited to row crops. It is not as suited to small grains, pasture, and hay crops because of flooding. Good tilth is easily maintained by returning crop residue to the soil.

This soil is suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 68 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, northern red oak, shortleaf pine, white ash, and white oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of wetness and the hazard of flooding.

This Lindside soil is in capability subclass IIw, and the woodland ordination symbol is 4A.

LoB—Loring silt loam, 2 to 6 percent slopes. This soil is deep and moderately well drained. It is on upland ridgetops and hillsides. This soil has a fragipan. Some areas of this map unit are dissected by shallow drainageways and small streams. The slopes are smooth and convex. The mapped areas range from 3 to 315 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 13 inches, is yellowish brown and dark brown silt loam. The next layer, to a depth of about 23 inches, is strong brown silt loam. Below that layer, to a depth of about 29 inches, is yellowish brown silt loam that has brown and gray mottles. The lower part, to a depth of about 63 inches, is firm, brittle, and compact, strong brown silt loam that has light gray mottles. The substratum to a depth of about 78 inches is yellowish brown silt loam that has light gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and moderately slow in the fragipan. The available water capacity is moderate. Root penetration and water movement are restricted in the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are some small areas of Memphis, Grenada, and Zanesville soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Loring soil is used for agriculture. In a few areas, it is left idle or is used as woodland.

This soil is suited to row crops, small grains, hay, and pasture. High yields can be obtained with proper management. In some areas, the suitability of the soil for row crops, small grains, hay, and pasture can be limited because of the size and shape of the areas. Some erosion control practices are needed if this soil is used for row crops. Conservation tillage (fig. 10) and cover crops help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to use for pasture and hay. High yields can be obtained with proper management.

This soil is suited to woodland. At the point of highest annual growth, cherrybark oak should produce a volume of 103 cubic feet per acre. Loblolly pine, yellow poplar, shortleaf pine, and eastern white pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses. The moderately slow permeability of the fragipan is a limitation to use of this soil as septic tank absorption fields. Wetness is a limitation for other urban uses. Low soil strength is a limitation for local roads and streets.

This Loring soil is in capability subclass IIe, and the woodland ordination symbol is 4A.

LoC2—Loring silt loam, 6 to 12 percent slopes, eroded. This soil is deep, sloping, and moderately well drained. It is on upland ridgetops and hillsides. This soil has a fragipan. Most areas of this map unit are dissected by drainageways. The mapped areas range from 3 to 260 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 13 inches, is yellowish brown and dark brown silt loam. The next layer, to a depth of about 23 inches, is strong brown silt loam. Below that layer, to a depth of about 29 inches, is yellowish brown silt loam that has brown and gray mottles. The lower part, to a depth of about 63 inches, is firm, brittle and compact, strong brown silt loam that has light gray mottles. The substratum to a depth of about 78 inches is yellowish brown silt loam that has light gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Root penetration and water movement are restricted in the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are some small areas of Memphis, Grenada, and Zanesville soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Loring soil is used for agriculture. In a few areas, it is left idle or is used as woodland.

This soil is suited to row crops, small grains, hay, or pasture. High yields can be obtained with proper management. In some areas, the suitability of this soil for row crops, small grains, hay, or pasture can be limited because of the size, shape, and slope of the areas. Erosion is a severe hazard if this soil is cultivated. Conservation tillage and cover crops help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to use for pasture and hay. High yields can be obtained with proper management.

This soil is suited to woodland. At the point of highest annual growth, cherrybark oak should produce a volume of 103 cubic feet per acre. Loblolly pine, yellow poplar, shortleaf pine, and eastern white pine are the preferred

Figure 10.—This no-till method for growing soybeans following the harvesting of the wheat on Loring silt loam, 2 to 6 percent slopes, is a good conservation practice used in the county.

trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses. The moderately slow permeability of the fragipan is a limitation to use of this soil as septic tank absorption fields. Wetness and slope are limitations for other urban uses. Low soil strength is a limitation for local roads and streets.

This Loring soil is in capability subclass IIIe, and the woodland ordination symbol is 4A.

Mc—McGary silty clay loam, occasionally flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on stream terraces. This soil formed in clayey alluvium deposited in slack water. Some areas of this map unit are dissected by sloughs, drainage ditches, and small streams. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 5 to 280 acres.

Typically, the surface layer is light olive brown silty clay loam about 6 inches thick. The upper part of the subsoil, to a depth of about 9 inches, is light brownish gray silty clay loam that has light yellowish brown mottles. The next layer, to a depth of about 17 inches, is gray silty clay that has mottles in shades of yellow and brown. The next layer, to a depth of about 44 inches, is yellowish brown silty clay mottled in shades of gray, yellow, and red. The lower part, to a depth of about 50 inches, is light olive brown silty clay that has gray mottles. The substratum to a depth of about 72 inches is light olive brown silty clay that has gray and brownish yellow mottles.

The natural fertility and organic matter content of this soil are low. Reaction is medium acid or strongly acid except where lime has been added. The permeability is moderately slow in the upper part of the subsoil and slow or very slow in the lower part. The available water capacity is high. The shrink-swell potential is high. Soil tilth generally is good, but some clayey spots have poor tilth and tend to crust and pack if cultivated when the soil is too wet. The root zone is deep, but root penetration is difficult because of the clayey subsoil. A seasonal high water table is at a depth of 1 foot to 3 feet. This soil is subject to brief periods of occasional flooding.

Included with this soil in mapping are some small areas of Belknap, Otwell, and Weinbach soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

Most of the acreage of this McGary soil is used as woodland. In some areas, this soil is used for crops, mainly corn, soybeans, or pasture.

This soil is not well suited to row crops or small grains because of wetness. Tilth can be maintained or improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but plants should be selected that can tolerate wetness.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 80 cubic feet per acre. Eastern white pine, baldcypress, white ash, yellow poplar, American sycamore, eastern cottonwood, and green ash are the preferred trees to plant. Plant competition and seedling mortality are concerns in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. The high shrink-swell potential and wetness are limitations for urban uses and are difficult to overcome. The slow permeability of the clayey subsoil, wetness, and flooding severely limit the use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This McGary soil is in capability subclass IIIw, and the woodland ordination symbol is 6W.

Me—Melvin silt loam, occasionally flooded. This soil is deep, nearly level, and poorly drained. It is on the flood plains of streams that drain into the Cumberland and Ohio Rivers. The slopes range from 0 to 2 percent. The mapped areas range from 3 to 55 acres.

Typically, the surface layer is brown silt loam that has gray and yellowish brown mottles. It is about 10 inches thick. The subsoil, to a depth of about 32 inches, is light brownish gray silt loam that has yellowish brown mottles. The substratum to a depth of about 60 inches is gray silt loam mottled in light brownish gray and yellowish brown.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to neutral. The permeability is moderate, and the available water capacity is high. Soil tilth is good. The root zone is deep. A seasonal high water table is within 1 foot of the surface. This soil is subject to brief periods of occasional flooding in winter and spring.

Included with this soil in mapping are some small areas of Newark and Lindside soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In some areas, this Melvin soil is used as woodland. In many areas, this soil has been drained and is used for crops, mainly corn and soybeans.

This soil is well suited to row crops if properly drained, but it is not as suited to small grains because of the hazard of flooding and the seasonal high water table. Good tilth can be maintained or improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but flooding and wetness are concerns in management. Installing a drainage system and using proper management practices, such as weed control, controlled grazing, and proper application of fertilizer and lime, can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 97 cubic feet per acre. Pin oak, American sycamore, sweetgum, loblolly pine, and eastern cottonwood are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Wetness and flooding severely limit the use of this soil as sites for buildings and local streets and roads and as septic tank absorption fields. The hazard of flooding is difficult and expensive to overcome. Low soil strength is a limitation for local roads and streets.

This Melvin soil is in capability subclass IIIw, and the woodland ordination symbol is 7W.

Ml—Melvin silty clay loam, frequently flooded. This soil is deep, nearly level, and poorly drained. It is on the flood plains of the larger streams. Many areas of this map unit are long, narrow sloughs. The slopes range from 0 to 2 percent. The mapped areas range from 10 to 120 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 9 inches thick. The subsoil, to a depth of about 21 inches, is gray silty clay loam that has yellowish brown mottles. The substratum to a depth of about 60 inches is gray silty clay loam that has yellowish brown mottles.

The natural fertility of this soil is medium, and the organic matter content is moderate. Reaction ranges from medium acid to neutral. The permeability is moderate, and the available water capacity is high. Soil tilth is good. The root zone is deep. A seasonal high water table is within 1 foot of the surface. This soil is subject to frequent flooding, mainly in winter and spring.

Included with this soil in mapping are some small areas of Newark soils. Also included are some areas of soils that are similar to Melvin soil but have a silt loam surface layer. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 4 acres.

In some areas, this Melvin soil is used as woodland. In many areas, it has been drained and is used for crops, mainly corn or soybeans.

This soil is well suited to row crops if properly drained, but it is not as suited to small grains because of the hazard of flooding and the seasonal high water table. Good tilth can maintained or improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but flooding and wetness are concerns in management. Installing a drainage system and using proper management practices, such as weed control, controlled grazing, and proper applications of fertilizer and lime, can increase forage production.

This soil is suited to use as woodland. At the point of highest annual growth, pin oak should produce a volume of 97 cubic feet per acre. Pin oak, American sycamore, sweetgum, loblolly pine, and eastern cottonwood are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Wetness and flooding severely limit the use of this soil as sites for buildings and local roads and streets and as septic tank absorption fields. The hazard of flooding is difficult and expensive to overcome. Low soil strength is a limitation for local roads and streets.

This Melvin soil is in capability subclass IIIw, and the woodland ordination symbol is 7W.

MmB—Memphis silt loam, 2 to 6 percent slopes. This soil is deep and well drained. It formed in loess on the uplands. Some areas of this map unit are dissected by shallow drainageways. The slopes are smooth. The mapped areas range from 3 to 115 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is brown silty clay loam. The middle part, to a depth of about 25 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 49 inches, is strong brown silt loam. The substratum to a depth of about 61 inches is strong brown silt loam.

The natural fertility of this soil is medium, and the organic matter content is moderate. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily tilled within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Loring soils. Also included are some small areas of Memphis soils that are severely eroded and have a silty clay loam surface layer. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 4 acres.

In most areas, this Memphis soil is used for agriculture. A few narrow ridgetops are in woodland.

This soil is well suited to cultivated crops, such as corn, soybeans, pasture, and hay. Good tilth is easily maintained by returning crop residue to the soil. The hazard of erosion is moderate if this soil is cultivated. Conservation tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and help control erosion.

This soil is well suited to use for pasture and hay.

This soil is suited to woodland. At the point of highest annual growth, loblolly pine should produce a volume of 131 cubic feet per acre. Cherrybark oak, loblolly pine, and yellow poplar are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to most urban uses. The hazard of erosion is moderate on construction sites, and some temporary erosion control practices should be used during construction. Steepness of slope, seepage, and moderate permeability are limitations for some urban uses. Low soil strength is a limitation for local roads and streets.

This Memphis soil is in capability subclass IIe, and the woodland ordination symbol is 9A.

MmC2—Memphis silt loam, 6 to 12 percent slopes, eroded. This soil is deep and well drained. It formed in loess on the uplands. Some areas of this map unit are dissected by shallow drainageways. The slopes are smooth. The mapped areas range from 5 to 135 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is brown silty clay loam. The middle part, to a depth of about 25 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 49 inches, is strong brown silt loam. The substratum to a depth of about 61 inches is strong brown silt loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily tilled within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Loring soils. Also included are some small areas of Memphis soils that are severely eroded. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 4 acres.

In most areas, this Memphis soil is used for agriculture. A few narrow ridgetops and some side slopes are in woodland. Some areas have been cleared, and the soil is used for crops, such as corn, soybeans, pasture, or hay.

This soil is suited to most crops commonly grown in the area. Good tilth is maintained by returning crop residue to the soil. The hazard of erosion is severe if this soil is cultivated. Terraces, conservation tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and help control erosion.

This soil is well suited to use for pasture and hay. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, loblolly pine should produce a volume of 131 cubic feet per acre. Cherrybark oak, loblolly pine, and yellow poplar are the preferred trees to plant. Plant competition is a concern in management.

This soil has moderate limitations for most urban uses. The hazard of erosion is severe on construction sites, and some temporary erosion control practices should be used during construction. Steepness of slope and moderate permeability are limitations for some urban uses. Low soil strength is a limitation for local roads and streets.

This Memphis soil is in capability subclass IIIe, and the woodland ordination symbol is 9A.

MmC3—Memphis silt loam, 6 to 12 percent slopes, severely eroded. This soil is deep and well drained. It is on the uplands. Because of severe erosion, the plow layer is mostly in the subsoil. Most areas of this map unit are dissected by shallow drainageways and small streams, and some areas have shallow gullies. The mapped areas range from 7 to 246 acres.

Typically, the surface layer is yellowish brown silt loam about 7 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 33 inches, is brown silty clay loam. The lower part, to a depth of about 42 inches, is strong brown silty clay loam. The substratum to a depth of about 60 inches is yellowish brown silt loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has poor tilth. It tends to crust and pack if tilled when the soil is too wet. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Loring and Zanesville soils. Also included are a few small, gullied areas of soils that are similar to Memphis soil. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 4 acres.

In most areas, this Memphis soil is used for agriculture, mainly for pasture, hay, and small grains. In some areas, this soil is used for crops, such as corn and soybeans.

This soil is suited to row crops and small grains. Moderate yields can be obtained with proper management. Because of the eroded condition and continuing very severe erosion hazard, the use of this soil for row crops is limited. Tilth can be maintained and improved by returning crop residue to the soil. If this soil is cultivated, erosion control practices are needed that will reduce runoff and help control erosion.

This soil is suited to use for pasture and hay crops. However, in places, the potential for production of these crops has been reduced because of the eroded condition of the soil. Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to use as woodland. At the point of highest annual growth, loblolly pine should produce a volume of 131 cubic feet per acre. Cherrybark oak, loblolly pine, and yellow poplar are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses; however, steepness of slope is the main limitation. In addition, erosion is a moderate hazard. Erosion control practices should be used on construction sites. Low soil strength is a limitation for local roads and streets.

This Memphis soil is in capability subclass IVe, and the woodland ordination symbol is 9A.

MmD2—Memphis silt loam, 12 to 30 percent slopes, eroded. This soil is deep, moderately steep, and well drained. It formed in loess on the uplands. Most areas of this map unit are dissected by shallow, intermittent drainageways. The mapped areas range from 3 to 100 acres.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 14 inches, is brown silty clay loam. The middle part, to a depth of about 25 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 49 inches, is strong brown silt loam. The substratum to a depth of about 61 inches is strong brown silt loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can be easily tilled within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Loring soils. Also included are some areas of Memphis soils that are severely eroded. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 4 acres.

In most areas, this Memphis soil is used for agriculture. A few narrow ridgetops and some side slopes are in woodland. Some areas have been cleared, and this soil is used for crops, such as corn, soybeans, pasture, or hay.

This soil is poorly suited to row crops, such as corn and soybeans, because of a very severe erosion hazard. Conservation tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and help control erosion.

The soil is suited to hay and pasture. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, cherrybark oak should produce a volume of 115 cubic feet per acre. Cherrybark oak, loblolly pine, and yellow poplar are the preferred trees to plant. The hazard of erosion, use of equipment, and plant competition are concerns in management.

This soil has severe limitations for urban uses. Steepness of slope is the main limitation, and erosion is a severe hazard. Erosion control practices should be used during construction. Low soil strength is a limitation for local roads and streets.

This Memphis soil is in capability subclass VIe, and the woodland ordination symbol is 8R.

MmD3—Memphis silt loam, 12 to 30 percent slopes, severely eroded. This soil is deep and well drained. It is on the uplands. Because of severe erosion, the plow layer is mostly in the subsoil. Most areas of this map unit are dissected by shallow drainageways and small streams, and some areas have shallow gullies. The mapped areas are 3 to 250 acres.

Typically, the surface layer is yellowish brown silt loam about 7 inches thick. It differs from the typical pedon because most of the original surface layer has been eroded away. The upper part of the subsoil, to a depth of about 33 inches, is brown silty clay loam. The lower part, to a depth of about 42 inches, is strong brown silty clay loam. The substratum to a depth of about 60 inches is yellowish brown silt loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has poor tilth. It tends to crust and pack if tilled when the soil is too wet. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are some small areas of Frondorf soils. Also included are a few small, gullied areas of soils that are similar to Memphis soil. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Memphis soil is used for pasture or as woodland. Some areas are used exclusively for wildlife.

Because of steepness of slope and the eroded condition of the soil and continuing very severe erosion hazard, this soil is not suited to cultivated crops.

In the less sloping areas, this soil is suited to use for pasture and hay. Proper application of fertilizer and lime and controlled grazing help control erosion and maintain good grass cover.

This soil is suited to woodland. At the point of highest annual growth, loblolly pine should produce a volume of 131 cubic feet per acre. Cherrybark oak, loblolly pine, and yellow poplar are the preferred trees to plant. Plant competition, the hazard of erosion, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Steepness of slope is a severe limitation for urban uses. Low soil strength is a limitation for local roads and streets.

This Memphis soil is in capability subclass VIIe, and the woodland ordination symbol is 9R.

Na—Newark silt loam, occasionally flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on the flood plains of streams that drain into the Cumberland and Ohio Rivers. This soil formed in mixed alluvium. Some areas of this map unit are dissected by small streams and drainage ditches. The slopes range from 0 to 2 percent. The mapped areas range from 3 to 310 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 17 inches, is brown silt loam that has pale brown and yellowish brown mottles. The middle part, to a depth of about 23 inches, is gray and light brownish gray silt loam that has brown and yellowish brown mottles. The substratum to a depth of about 60 inches is brown silt loam that has gray and yellowish brown mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to mildly alkaline. The permeability is moderate, and the available water capacity is high. Soil tilth is good. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 0.5 foot to 1.5 feet. This soil is subject to occasional flooding.

Included with this soil in mapping are some small areas of Melvin and Lindside soils. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Newark soil has been cleared and is used for crops, mainly corn or soybeans. A few small areas have been left in native hardwoods.

If flooding is controlled and this soil is properly drained, it is well suited to row crops. It is not as suited to small grains because of the hazard of flooding and the seasonal high water table. Good tilth can be maintained by returning crop residue to the soil.

This soil is suited to use for pasture and hay. Occasional flooding and wetness are concerns in management. Installing a drainage system and using proper management practices, such as weed control, controlled grazing, and proper application of fertilizer and lime, can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 93 cubic feet per acre. Eastern cottonwood, sweetgum, American sycamore, and green ash are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Flooding is a severe hazard, and the seasonal high water table is a severe limitation. Low soil strength is a limitation for local roads and streets.

This Newark soil is in capability subclass IIw, and the woodland ordination symbol is 7W.

Ne—Newark silty clay loam, frequently flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on the flood plains of large streams. Many areas of this map unit are dissected by drainage ditches and small streams. The slopes are smooth and range from 0 to 2 percent. The mapped areas range from 3 to 140 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 9 inches thick. The upper part of the subsoil, to a depth of about 16 inches, is brown silty clay loam that has grayish brown and yellowish brown mottles. The lower part, to a depth of about 30 inches, is grayish brown silty clay loam that has yellowish brown mottles. The upper part of the substratum, to a depth of about 46 inches, is gray silty clay loam that has dark yellowish brown mottles. The lower part to a depth of about 60 inches is brown silty clay loam that has light brownish gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to mildly alkaline. The permeability is moderate, and the available water capacity is high. Soil tilth is good. The root zone is deep and is easily penetrated by plant roots. The rooting depth is somewhat restricted by the seasonal high water table within 1.5 feet of the surface. This soil is subject to frequent flooding.

Included with this soil in mapping are some small areas of Melvin and Lindside soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 4 acres.

Most of the acreage of this Newark soil has been cleared and is used for crops, mainly corn or soybeans. Some areas have been left in native hardwoods.

If flooding is controlled and this soil is properly drained, it is well suited to row crops, but it is not as suited to small grains, hay, and pasture because of the hazard of flooding and the seasonal high water table. Proper management practices should include drainage. Soil tilth can be maintained or improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay. Flooding and wetness are concerns in management. Installing a drainage system and proper management practices, such as weed control, controlled grazing, and proper applications of fertilizer and lime, can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, pin oak should produce a volume of 93 cubic feet per acre. Eastern cottonwood, sweetgum, American sycamore, and green ash are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses. Flooding is a severe hazard, and the seasonal high water table is a severe limitation. Low soil strength is a limitation for local roads and streets.

This Newark soil is in capability subclass IIw, and the woodland ordination symbol is 7W.

NhB—Nicholson silt loam, 2 to 6 percent slopes. This soil is deep and moderately well drained. It is on broad ridges on the uplands. This soil has a fragipan. The mapped areas range from 3 to 70 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is yellowish brown silty clay loam. The middle part, to a depth of about 55 inches, is compact, yellowish brown silty clay loam that has gray mottles. The lower part to a depth of about 70 inches is mottled reddish brown silty clay.

The natural fertility of this soil is medium, and the organic matter content is moderate. Reaction ranges from slightly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is good. A perched water table is at a depth of 1.5 to 2.5 feet late in winter and early in spring.

Included with this soil in mapping are some small areas of Grenada and Hammack soils. Also included are some small areas of Nicholson soils that are severely eroded, and some areas of these soils that have slopes of more than 6 percent. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

Most of the acreage of this Nicholson soil is used for cultivated crops, pasture, or hay.

This soil is suited to most crops commonly grown in the area. Crops respond well to fertilizer and lime. The erosion hazard moderately limits the use of this soil for crops. If this soil is cultivated, some erosion control practices, such as conservation tillage, are needed. Returning crop residue to the soil helps to maintain good tilth and the content of organic matter. The fragipan is at a depth of about 2 feet. Root penetration and the vertical movement of air and water are restricted by the fragipan.

This soil is well suited to use for pasture and hay. The fragipan can be a limitation for deep-rooted plants, such as alfalfa. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper plant selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 60 cubic feet per acre. White oak, northern red oak, yellow poplar, sweetgum, and eastern white pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is suited to most urban uses; however, wetness limits the use of this soil for sanitary facilities and severely limits its use as sites for buildings with basements. The slow permeability of the fragipan is a severe limitation to use as septic tank absorption fields. This soil is suited to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Low soil strength is a limitation for local roads and streets.

This Nicholson soil is in capability subclass IIe, and the woodland ordination symbol is 4A.

NhC2—Nicholson silt loam, 6 to 12 percent slopes, eroded. This soil is deep and moderately well drained. It is on side slopes of the uplands. This soil has a fragipan. The mapped areas range from 4 to 110 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is yellowish brown silty clay loam. The middle part, to a depth of about 55 inches, is compact, yellowish brown silty clay loam that has gray mottles. The lower part to a depth of about 70 inches is reddish brown silty clay that has mottles in shades of brown.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from slightly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is good. A perched water table is at a depth of 1.5 to 2.5 feet late in winter and early in spring.

Included with this soil in mapping are some small areas of Loring and Hammack soils. Also included are small areas of Nicholson soils that are severely eroded. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Nicholson soil is used for cultivated crops, pasture, or hay.

This soil is suited to most crops commonly grown in the area. Crops respond well to fertilizer and lime. The hazard of erosion moderately limits the use of this soil for crops. If this soil is cultivated, erosion control practices, such as conservation tillage, are needed. Returning crop residue to the soil helps to maintain good tilth. The fragipan is at a depth of about 2 feet. Root penetration and the vertical movement of air and water are restricted by the fragipan.

This soil is well suited to use for pasture and hay. The fragipan can be a limitation for deep-rooted plants, such as alfalfa. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 60 cubic feet per acre. White oak, northern red oak, yellow poplar, sweetgum, and eastern white pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to some urban uses. Steepness of slope, wetness, and slow permeability in the fragipan are limitations for most urban uses. This soil is also suited to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Low soil strength is a limitation for local roads and streets.

This Nicholson soil is in capability subclass IIIe, and the woodland ordination symbol is 4A.

NhC3—Nicholson silt loam, 6 to 12 percent slopes, severely eroded. This soil is deep and moderately well drained. It is on side slopes of the uplands. This soil has a fragipan. The mapped areas range from 4 to 340 acres.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown silt loam. The fragipan layer, to a depth of about 59 inches, is firm, brittle and compact, dark brown and strong brown silt loam that has gray and brownish yellow mottles. The lower part to a depth of about 78 inches is red clay.

The natural fertility and organic matter content of this soil are low. Reaction ranges from slightly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is fair. It tends to crust and pack if cultivated when the soil is too wet. Root penetration and the vertical movement of air and water are restricted by the fragipan that is at a depth of 20 inches. A perched water table is within 1.5 to 2.5 feet of the surface late in winter and early in spring.

Included with this soil in mapping are some small areas of Loring and Hammack soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Nicholson soil is used for pasture or hay.

This soil is poorly suited to cultivated crops because of the eroded condition of the soil and the continuing hazard of erosion. The hazard of erosion is severe if the soil is cultivated. Returning crop residue to the soil improves tilth, helps to maintain organic matter, and helps control erosion. The fragipan restricts water movement and causes this soil to dry slowly in the spring. Crops respond well to fertilizer and lime.

This soil is suited to use for pasture and hay. Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants help control erosion and increase forage production.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 52 cubic feet per acre. White oak, white ash, and eastern white pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The main limitations are steepness of slope, wetness, and slow permeability. Low soil strength is a limitation for local roads and streets.

This Nicholson soil is in capability subclass IVe, and the woodland ordination symbol is 4A.

NhD2—Nicholson silt loam, 12 to 20 percent slopes, eroded. This soil is deep and moderately well drained. It is on side slopes on the uplands. This soil has a fragipan. The mapped areas range from 10 to 60 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is yellowish brown silty clay loam. The middle part, to a depth of about 55 inches, is compact, yellowish brown silty clay loam that has gray mottles. The lower part to a depth of about 70 inches is reddish brown silty clay that has mottles in shades of brown.

The natural fertility of this soil is medium, and the organic matter content is moderate. Reaction ranges from slightly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is good. A perched water table is within 1.5 to 2.5 feet of the surface late in winter and early in spring.

Included with this soil in mapping are some small areas of Hammack soils. Also included are some small areas of Nicholson soils that are severely eroded. The included soils make up about 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Nicholson soil is used for cultivated crops, pasture, or hay.

This soil is suited to most crops commonly grown in the area. The hazard of erosion is severe, and erosion control practices should be used if this soil is cultivated. Returning crop residue to the soil helps to maintain good tilth. The fragipan is at a depth of about 2 feet. Root penetration and the vertical movement of air and water are restricted by the fragipan.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 60 cubic feet per acre. White oak, northern red oak, and yellow poplar are the preferred trees to plant. Plant competition, use of equipment, and the hazard of erosion are concerns in management.

This soil is not suited to most urban uses or to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope, wetness, and slow permeability are limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Nicholson soil is in capability subclass IVe, and the woodland ordination symbol is 4R.

NhD3—Nicholson silt loam, 12 to 20 percent slopes, severely eroded. This soil is deep and moderately well drained. It is on side slopes on the uplands. This soil has a fragipan. The mapped areas range from 3 to 10 acres.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is yellowish brown silt loam. The fragipan layer, to a depth of about 59 inches, is firm, brittle and compact, dark brown and strong brown silt loam that has gray and brownish yellow mottles. The lower part to a depth of about 78 inches is red clay.

The natural fertility and organic matter content of this soil are low. Reaction ranges from slightly acid to very strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is fair. This soil tends to crust and pack if cultivated when the soil is too wet. Root penetration and the vertical movement of air and water are restricted by the fragipan that is at a depth of 20 inches.

Included with this soil in mapping are some small areas of Hammack soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Nicholson soil is used for pasture or hay.

This soil is not suited to cultivated crops because of the eroded condition of the soil and the continuing hazard of erosion. The hazard of erosion is severe if this soil is cultivated. The fragipan restricts water movement and causes this soil to dry slowly in the spring.

This soil is suited to use for pasture and hay. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants help control erosion and increase forage production.

This soil is suited to woodland. At the point of highest annual growth, black oak should produce a volume of 52 cubic feet per acre. White oak, eastern white pine, and white ash are the preferred trees to plant. Plant competition, use of equipment, and the hazard of erosion are concerns in management.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is not suited to most urban uses or to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Steepness of slope, wetness, and slow permeability are limitations for urban and recreational uses. Low soil strength is a limitation for local roads and streets.

This Nicholson soil is in capability subclass VIe, and the woodland ordination symbol is 4R.

Nn—Nolin silt loam, occasionally flooded. This soil is deep, nearly level, and well drained. It is on flood plains of streams that drain into the Cumberland and Ohio Rivers. Some areas of this map unit are dissected by drainage ditches and small streams. The slopes range from 0 to 2 percent. The mapped areas range from 5 to 270 acres.

Typically, this soil is brown silt loam throughout. The surface layer is about 8 inches thick. The subsoil extends to a depth of about 42 inches. The substratum extends to a depth of about 60 inches.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction ranges from medium acid to neutral. The permeability is moderate. Soil tilth is good. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 3 to 6 feet. This soil is subject to occasional flooding.

Included with this soil in mapping are some small areas of Lindside and Newark soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 1 acre.

Most of the acreage of this Nolin soil is used for crops, mainly corn or soybeans. A few small areas have been left in native hardwoods.

This soil is well suited to row crops, but it is not as suited to small grains because of occasional flooding. Good tilth can be maintained by returning crop residue to the soil.

This soil is well suited to use for pasture and hay, but occasional flooding can be a concern in management. Proper applications of fertilizer and lime, weed control, and controlled grazing increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 119 cubic feet per acre. Yellow poplar, black walnut, eastern white pine, eastern cottonwood, white ash, cherrybark oak, and sweetgum are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Flood control structures, such as floodwalls or levees, are needed to help contain the floodwater. Low soil strength is a limitation for local roads and streets.

This Nolin soil is in capability subclass IIw, and the woodland ordination symbol is 8A.

No—Nolin silty clay loam, frequently flooded. This soil is deep, nearly level, and well drained. It is on the Ohio River flood plain. Some areas of this map unit are dissected by drainage ditches and small streams. The slopes range from 0 to 2 percent. The mapped areas range from 10 to 200 acres.

Typically, the surface layer is dark grayish brown silty clay loam about 8 inches thick. The subsoil, to a depth of about 51 inches, is brown silty clay loam. The substratum to a depth of about 60 inches is brown silty clay loam.

The natural fertility of this soil is high, and the organic matter content is moderate. Reaction ranges from medium acid to neutral. The permeability is moderate. Soil tilth is fair, and the plow layer tends to crust and pack if cultivated when the soil is too wet. The root zone is deep. A seasonal high water table is at a depth of 3 to 6 feet. This soil is subject to frequent flooding.

Included with this soil in mapping are some small areas of Huntington and Lindside soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Nolin soil is used for crops, mainly corn or soybeans. A few small areas have been left in native hardwoods.

This soil is well suited to row crops. It is not as suited to small grains because of the hazard of flooding. Tilth can be improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but frequent flooding is a concern in management. Proper application of fertilizer and lime, weed control, and controlled grazing can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, sweetgum should produce a volume of 112 cubic feet per acre. Eastern cottonwood, white ash, and cherrybark oak are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Flood control structures, such as floodwalls or levees, are needed to help contain the floodwater.

This Nolin soil is in capability subclass IIw, and the woodland ordination symbol is 8W.

OtA—Otwell silt loam, 0 to 2 percent slopes, occasionally flooded. This soil is deep and moderately well drained. It is on stream terraces. This soil has a fragipan. Some areas of this map unit are frequently dissected by ditches, sloughs, or small streams. The mapped areas range from 3 to 75 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 26 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 54 inches, is very firm and compact, light olive brown and yellowish brown silty clay loam that has light brownish gray mottles. The substratum to a depth of about 80 inches is yellowish brown silty clay loam that has light gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and very slow in the fragipan. The available water capacity is moderate. This soil is easily tilled within a wide range of moisture content. This soil is wet for long periods during winter and early in spring. Root penetration and vertical movement of air and water is restricted by the fragipan that is at a depth of about 24 inches. A seasonal high water table is at a depth of 2 to 3 feet. This soil is subject to occasional flooding during winter and spring.

Included with this soil in mapping are some small areas of Wheeling and Weinbach soils. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Otwell soil is used for crops, mainly corn or soybeans. A few small areas have been left in native hardwoods.

This soil is well suited to row crops, but it is not as suited to small grains, hay, and pasture because of the hazard of flooding and wet conditions during the winter. This soil is not as suited to deep-rooted crops because of the fragipan and the seasonal high water table.

This soil is suited to use for pasture and hay. Flooding is a concern in management. Brush and weed control, proper grazing, and proper application of fertilizer and lime can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, white oak should produce a volume of 47 cubic feet per acre. Eastern white pine, yellow poplar, and white ash are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding and wetness. The slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This Otwell soil is in capability subclass IIw, and the woodland ordination symbol is 3A.

OtB—Otwell silt loam, 2 to 6 percent slopes, occasionally flooded. This soil is deep and moderately well drained. It is on the terraces of the larger streams. This soil has a fragipan. Many areas of this map unit are dissected by shallow drainageways. The slopes are smooth. The mapped areas range from 3 to 125 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 26 inches, is yellowish brown silty clay loam. The middle part, to a depth of about 54 inches, is very firm and compact, light olive brown and yellowish brown silty clay loam that has light brownish gray mottles. The substratum to a depth of about 80 inches is yellowish brown silty clay loam that has light gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and very slow in the fragipan. The available water capacity is moderate. This soil is easily tilled within a wide range of moisture content. This soil is wet for long periods during winter and spring. Root penetration and vertical movement of air and water is restricted by the fragipan that is at a depth of about 24 inches. A seasonal high water table is at a depth of 2 to 3 feet. This soil is subject to occasional flooding.

Included with this soil in mapping are some small areas of Wheeling soils. Also included are some areas of Otwell soils that are severely eroded. The included soils make up less than 5 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Otwell soil is used for crops, mainly corn or soybeans. A few small areas have been left in native hardwoods.

This soil is well suited to row crops, but it is not as suited to small grains because of the hazard of flooding and seasonal wetness. The hazard of erosion is moderate. Crops respond well to lime and fertilizer. This soil is not as suited to deep-rooted crops because of the fragipan and the seasonal high water table. Good tilth can be maintained by returning crop residue to the soil and including grasses and legumes in the cropping system.

This soil is suited to use for pasture and hay. Occasional flooding is a concern in management. Brush and weed control, proper grazing, and proper application of fertilizer and lime can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, white oak should produce a volume of 47 cubic feet per acre. Eastern white pine, yellow poplar, and white ash are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding and wetness. The slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This Otwell soil is in capability subclass IIe, and the woodland ordination symbol is 3A.

OtC3—Otwell silt loam, 6 to 12 percent slopes, severely eroded, occasionally flooded. This soil is deep and moderately well drained. It is on stream terraces. Some areas of this map unit are frequently dissected by sloughs and small streams. The mapped areas range from 3 to 220 acres.

Typically, the surface layer is yellowish brown silt loam about 7 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 19 inches, is yellowish brown and brownish yellow silty clay loam. The lower part, to a depth of about 47 inches, is a firm light olive brown or yellowish brown silty clay loam fragipan that has gray mottles. The substratum to a depth of about 73 inches is yellowish brown silty clay loam that has gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from medium acid to very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. This soil is easily tilled within a wide range of moisture content. It is wet for long periods during winter and early in spring. Root penetration and vertical movement of air and water is restricted by the fragipan that is at a depth of about 19 inches. A seasonal high water table is at a depth of 2 to 3 feet. This soil is subject to occasional flooding during winter and spring.

Included with this soil in mapping are some small areas of McGary and Weinbach soils. Also included are spots that are not severely eroded. The included soils make up about 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Otwell soil is used as woodland. In a few small areas, it is used for crops, mainly corn or soybeans.

This soil is poorly suited to row crops because of the eroded condition of the soil and continuing severe erosion hazard. This soil is poorly suited to small grains, hay, and pasture because of the hazard of flooding and wet conditions during the winter. It is poorly suited to deep-rooted plants because of the fragipan and the seasonal high water table.

This soil is suited to woodland. At the point of highest annual growth, white oak should produce a volume of 47 cubic feet per acre. Eastern white pine, yellow poplar, and white ash are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding, wetness, and steepness of slope. The slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This Otwell soil is in capability subclass IVe, and the woodland ordination symbol is 3A.

Pt—Pits, limestone. This map unit is made up of quarries from which limestone has been excavated. The soil and several feet of bedrock have been removed. In this area are other Pits, 10 to 60 feet deep, that have sandstone or limestone bedrock at the bottom.

Included in mapping are adjacent loading and access areas from which the soil material has been removed or covered with broken pieces of bedrock. Only one quarry is operating in the northeastern part of Crittenden County (fig. 11). The other quarries are smaller and have been abandoned.

Pits, limestone, is in capability subclass VIIIs. A woodland ordination symbol has not been designated for this map unit.

Pu—Pits-Udorthents complex. This complex consists of material removed during fluorite-mining operations. These materials consist of various size boulders and clay particles. Most areas in this map unit are along fault lines in limestone formations of Mississippian age.

Some areas include shallow ponds that are partly filled with sand, silt, and stone. Reaction ranges from strongly acid to neutral.

Most areas have not been reclaimed. In some areas, vegetation includes grasses, forbs, and mixed hardwoods.

Pits-Udorthents complex is in capability subclass VIIs. A woodland ordination symbol has not been designated for this map unit.

Ro—Robinsonville fine sandy loam, frequently flooded. This soil is deep, nearly level, and well drained. It is on the flood plains. The slopes are uniform and range from 0 to 2 percent. The mapped areas range from 4 to 175 acres.

Typically, the surface layer is brown fine sandy loam about 12 inches thick. The underlying material to a depth of about 60 inches is brown and dark grayish brown, stratified fine sandy loam, loam, and loamy fine sand.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from slightly acid to moderately alkaline. The permeability is moderate or moderately rapid, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant

Figure 11.—This is the only producing limestone quarry in Crittenden County.

roots. A seasonal high water table is at a depth of 4 to 6 feet. This soil is subject to frequent flooding.

Included with this soil in mapping are some small areas of Huntington and Nolin soils. Huntington soils have a silt loam surface layer, and Nolin soils have a silty clay loam surface layer. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

Most of the acreage of this Robinsonville soil is used for crops, mainly corn. In some areas, this soil is used as woodland.

This soil is well suited to row crops, but it is not as suited to small grains because of the hazard of flooding. Good tilth is easily maintained by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but frequent flooding is a concern in management. Proper application of fertilizer, weed and brush control, and controlled grazing can increase forage production.

This soil is well suited to woodland. At the point of highest annual growth, eastern cottonwood should produce a volume of 156 cubic feet per acre. Eastern cottonwood, sweetgum, and American sycamore are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Wetness and seepage are limitations for urban uses.

This Robinsonville soil is in capability subclass IIw, and the woodland ordination symbol is 11W.

Ru—Robinsonville-Huntington complex, frequently flooded. The soils in this complex are deep and well drained. These soils are on the flood plains. The slopes range from 0 to 2 percent. The mapped areas range from 8 to 150 acres.

Robinsonville soil makes up about 70 percent of this map unit, Huntington soil about 20 percent, and included soils about 10 percent. The individual areas of the soils in this map unit are too mixed or too small to map separately at the scale used for the maps in the back of this publication.

Typically, the surface layer is brown fine sandy loam about 12 inches thick. The underlying material to a depth of about 60 inches is brown and dark grayish brown stratified fine sandy loam, loam, and loamy fine sand.

The natural fertility of Robinsonville soil is medium, and the organic matter content is low. Reaction ranges from slightly acid to moderately alkaline throughout. The permeability is moderate or moderately rapid, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. A seasonal high water table is at a depth of 4 to 6 feet. This soil is subject to frequent flooding.

Typically, the surface layer of Huntington soil is very dark grayish brown silt loam about 11 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is dark grayish brown silt loam. The lower part to a depth of about 60 inches is brown silt loam and silty clay loam.

The natural fertility and organic matter content of Huntington soil are high. Reaction ranges from slightly acid to mildly alkaline throughout. The permeability is moderate, and the available water capacity is high. This soil has good tilth, and the root zone is deep. This soil is subject to frequent flooding.

Included with the soils in this complex in mapping are some small areas of Nolin silty clay loam. Also included are some small areas of soils that are similar to the soils in this complex but have short slopes up to 20 percent.

In most areas, these soils are used for cultivated crops.

Robinsonville and Huntington soils are well suited to row crops. They are not as suited to small grains, hay, and pasture because of the hazard of flooding. Good tilth is easily maintained by returning crop residue to the soil.

These soils are well suited to woodland. At the point of highest annual growth, eastern cottonwood should produce a volume of 156 cubic feet per acre on Robinsonville soil, and 98 cubic feet per acre on Huntington soil. Eastern cottonwood, sweetgum, and American sycamore are the preferred trees to plant on Robinsonville soil. Yellow poplar, black walnut, and eastern white pine are the preferred trees to plant on Huntington soil. Plant competition, seedling mortality, and the use of equipment are concerns in management on Robinsonville soil. Plant competition is a concern in management on Huntington soil.

These soils are poorly suited to urban uses because of the hazard of flooding.

Robinsonville and Huntington soils are in capability subclass IIw. The woodland ordination symbol is 11W for Robinsonville soil and 7A for Huntington soil.

UnB—Uniontown silt loam, 2 to 6 percent slopes, rarely flooded. This soil is deep and moderately well drained or well drained. It is on stream terraces. The mapped areas range from 4 to 35 acres.

Typically, the surface layer is grayish brown silt loam about 10 inches thick. The subsoil, to a depth of 36 inches, is yellowish brown silty clay loam. The substratum to a depth of about 60 inches is yellowish brown silt loam that has brown and gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from strongly acid to slightly acid to a depth of about 36 inches except where the surface layer has been limed. It is neutral or mildly alkaline in the substratum. The permeability is moderate or moderately slow, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. The seasonal high water table is at a depth of 2.5 to 6 feet. In most areas, this soil is subject to rare flooding.

Included with this soil in mapping are some small areas of Otwell, Weinbach, and Henshaw soils. Also included are some small areas of Uniontown soils that have a silty clay loam surface layer. The included soils make up about 5 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Uniontown soil is used for agriculture.

This soil is well suited to row crops and small grains. The shape of areas and wetness are limitations on adjacent soils, and flooding is a hazard. Good tilth is easily maintained by returning crop residue to the soil. Conservation tillage and using grasses and legumes in the cropping system reduce runoff and help control erosion.

This soil is well suited to hay and pasture. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, yellow poplar should produce a volume of 88 cubic feet per acre. Yellow poplar, black walnut, white ash, white oak, northern red oak, eastern white pine, and sweetgum are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Wetness and slow permeability are limitations for urban uses. If adequate methods to control flooding are used, the soil is suited to urban development. Low soil strength is a limitation for local roads and streets.

This Uniontown soil is in capability subclass IIe, and the woodland ordination symbol is 6A.

UoC3—Uniontown silty clay loam, 6 to 12 percent slopes, severely eroded, rarely flooded. This soil is deep and moderately well drained or well drained. It is on the sides of stream terraces. Because of the eroded condition of the soil, the plow layer is made up mostly of subsoil. The mapped areas range from 10 to 90 acres.

Typically, the surface layer is yellowish brown silty clay loam about 9 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The subsoil, to a depth of about 30 inches, is yellowish brown silty clay loam. The substratum to a depth of about 60 inches is yellowish brown silt loam that has brown and gray mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction ranges from strongly acid to slightly acid to a depth of 30 inches except where the surface layer has been limed. It is neutral or mildly alkaline in the substratum. The permeability is moderate or moderately slow, and the available water capacity is high. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. The seasonal high water table is at a depth of 2.5 to 6 feet. In most areas, this soil is subject to rare flooding.

Included with this soil in mapping are some small areas of Otwell soils. Also included are some areas of soils that are similar to Uniontown soil but have more clay throughout, some areas of soils that have slopes steeper than 12 percent, and a few spots that have lime concretions on the surface. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Uniontown soil is used for agriculture.

The soil is poorly suited to row crops because of the eroded condition of the soil and continuing very severe hazard of erosion. Tilth can be improved by returning crop residue to the soil.

This soil is suited to use for hay and pasture. Fertilizer and lime applications, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production and help control erosion.

This soil is suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 52 cubic feet per acre. White ash, eastern white pine, northern red oak, and white oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Wetness and steepness of slope are limitations for urban uses. Low soil strength is a limitation for local roads and streets.

This Uniontown soil is in capability subclass IVe, and the woodland ordination symbol is 4A.

Wa—Waverly silt loam, occasionally flooded. This soil is deep, nearly level, and poorly drained. It is on the flood plains. Many areas of this map unit are dissected by drainage ditches. The slopes range from 0 to 2 percent. The mapped areas range from 3 to 115 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil, to a depth of about 44 inches, is light gray silt loam that has yellowish brown and brown mottles. The substratum to a depth of about 60 inches is light gray silt loam that has grayish brown mottles.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. Soil tilth is good. The root zone is deep. A seasonal high water table is at a depth of 0.5 to 1 foot. This soil is subject to occasional flooding.

Included with this soil in mapping are some small areas of Collins and Belknap soils that are better drained than Waverly soil. Also included are some areas of soils that are similar to Waverly soil but have more clay throughout. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

Most of the acreage of this Waverly soil has been cleared and drained and is used for crops, mainly corn and soybeans. Some areas have been left in native hardwoods.

This soil is suited to row crops, but it is not as suited to small grains because of wetness and the hazard of flooding. A drainage system must be installed if the soil is used for row crops. Tilth can be maintained or improved by returning crop residue to the soil.

This soil is suited to use for pasture and hay, but the hazard of flooding and the wetness limitation are significant concerns in management. Installing a drainage system and using management practices, such as controlled grazing, brush and weed control, and proper application of fertilizers, can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, cherrybark oak should produce a volume of 151 cubic feet per acre. Cherrybark oak, eastern cottonwood, sweetgum, and willow oak are the preferred trees to plant. Plant competition, seedling mortality, and use of equipment are concerns in management.

This soil is poorly suited to most urban uses because of the hazard of flooding. Wetness is a limitation for urban uses.

This Waverly soil is in capability subclass IIIw, and the woodland ordination symbol is 10W.

We—Weinbach silt loam, rarely flooded. This soil is deep, nearly level, and somewhat poorly drained. It is on terraces of the larger streams. Some areas in this map unit are dissected by drainage ditches and small streams. The slopes range from 0 to 2 percent. The mapped areas range from 3 to 90 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsurface layer, to a depth of about 14 inches, is yellowish brown silt loam that has light brownish gray mottles. The upper part of the subsoil, to a depth of about 22 inches, is yellowish brown silty clay loam that has light brownish gray and yellowish brown mottles. The next layer, to a depth of about 40 inches, is a firm, brittle and compact fragipan that is yellowish brown and light olive brown silty clay loam. Mottles are light brownish gray and yellowish brown. The lower part, to a depth of about 49 inches, is yellowish brown silty clay loam that has light brownish gray mottles. The substratum to a depth of about 60 inches is mottled yellowish brown and light brownish gray silty clay loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is strongly acid or very strongly acid throughout except where the surface layer has been limed. The permeability is moderate above the fragipan and very slow in the fragipan. The available water capacity is moderate. Root penetration and the vertical movement of air and water are restricted by the fragipan. This soil is wet for long periods in winter and spring. A seasonal high water table is at a depth of 1 foot to 3 feet. This soil is subject to rare flooding.

Included with this soil in mapping are some small areas of Otwell, McGary, and Melvin soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Weinbach soil is used for crops, mainly soybeans. In a few areas, it is used for pasture or has been left in native hardwoods.

This soil is well suited to row crops, but it is not as suited to small grains. The main limitations are wetness and the restricted rooting depth. A tile drainage system is not always successful on this soil, but some of the excess water can be removed by surface drains.

This soil is suited to use for pasture and hay. Plants that can tolerate seasonal wetness should be planted on this soil.

This soil is suited to woodland. At the point of highest annual growth, white oak should produce a volume of 57 cubic feet per acre. Eastern white pine, white ash, baldcypress, yellow poplar, and American sycamore are the preferred trees to plant. The use of equipment, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to most urban uses because of wetness. The very slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. Low soil strength is a limitation for local roads and streets.

This Weinbach soil is in capability subclass IIIw, and the woodland ordination symbol is 4W.

WhB—Wheeling silt loam, 2 to 6 percent slopes, rarely flooded. This soil is deep and well drained. It is on stream terraces along the Ohio River. The mapped areas range from 4 to 120 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is dark yellowish brown silty clay loam. The lower part, to a depth of about 50 inches, is yellowish brown loam. The substratum to a depth of about 60 inches is yellowish brown loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is medium acid or strongly acid except where the surface layer has been limed. The permeability and the available water capacity are moderate. This soil has good tilth and can be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. This soil is subject to rare flooding.

Included with this soil in mapping are some small areas of Otwell soils. Also included are some areas of soils that are similar to Wheeling soil but have slopes of less than 2 percent. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Wheeling soil is used for agriculture.

This soil is well suited to row crops and small grains. Cover crops and grasses and legumes in the cropping system and crop residue in or on the soil help control erosion and improve tilth.

This soil is well suited to use for hay and pasture (fig. 12). Proper application of fertilizer and lime, weed control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 62 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, and northern red oak are the preferred trees to plant. Plant competition is a concern in management.

Except for the hazard of flooding, this soil is well suited to most urban uses. Low soil strength is a limitation for local roads and streets.

This Wheeling soil is in capability subclass IIe, and the woodland ordination symbol is 4A.

WhC2—Wheeling silt loam, 6 to 12 percent slopes, eroded, rarely flooded. This soil is deep and well drained. It is on stream terraces along the Ohio River. The mapped areas range from 3 to 65 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of about 50 inches, is dark yellowish brown silty clay loam in the upper part and yellowish brown loam in the lower part. The substratum to a depth of about 60 inches is yellowish brown loam.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is medium acid or strongly acid except where the surface layer has been limed. The permeability is moderate, and the available water capacity is high. This soil has good tilth and can

Figure 12.—Mixed hay crop of grasses and legumes is being harvested in an area of Wheeling silt loam, 2 to 6 percent slopes, rarely flooded.

be easily cultivated within a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots. This soil is subject to rare flooding.

Included with this soil in mapping are some small areas of Otwell soils. The included soils make up less than 10 percent of this map unit. Individual areas generally are less than 2 acres.

In most areas, this Wheeling soil is used for agriculture.

This soil is suited to row crops and small grains. The hazard of erosion is moderate and is a concern in management. Cover crops and grasses and legumes in the rotation system can help control erosion. Returning crop residue to the soil can help maintain good tilth.

This soil is well suited to use for hay and pasture. Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, northern red oak should produce a volume of 62 cubic feet per acre. Eastern white pine, yellow poplar, black walnut, and northern red oak are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses. The suitability is limited because of steepness of slope and the hazard of rare flooding.

This Wheeling soil is in capability subclass IIIe, and the woodland ordination symbol is 4A.

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded. This soil is deep and well drained or moderately well drained. It is on upland side slopes in areas that are underlain by sandstone and shale. This soil has a fragipan. Many areas of this map unit are dissected by shallow drainageways. The mapped areas range from 6 to 145 acres.

Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 22 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 38 inches, is a compact, yellowish brown silty clay loam fragipan that has gray mottles. The substratum, to a depth of about 58 inches, is yellowish brown silty clay loam that has 10 percent coarse sandstone fragments. Sandstone bedrock is at a depth of about 58 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is very strongly acid or strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Soil tilth is good. Root penetration is restricted in the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are some small areas of Loring, Frondorf, Clifty, and Collins soils. Also included are some areas of Zanesville soils that are severely eroded. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Zanesville soil is used for agriculture. A few small areas have been left in native hardwoods or have reverted to woodland.

This soil is suited to row crops and small grains. Good tilth is easily maintained by returning crop residue to the soil. The hazard of erosion is severe if this soil is cultivated. Conservation tillage, grasses and legumes in the cropping system, and cover crops help slow runoff and control erosion.

This soil is well suited to use for hay and pasture (fig. 13). Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants increase forage production.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 102 cubic feet per acre. Yellow poplar, white ash, white oak, northern red oak, eastern white pine, and shortleaf pine are the preferred trees to plant. Plant competition is a concern in management.

This soil is suited to most urban uses. The slow permeability of the fragipan, depth to bedrock, wetness, and steepness of slope are the main limitations. Low soil strength is a limitation for local roads and streets.

This Zanesville soil is in capability subclass IIIe, and the woodland ordination symbol is 7A.

ZaC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded. This soil is deep and well drained or moderately well drained. It is on upland hillsides in areas that are underlain by sandstone and shale. This soil has a fragipan. Many areas of this map unit have shallow gullies and are dissected by shallow drainageways. The mapped areas range from 4 to 580 acres.

Typically, the surface layer is yellowish brown silt loam about 4 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 18 inches, is yellowish brown silt loam. The lower part, to a depth of about 38 inches, is a compact, yellowish brown silt loam fragipan that has gray mottles. The substratum, to a depth of about 58 inches, is dark brown, yellowish brown, and light gray loam. Sandstone bedrock is at a depth of about 58 inches.

The natural fertility and organic matter content of this soil are low. Reaction is very strongly acid or strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. This soil has poor tilth, and it tends to crust and pack unless cultivated within a narrow range of moisture content. The root zone is moderately deep. Root penetration and water movement are restricted by the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are some small areas of Loring, Frondorf, Clifty, and Collins soils. Also included are some areas of Zanesville soils that are not eroded. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Zanesville soil is used for agriculture. A few small areas are in second-growth woodland or are left idle.

This soil is suited to row crops and small grains. The moderately deep root zone and the available water capacity are limitations. The hazard of erosion is very severe if cultivated crops are grown. Erosion must be controlled if this soil is used for row crops.

This soil is suited to use for hay and pasture. Proper application of fertilizer and lime, weed and brush control, controlled grazing, and proper selection and establishment of plants increase the productivity.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 91 cubic feet per acre. Virginia pine, shortleaf pine, eastern white pine, and white oak are the preferred trees to plant. Plant competition and seedling mortality are concerns in management.

Figure 13.—These beef cattle are on fescue pasture in an area of Zanesville silt loam, 6 to 12 percent slopes, eroded.

This soil is suited to most urban uses. The slow permeability of the fragipan is a severe limitation to use of this soil as septic tank absorption fields. The fragipan restricts drainage and causes some seepy spots to occur in winter and in spring. Steepness of slope, depth to bedrock, and wetness are limitations for some urban uses. Low soil strength is a limitation for local roads and streets.

This Zanesville soil is in capability subclass IVe, and the woodland ordination symbol is 6D.

ZaD2—Zanesville silt loam, 12 to 20 percent slopes, eroded. This soil is well drained or moderately well drained. It is on upland side slopes in areas that are underlain by sandstone and shale. This soil has a fragipan. Many areas of this map unit are dissected by shallow drainageways. The mapped areas range from 5 to 125 acres.

Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of about 18 inches, is yellowish brown silty clay loam. The lower part, to a depth of about 38 inches, is a compact, yellowish brown silt loam fragipan that has gray mottles. The substratum, to a depth of about 58 inches, is yellowish brown silt loam that has 10 percent coarse sandstone fragments. Sandstone bedrock is at a depth of about 58 inches.

The natural fertility of this soil is medium, and the organic matter content is low. Reaction is very strongly acid or strongly acid except where the surface layer has been limed. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. This soil has good tilth. Root penetration is restricted by the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are some small areas of Loring, Frondorf, Clifty, and Collins soils. Also included are some areas of Zanesville soils that are severely eroded. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Zanesville soil is used for agriculture. Some areas have been left in native hardwoods or have reverted to woodland.

If this soil is used for row crops, erosion must be controlled. Conservation tillage, contour cultivation, and grasses and legumes in the rotation system help control erosion. Good tilth can be maintained by returning crop residue to the soil.

This soil is suited to use for pasture and hay. Controlled grazing, weed and brush control, and proper application of fertilizer and lime can increase forage production.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 102 cubic feet per acre. Yellow poplar, white ash, white oak, northern red oak, eastern white pine, and shortleaf pine are the preferred trees to plant. Plant competition, use of equipment, and the hazard of erosion are concerns in management.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The main limitations are steepness of slope, wetness, depth to bedrock, and the slow permeability of the fragipan. Low soil strength is a limitation for local roads and streets.

This Zanesville soil is in capability subclass IVe, and the woodland ordination symbol is 7R.

ZaD3—Zanesville silt loam, 12 to 20 percent slopes, severely eroded. This soil is deep and well drained or moderately well drained. It is on upland side slopes in areas that are underlain by sandstone and shale. This soil has a fragipan. Many areas of this map unit have shallow gullies and are dissected by shallow drainageways. The mapped areas range from 6 to 250 acres.

Typically, the surface layer is yellowish brown silt loam about 4 inches thick. It differs from the typical pedon because most of the original surface layer has eroded away. The upper part of the subsoil, to a depth of about 18 inches, is yellowish brown silt loam. The lower part, to a depth of about 38 inches, is a compact, yellowish brown silt loam fragipan that has gray mottles. The substratum, to a depth of about 58 inches, is dark brown, yellowish brown, and light gray loam. Sandstone bedrock is at a depth of about 58 inches.

The natural fertility and organic matter content of this soil are low. Reaction is very strongly acid or strongly acid except where lime has been added. The permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. This soil has poor tilth, and it tends to crust and pack unless cultivated within a narrow range of moisture content. The root zone is moderately deep. Root penetration is restricted by the fragipan. A seasonal high water table is at a depth of 2 to 3 feet.

Included with this soil in mapping are small areas of Loring, Frondorf, Clifty, and Collins soils. Also included are some areas of Zanesville soils that are not eroded. The included soils make up less than 15 percent of this map unit. Individual areas generally are less than 3 acres.

In most areas, this Zanesville soil is used for agriculture. Some areas have been left in native hardwoods or have reverted to woodland.

This soil is not suited to cultivated crops because of the eroded condition of the soil and the continuing severe erosion hazard.

This soil is suited to use for pasture and hay if adequately treated with lime and fertilizer and properly managed to provide adequate cover crops to control erosion.

This soil is suited to woodland. At the point of highest annual growth, Virginia pine should produce a volume of 91 cubic feet per acre. Virginia pine, shortleaf pine, eastern white pine, and white oak are the preferred trees to plant. The hazard of erosion, use of equipment, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to most urban uses and to recreational uses, such as campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. The main limitations are steepness of slope, wetness, depth to bedrock, and the slow permeability of the fragipan. Low soil strength is a limitation for local roads and streets.

This Zanesville soil is in capability subclass VIe, and the woodland ordination symbol is 6D.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Crittenden County are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

The following map units, or soils, make up prime farmland in Crittenden County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

Be	Belknap silt loam, occasionally flooded
Ca	Calloway silt loam, 0 to 2 percent slopes (where drained)
Cl	Clifty silt loam, occasionally flooded
Co	Collins silt loam, occasionally flooded
CrB	Crider silt loam, 2 to 6 percent slopes
GrB	Grenada silt loam, 2 to 6 percent slopes
Hn	Henshaw silt loam, rarely flooded
Hu	Huntington silt loam, frequently flooded
Ka	Karnak silty clay loam, occasionally flooded (where drained)
Ld	Lindside silt loam, occasionally flooded
Ln	Lindside silty clay loam, frequently flooded
LoB	Loring silt loam, 2 to 6 percent slopes
Mc	McGary silty clay loam, occasionally flooded (where drained)
Me	Melvin silt loam, occasionally flooded (where drained)
Ml	Melvin silty clay loam, frequently flooded (where drained)
MmB	Memphis silt loam, 2 to 6 percent slopes
Na	Newark silt loam, occasionally flooded (where drained)
Ne	Newark silty clay loam, frequently flooded (where drained)
NhB	Nicholson silt loam, 2 to 6 percent slopes
Nn	Nolin silt loam, occasionally flooded
No	Nolin silty clay loam, frequently flooded
OtA	Otwell silt loam, 0 to 2 percent slopes, occasionally flooded

OtB Otwell silt loam, 2 to 6 percent slopes, occasionally flooded
Ro Robinsonville fine sandy loam, frequently flooded
Ru Robinsonville-Huntington complex, frequently flooded
UnB Uniontown silt loam, 2 to 6 percent slopes, rarely flooded
Wa Waverly silt loam, occasionally flooded (where drained)
We Weinbach silt loam, rarely flooded (where drained)
WhB Wheeling silt loam, 2 to 6 percent slopes, rarely flooded

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

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

William H. Amos, Jr., agronomist, Soil Conservation Service, helped to 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 survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

In 1983, about 32,000 beef and dairy cattle were in Crittenden County. A mixture of grasses and legumes produce most of the hay crops and pasture. About 80 percent of the hayland is used in a hay and pasture rotation system. After harvesting, most of the hay is rolled into large, round bales.

About 42 percent of the total farm cash receipts in Crittenden County is from livestock; therefore, a high quality forage program is necessary. General principles of pasture and hayland management are described in the following paragraphs.

A successful livestock program is dependent on a forage program that can supply large quantities of homegrown feeds of adequate quality. Such a program can furnish up to 78 percent of the feed for beef cattle and 66 percent for dairy cattle.

In 1981, more than 61,000 acres was used as cropland and hayland. Of this acreage, 41,000 acres was used for row crops, mainly corn and soybeans; about 18,000 acres was in alfalfa and other hay crops; and about 2,000 acres was in close-growing crops, mainly wheat and barley.

The soils in the county have high potential for increased production of food. About 21,000 acres of potentially good cropland is now in woodland, and about 35,000 acres is in pasture. In addition to the reserve capacity of this land, food production can increase by applying the latest crop production technology to all cropland in Crittenden County. This soil survey can help facilitate the application of this technology.

Erosion is the main concern on about 55 percent of the cropland and pasture in the county. If a soil has slope of more than 2 percent, erosion is a hazard. Crider, Frondorf, Grenada, Hammack, Loring, Memphis, Nicholson, Otwell, Wheeling, and Zanesville soils have slopes of more than 2 percent.

Erosion of the surface layer is damaging because productivity is reduced and streams are polluted by sediment. The soil loses its productivity when the subsoil is incorporated into the plow layer. This is especially damaging to soils that have a subsoil or a layer below the subsoil that limits the depth of the root zone. These layers include the fragipan in Grenada, Loring, Nicholson, Otwell, and Zanesville soils and the bedrock in Frondorf soils. Erosion control minimizes the pollution of streams by sediment and improves the quality of water for municipal use and recreation and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult in soils that have a fragipan because the original friable surface layer has been eroded away. These areas are common in the severely eroded Nicholson, Otwell, and Zanesville soils.

Generally, erosion control practices provide protective soil cover, reduce runoff, and increase infiltration. A conservation tillage system that keeps vegetation on the soil for extended periods controls erosion and maintains the productivity of the soil. A cropping system on livestock farms that includes legumes and forage reduces erosion on sloping land, provides nitrogen, and improves tilth for subsequent crops.

On sloping soils, conservation tillage is needed to provide vegetative cover on a year-round basis. Leaving crop residue on the surface increases infiltration, reduces runoff, and helps to control erosion. These practices can be adapted to most soils in Crittenden County. No-till planting is becoming more common and is effective in reducing erosion on sloping land.

Information for the design of erosion control measures for each kind of soil is available in local offices of the Soil Conservation Service.

Drainage is the main concern in management, and it is needed on about 8 percent of the acreage used for crops and pasture in Crittenden County. Some soils are so wet that the production of crops common to the area generally is not possible unless these soils are drained.

Belknap, Calloway, Henshaw, Karnak, McGary, Melvin, Newark, Waverly, and Weinbach soils, which make up about 18,000 acres in Crittenden County, are somewhat poorly drained or poorly drained. Unless these soils are artificially drained, crop yields are reduced in most years.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface and tile drains is needed in most areas of poorly drained soils that are used for intensive row cropping. Drains should be more closely spaced in slowly permeable soils than in the more permeable soils. The permeability is very slow in McGary soils. In many areas of Karnak, Melvin, and Waverly soils, adequate outlets are not available for tile drainage systems. Open ditch drainage is most effective on soils, such as Calloway and Weinbach soils, that have a fragipan.

Natural soil fertility is medium in most soils on the uplands in Crittenden County. Some soils on the flood plains, such as Huntington, Lindside, Nolin, Newark, and Robinsonville soils, are higher in natural plant nutrients than are most soils on the uplands (fig. 14). These soils on the flood plains range from slightly acid to mildly alkaline. Belknap, Collins, and Waverly soils that are also on the flood plains range from very strongly acid to medium acid.

Many soils on the uplands are very strongly acid in their natural state. If lime has never been added, ground limestone is required to sufficiently raise the pH level for optimum yield of alfalfa and other crops that grow best on nearly neutral soils. Available phosphorus and potash levels are naturally low in most of these soils. On all soils, applications of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Kentucky Cooperative Extension Service can help to determine the kinds and amounts of fertilizer and lime to apply.

Tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Most of the soils used for crops in Crittenden County have a surface layer of silt loam that has a light color and a low organic matter content. The structure of these soils generally is weak, and heavy rainfall causes a crust to form on the surface. This crust is hard when dry and is nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Crop residue, manure in or on the soil, and other organic material regularly added to the soil can improve soil structure and reduce crust formation.

Field crops suited to the soils and climate of Crittenden County include many that are not commonly grown. Corn and soybeans are the most common row crops. Grain sorghum, sunflowers, popcorn, navy beans, sugar beets, peanuts, potatoes, and similar crops can be grown on a larger scale if economic conditions are favorable. Wheat and barley are the common close-growing crops. Rye, oats, buckwheat, and flax and grass seed from fescue, red clover, orchardgrass, bromegrass, and timothy can be grown on a larger scale if economic conditions are favorable. A small acreage of specialty crops, including vegetables, such as corn and tomatoes; tree fruits, such as apples and peaches; and other crops, such as strawberries and nursery plants, are grown commercially in Crittenden County. In addition, large areas can be adapted to other specialty crops, such as blueberries, grapes, and other vegetables, that are not commonly grown in the county.

Deep soils that have good natural drainage and that warm up early in the spring are well suited to vegetables. Crider, Memphis, and Wheeling soils, which have less than 6 percent slopes, are especially suited to vegetable crops. These soils make up about 2,450 acres. Generally, crops can be planted and harvested earlier on these soils than crops that are grown on other soils in Crittenden County. Most of the well drained soils are suitable for orchards and nursery plants. Soils in low positions on the landscape, where frost is frequent and

Figure 14.—The Huntington, Robinsonville, and Nolin soils are frequently flooded and are high in natural plant nutrients. These soils are on the Ohio River flood plain.

air drainage is poor, generally are poorly suited to early vegetables, small fruits, and orchards.

The local offices of the Soil Conservation Service and the Kentucky Cooperative Extension Service can provide the latest information and suggestions for special crops.

Generally, soils that are well suited to crops are also well suited to urban development. Data about specific soils in this soil survey can be used in planning future land use patterns. Potential productive capacity in farming should be weighed against soil limitations and potential for nonfarm development.

In Crittenden County, about 64,000 acres is used for hay and pasture *(10)*. About 26,000 acres needs reestablishment, and a sizeable acreage needs improvement, brush control, and protection from overgrazing.

The soils in Crittenden County vary widely in their capabilities because of difference in depth to bedrock or limiting layers, internal drainage, ability to supply moisture, and many other properties. Grasses and legumes and grass-legume mixtures vary widely in their ability to persist and produce on different soils. The plants or mixture of plants should be matched to the different soils to obtain maximum yields and to conserve soil and water.

Soils that are deep, level to gently sloping, and well drained are best suited to high-yield crops, such as corn silage, alfalfa, or alfalfa mixed with orchardgrass or timothy. The soils on the steep parts of the landscape should be maintained in sod-forming grasses, such as tall fescue or bluegrass, to help control erosion. For optimum yield, alfalfa should be mixed with a cool-season grass on soils that are at least 2 feet deep and well drained. On soils that are less than 2 feet deep or are not well drained, a mixture of clover and grass or a stand of pure grass is suitable. Legumes can be established through renovation in sod that is dominantly grass.

Plants should be suited to the soil and also to the intended use. Selected plants should provide maximum quality and versatility in the forage program. Generally, legumes produce higher quality feed than grasses. Tall legumes, such as alfalfa and red clover, are more versatile than a legume, such as white clover, which is used mainly for grazing. Grasses, such as orchardgrass, timothy, and tall fescue, are more suitable for hay and silage.

Tall fescue is a cool-season grass that is suited to a wide range of soil conditions. It is used for both pasture and hay. The growth of tall fescue, which occurs from August through November, is commonly permitted to accumulate in the field and "stockpiled" for deferred grazing from late fall through winter. Nitrogen fertilizer is a nutrient that is needed for maximum production during this period of growth, and the rate of application should be based on the desired level of production.

Pasture and hay yields can be increased by renovation. Renovation is the improvement of pasture and hay fields by partly destroying the sod and liming, fertilizing, and seeding to reestablish desirable forage plants. Adding legumes to these grass fields provides high quality feed and increases the production of feed in summer. Legumes also add nitrogen to the soil. In Kentucky, under proper growing conditions, alfalfa can add 200 to 300 pounds of nitrogen per acre every year to this soil, red clover 100 to 200 pounds, and ladino clover 100 to 150 pounds. An acre of Korean lespedeza, vetch, and other annual forage legumes can add 75 to 100 pounds of nitrogen *(11)*.

The local office of the Soil Conservation Service or the Kentucky Cooperative Extension Service can provide additional information on pasture and hayland management.

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 5. 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 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 insures 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 5 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 use as cropland. 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 rangeland, for woodland, and 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. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use. (None in Crittenden County.)

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 they have other limitations, impractical to remove, that limit their use. (None in Crittenden County.)

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

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

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

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

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w* or *s.*

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Charles A. Foster, forester, Soil Conservation Service, helped to prepare this section.

Crittenden County is in the western Mesophytic Forest region of Kentucky, a transitional area in which oaks are dominant. Commercial forest land covers 92,600 acres, or 40 percent of the total land area *(12)*. The dominant forest types include the oak-hickory on about 74 percent of the forest land, the elm-ash-red maple on 11 percent, the maple-beech-birch on 5 percent, the oak-pine on 5 percent, the loblolly-shortleaf pine on 4 percent, and the oak-gum on 1 percent.

Woodland tracts in the county are small private holdings of about 24 acres and are essentially unmanaged. Most of the forest land is capable of producing 50 cubic feet or more of wood per acre per year, but actual production is 33 cubic feet. An obstacle in managing private forest lands is that about 30 percent of the landowners have woodland that is only a part of the farm or tract. Also, many stands are not well stocked with desirable, high quality trees, and many tracts are owned less than 10 years.

Tree growth, stocking, and quality can be improved by removing low quality trees in fully stocked and understocked stands of all sizes and by regenerating sawtimber stands after harvest. Soil surveys are useful in identifying Kentucky's most productive forest lands, in identifying soil limitations for proper management, and in selecting suitable trees to plant.

The three commercial sawmills in Crittenden County produce rough lumber, dimension stock, cross ties, and chips. Several mills in adjacent counties buy logs or standing trees from Crittenden County.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed soil map units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic feet per acre. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of restricted rooting depth, such as a shallow soil that is underlain by hard rock, hardpan, or other layers that restrict roots. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: R, W, and D.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competition* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic feet. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The procedures and technique for determining site index are given in the site index tables for the soil survey of Crittenden County *(3, 4, 5, 6, 7, 8, 9, 14, 15)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic feet per acre per year. Cubic feet per acre can be converted to board feet by multiplying by a factor of about 5. For example, a productivity of 71 means the soil can be expected to produce 355 board feet per acre per year at the point where mean annual increment culminates.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle 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, 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

William H. Casey, biologist, Soil Conservation Service, helped to prepare this section.

The wildlife population of Crittenden County consists of about 42 species of mammals, 45 species of reptiles and amphibians, and 117 species of birds that are either summer or year-round residents. More than 200 other species of birds visit Kentucky during migration each year, and many of them are in the county at other times during the year.

Wildlife is an important natural resource in the county, especially species that furnish opportunities for sport hunting, commercial trapping, or esthetic enjoyment. Endangered species are a management concern.

The bobwhite quail, mourning dove, ducks, geese, gray squirrel, white-tailed deer, and raccoon are the main game species. Trappers concentrate on the mink, muskrat, and foxes. Photographers, birdwatchers, and others who appreciate the esthetic value of wildlife are especially interested in rare or unusual species that are seldom seen or are difficult to approach. The habitat of the Indiana bat, gray bat, bald eagle, American peregrine falcon, and Bachman's warbler includes Crittenden County, and these endangered species are now protected from possible extinction by the U.S. Fish and Wildlife Service.

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 kinds and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and wheatgrass.

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, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

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

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

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, red fox, and mourning dove.

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, and deer.

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for *planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and 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 must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrink-swell potential can cause the movement of footings. Depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to 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, 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, depth to a high water table, depth to bedrock, 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 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that 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, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock 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 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates that are suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

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

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

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

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

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal 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 releases a variety of plant-available nutrients as it decomposes.

Figure 15.—This grassed waterway channels excess surface water from an area of Loring silt loam, 6 to 12 percent slopes, eroded, and helps control further erosion of the soil.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for 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 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 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, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity (fig. 15). Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "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 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, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

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

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

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

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, 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 influence the soil's adsorption of cations, moisture retention, 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 earth-moving 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 1/3 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 movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These 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 0.02 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 over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

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. (None in Crittenden County.)

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.

In table 16, Waverly soil is assigned to two hydrologic soil groups. Soils that have a seasonal high water table but can be drained are assigned first to a hydrologic group that denotes the drained condition of the soil and then to a hydrologic group that denotes the undrained condition, for example, B/D. Because there are different degrees of drainage and water table control, onsite investigation is needed to determine the hydrologic group of the soil in a particular location.

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 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *brief* (2 to 7 days) and *long* (7 days to 1 month). The time of year that floods are most likely to occur is expressed in months. December-May, for example, means that flooding can occur during the period December through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists 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.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. Most of the pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the National 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 oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(18)*.

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).
Water retained—pressure extraction, percentage of oven-dry weight of less than 2 mm material; 1/3 or 1/10 (3/10) bar (4B1), 15 bars (4B2).
Organic carbon—dichromate, ferric sulfate titration (6A1a).
Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (6O2), potassium (6Q2), sodium (6P2).
Extractable acidity—potassium chloride-triethanolamine (6H3a).
Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).
Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1a).
Reaction (pH)—calcium chloride (8C1e).
Iron—dithionate-citrate extract (6C2b).
Carbonate as calcium carbonate—manometric (6E1b).

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, South National Technical Center, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(17)*. 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 on laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

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 Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that occur on flood plains).

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 Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

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. There can be some variation in the texture of the surface layer or of the substratum within a series. An example is the Melvin series, which is a member of the fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

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 (16)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (17)*. 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."

Baxter Series

The Baxter series consists of deep, well drained, gravelly soils. These soils are on the uplands. They formed in residuum from cherty limestone. The slopes range from 20 to 50 percent.

Baxter soils are in similar positions on the landscape as Hammack and Loring soils. The surface layer and upper part of the subsoil of Hammack soils formed in loess. Loring soils have a fragipan that formed in deep loess.

Typical pedon of Baxter gravelly silt loam, 20 to 50 percent slopes; about 9 miles north of Marion, 500 feet north of Kentucky Highway 135, 50 feet east of Kentucky Highway 91:

A—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak very fine granular structure; very friable; common fine roots; 15 percent chert fragments; neutral; abrupt smooth boundary.

E—2 to 8 inches; brown (10YR 5/3) gravelly silt loam; weak fine granular structure; friable; common fine roots; 15 percent chert fragments; medium acid; clear smooth boundary.

Bt1—8 to 14 inches; yellowish brown (10YR 5/6) very gravelly silt loam; weak fine subangular blocky structure; friable; few fine roots; thin patchy clay film on peds and coarse fragments; 35 percent chert fragments; very strongly acid; clear smooth boundary.

Bt2—14 to 22 inches; strong brown (7.5YR 5/6) very gravelly silty clay loam; moderate medium subangular blocky structure; firm; few fine and medium roots; thin continuous clay film on peds and coarse fragments; 40 percent chert fragments; strongly acid; clear smooth boundary.

Bt3—22 to 32 inches; red (2.5YR 4/6) gravelly clay; common fine faint yellowish red mottles; moderate fine angular blocky structure; very firm; few fine roots; thin continuous clay film on peds and coarse fragments; 25 percent chert fragments; very strongly acid; gradual smooth boundary.

Bt4—32 to 48 inches; red (2.5YR 4/6) gravelly clay; moderate fine angular blocky structure; very firm; few fine roots; thin continuous clay film on peds and coarse fragments; 30 percent chert fragments; strongly acid; gradual smooth boundary.

Bt5—48 to 68 inches; yellowish red (5YR 4/6) gravelly clay; moderate fine angular blocky structure; very firm; few fine roots; thin continuous clay film on peds and coarse fragments; 30 percent chert fragments; strongly acid.

The thickness of the solum ranges from 60 to 120 inches or more. Bedrock is at a depth of more than 5 feet. Reaction is strongly acid or very strongly acid throughout except where the surface layer has been limed. The content of chert fragments in the solum ranges from 15 to 45 percent, and the weighted average in the control section is less than 35 percent.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The texture is gravelly silt loam.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. The texture is gravelly silt loam.

The Bt1 and Bt2 horizons have hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. The texture is gravelly or very gravelly silt loam or silty clay loam. The Bt3, Bt4, and Bt5 horizons have hue of 10R to 5YR, value of 4 or 5, and chroma of 4 to 8. The texture is gravelly or very gravelly silty clay or clay.

Baxter soils mapped in Crittenden County are taxadjuncts to the Baxter series because the upper part of the B horizon is more brown than is typical for the series. However, this difference does not affect the use, management, or behavior of these soils.

Belknap Series

The Belknap series consists of deep, somewhat poorly drained, and moderately permeable or moderately slowly permeable soils. These soils are on the flood plains. They formed in loamy alluvium. The slopes range from 0 to 2 percent.

Belknap soils are in similar positions on the landscape as Collins and Waverly soils. Collins soils are moderately well drained. Waverly soils are poorly drained.

Typical pedon of Belknap silt loam, occasionally flooded; about 3 miles northwest of Shady Grove, 400 feet southwest of Kentucky Highway 120 at Deanwood, 200 feet north of Piney Creek:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

C—10 to 17 inches; brown (10YR 4/3) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak fine granular structure; friable; few fine roots; strongly acid; clear smooth boundary.

Cg1—17 to 31 inches; light brownish gray (10YR 6/2) silt loam; many medium faint brown (10YR 5/3) mottles; weak fine granular structure; friable; few fine roots; about 6 percent common fine black and brown concretions; very strongly acid; gradual smooth boundary.

Cg2—31 to 60 inches; light brownish gray (10YR 6/2) silt loam; common medium faint brown (10YR 5/3) mottles; massive; firm; few fine pores; about 8 percent common fine black and brown concretions; very strongly acid.

Depth to bedrock is 5 to 10 feet or more. Reaction in the 10- to 40-inch control section is strongly acid or very strongly acid. The texture is silt or silt loam throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The C horizon has matrix hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. These horizons have mottles in shades of gray and brown.

Calloway Series

The Calloway series consists of deep, somewhat poorly drained, and slowly permeable soils. These soils are on the uplands. They formed in loess that is more than 48 inches thick. The slopes range from 0 to 2 percent.

Calloway soils are in similar positions on the landscape as Grenada and Loring soils and are adjacent to Belknap soils that are on the flood plains. Grenada and Loring soils have a subsoil that is more brown and less gray than that of the Calloway soils. Belknap soils do not have a fragipan.

Typical pedon of Calloway silt loam, 0 to 2 percent slopes; about 0.7 mile northwest of Crayne, 400 feet northwest of Kentucky Highway 688, 100 feet south of an unpaved road:

Ap—0 to 9 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

Bw—9 to 22 inches; light olive brown (2.5Y 5/4) silt loam; few fine distinct light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; few fine roots; few fine black concretions; medium acid; clear smooth boundary.

E—22 to 29 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct brownish yellow (10YR 6/6) mottles; moderate fine subangular blocky structure; friable; few fine black concretions; very strongly acid; clear smooth boundary.

Btx1—29 to 44 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm; thin patchy clay film on ped faces; few fine black concretions; very strongly acid; gradual smooth boundary.

Btx2—44 to 60 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse distinct light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular; firm; thin patchy clay film on ped faces; few fine black concretions; strongly acid.

The thickness of the solum is more than 60 inches. Depth to bedrock is 5 to 8 feet or more. Depth to the fragipan ranges from 18 to 36 inches. Reaction ranges from medium acid to very strongly acid except where the surface layer has been limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 or 6. Mottles are in shades of gray. The texture is silt loam or silty clay loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. The texture is silt or silt loam.

The Btx horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. Mottles are few to many and are in shades of gray, brown, or yellow. The texture is silt loam or silty clay loam.

Caneyville Series

The Caneyville series consists of moderately deep and well drained soils. These soils are on upland hillsides. They formed in residuum from limestone. The slopes range from 15 to 40 percent.

Caneyville soils are in similar positions on the landscape as Loring and Zanesville soils and are commonly adjacent to Nolin, Lindside, and Newark soils that are on the flood plains. Loring and Zanesville soils have a fragipan. Nolin, Lindside, and Newark soils do not have an argillic horizon.

Typical pedon of Caneyville silt loam, in an area of Caneyville-Crider-Rock outcrop complex, 15 to 40 percent slopes; about 7.2 miles east of Marion, 0.6 mile south of Kentucky Highway 120, 0.3 mile southwest of Sugar Grove Church, 100 feet north of farm road:

O—1 inch to 0; hardwood leaf litter.

A—0 to 2 inches; brown (10YR 4/3) silt loam; weak very fine granular structure; very friable; few fine roots; very strongly acid; abrupt smooth boundary.

E—2 to 5 inches; light yellowish brown (10YR 6/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; very strongly acid; abrupt smooth boundary.

Bt1—5 to 11 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; very firm; common fine roots; thin continuous clay film on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—11 to 24 inches; reddish brown (5YR 4/4) silty clay; moderate fine and medium angular blocky structure; very firm; common fine roots; thin continuous clay film on faces of peds; strongly acid; gradual smooth boundary.

Bt3—24 to 30 inches; reddish brown (5YR 4/4) silty clay; common medium distinct pale brown (10YR 6/3) mottles; moderate fine subangular blocky structure; very firm; few fine roots; thin continuous clay film on faces of peds; few black stains on peds; strongly acid; gradual smooth boundary.

Bt4—30 to 34 inches; reddish brown (5YR 4/4) silty clay; common medium distinct pale brown (10YR 6/3) mottles; moderate fine subangular blocky structure; very firm; few fine roots; thin continuous clay film on faces of peds; common black stains on peds; neutral; abrupt smooth boundary.

R—34 inches; light gray limestone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Reaction ranges from very strongly acid to neutral in the upper part of the solum and from medium acid to mildly alkaline in the lower part. Limestone, chert, or sandstone fragments range from 0 to 10 percent.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3.

The E horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. The texture is silt loam or silty clay loam.

The Bt horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. The texture is silty clay loam, silty clay, or clay. In some pedons, the upper part of this horizon has mottles in shades of brown or yellow, and the lower part has mottles in shades of gray.

Clifty Series

The Clifty series consists of deep, well drained, and moderately rapidly permeable soils. These soils are on the flood plains. They formed in alluvium. The slopes range from 0 to 2 percent.

Clifty soils are commonly adjacent to Frondorf and Zanesville soils that are on the uplands. In Frondorf soils, bedrock is at a depth of less than 40 inches. Zanesville soils have a fragipan.

Typical pedon of Clifty silt loam, occasionally flooded; about 6 miles north of Marion, 333 yards northwest of Browns School, 333 yards west of Kentucky Highway 603:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; common fine roots; 5 percent coarse fragments; strongly acid; clear smooth boundary.

Bw1—8 to 14 inches; brown (10YR 4/3) gravelly silt loam; moderate medium subangular blocky structure; friable; few fine roots; 15 percent coarse fragments; very strongly acid; gradual smooth boundary.

Bw2—14 to 32 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; weak fine granular structure; friable; 30 percent coarse fragments; strongly acid; gradual smooth boundary.

C—32 to 62 inches; yellowish brown (10YR 5/4) gravelly silt loam; common fine distinct grayish brown (10YR 5/2) mottles; massive; firm; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

R—62 inches; sandstone.

The thickness of the solum ranges from 20 to 40 inches. Depth to bedrock ranges from 5 to 10 feet or more. Reaction ranges from medium acid to very strongly acid unless lime has been added. Below the surface layer, the content of coarse fragments ranges from 15 to 35 percent.

The A horizon has hue of 10YR to 7.5YR, value of 4 or 5, and chroma of 3 or 4. The texture is silt loam.

The B horizon has hue of 10YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. The texture is silt loam, loam, fine sandy loam, or the gravelly analogs of these textures.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 6, and it has few or common mottles in shades of gray. The texture is silt loam, loam, clay loam, or sandy loam, or the gravelly analogs of these textures.

Collins Series

The Collins series consists of deep, moderately well drained, and moderately permeable soils. These soils are on the flood plains. They formed in loamy alluvium. The slopes range from 0 to 2 percent.

Collins soils are in similar positions on the landscape as Lindside, Belknap, and Waverly soils and are commonly adjacent to Frondorf soils that are on the uplands. Lindside soils have a fine-silty, nonacid control section. Belknap and Waverly soils have a control section that is more gray than that of Collins soils. Frondorf soils have an argillic horizon.

Typical pedon of Collins silt loam, occasionally flooded; about 3 miles northwest of Shady Grove, 100 feet west of Kentucky Highway 120, 400 feet north of Piney Creek:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

C1—9 to 18 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular and weak medium subangular blocky structure; thin faint bedding planes; friable; few fine roots; few fine pores; few dark brown stains; very strongly acid; gradual smooth boundary.

C2—18 to 26 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine faint brown and common fine distinct light brownish gray (10YR 6/2) mottles; few fine roots; very strongly acid; gradual smooth boundary.

C3—26 to 45 inches; brown (10YR 5/3) silt loam; massive; friable; few fine distinct yellowish brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; few fine roots; few fine dark brown concretions in lower part; very strongly acid; gradual smooth boundary.

C4—45 to 60 inches; brown (10YR 5/3) silt loam; massive; friable; many medium distinct light gray (10YR 7/2) mottles; few fine black concretions; very strongly acid.

Depth to bedrock is 5 to 10 feet or more. Reaction is strongly acid or very strongly acid except where the surface layer has been limed. In most pedons, bedding planes are evident in the C1 horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The C horizon has hue of 10YR to 7.5YR, value of 4 to 7, and chroma of 1 to 4. It is mottled in shades of brown and gray below a depth of 18 inches. The texture is silt or silt loam.

Crider Series

The Crider series consists of deep, well drained, and moderately permeable soils. These soils are on the uplands. They formed in loess that is underlain by residuum from limestone. The slopes range from 2 to 30 percent.

Crider soils are in similar positions on the landscape as Nicholson, Hammack, and Baxter soils and are commonly adjacent to Nolin, Lindside, and Newark soils that are in basins and on the flood plains. Nicholson soils have a fragipan. Hammack and Baxter soils have a subsoil that has more chert than that of Crider soils. Nolin, Lindside, and Newark soils formed in alluvium and do not have an argillic horizon.

Typical pedon of Crider silt loam, 2 to 6 percent slopes; in a pasture field; about 6 miles east of Dycusburg, 267 yards southeast of Kentucky Highway 902, 467 yards west of Livingston Creek:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BA—9 to 14 inches; yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; thin patchy clay film on vertical faces of peds; few wormholes and worm casts; few common fine roots; medium acid; clear wavy boundary.

Bt1—14 to 19 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; firm; dark brown (7.5YR 4/4) thin continuous clay film on vertical faces of peds; few organic coatings on faces of peds; few manganese concretions; medium acid; gradual wavy boundary.

Bt2—19 to 31 inches; strong brown (7.5YR 5/6) silt loam; few fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium coarse subangular blocky and angular blocky structure; firm; few fine roots; thin continuous dark brown (7.5YR 4/4) clay film on vertical faces of peds; few manganese concretions; few organic coatings on faces of peds; strongly acid; clear wavy boundary.

2Bt3—31 to 39 inches; yellowish red (5YR 4/6) silt loam; few fine distinct light yellowish brown (10YR 6/4) mottles; moderate fine and medium subangular blocky and angular blocky structure; firm; thin continuous dark reddish brown (5YR 3/4) clay film on vertical faces of peds; few manganese coatings on faces of peds; few fine roots; strongly acid; gradual wavy boundary.

2Bt4—39 to 52 inches; yellowish red (5YR 4/6) silt loam; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine roots; thin continuous dark reddish brown (5YR 3/4) clay film on vertical faces of peds; strongly acid; gradual wavy boundary.

2Bt5—52 to 70 inches; yellowish red (5YR 4/6) silt loam; moderate medium and coarse subangular blocky and angular blocky structure; very firm; thin continuous dark red (2.5YR 3/6) clay film on vertical faces of peds; few fine roots; few pores; few manganese coatings on interior of peds; very strongly acid; gradual wavy boundary.

2Bt6—70 to 82 inches; dark red (2.5YR 3/6) silty clay loam; moderate medium distinct light brown (7.5YR 6/4) mottles; moderate medium and coarse subangular blocky and angular blocky structure; very firm; few fine roots; thin and thick continuous dark red (2.5YR 3/6) clay film on vertical faces of peds; few manganese coatings on interior of peds; very strongly acid.

The thickness of the solum is more than 60 inches. Depth to limestone bedrock ranges from 6 to 10 feet or more. Reaction is medium acid or strongly acid to a depth of 40 inches except where the surface layer has been limed. It is slightly acid to very strongly acid at a depth of more than 40 inches. Some pedons have up to 15 percent chert fragments in the 2Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

Some pedons have a BA horizon that has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 4 to 6. The upper part of the Bt horizon has the same colors as those of the BA horizon. The lower part has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. The texture is silt loam or silty clay loam. The 2Bt horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 4 to 6. The texture is silt loam, silty clay loam, silty clay, or clay.

The Crider soils mapped in Crittenden County are taxadjuncts to the Crider series because they have more silt in the 2Bt horizon than is typical for the series. However, this difference has little effect on the use, management, and behavior of these soils.

Faywood Series

The Faywood series consists of moderately deep, well drained, and moderately slowly permeable or slowly permeable soils. These soils are on upland side slopes. They formed in residuum of limestone interbedded with shale. The slopes range from 15 to 40 percent.

Faywood soils are associated on the landscape with Lowell soils. Lowell soils are deeper to bedrock than Faywood soils.

Typical pedon of Faywood silty clay loam, in an area of Faywood-Lowell-Rock outcrop complex, 15 to 40 percent slopes; about 5 miles east of Marion, 100 feet north of Kentucky Highway 120, 267 yards west of junction of Kentucky Highway 120 and Kentucky Highway 654:

A—0 to 2 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; friable; 10 percent coarse limestone fragments; neutral; clear smooth boundary.
AB—2 to 5 inches; dark brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; 10 percent coarse limestone fragments; neutral; clear smooth boundary.
Bt—5 to 23 inches; yellowish brown (10YR 5/4) clay; moderate medium angular blocky structure; firm; common fine faint yellowish brown mottles; thin patchy clay film on faces of peds; neutral; gradual smooth boundary.
C—23 to 38 inches; light olive brown (2.5Y 5/4) clay; massive; firm; common fine faint light olive gray mottles; neutral; abrupt smooth boundary.
R—38 inches; limestone bedrock.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Reaction ranges from strongly acid to mildly alkaline. Coarse limestone fragments range from 0 to 15 percent in the solum and from 0 to 35 percent in the C horizon.

The A and AB horizons have hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. The lower part of the Bt horizon is mottled in shades of brown and yellow. The texture is silty clay or clay.

The C horizon has colors similar to those in the Bt horizon. Mottles are in shades of brown, yellow, and gray. The texture is silty clay or clay.

Frondorf Series

The Frondorf series consists of moderately deep, well drained, and moderately permeable soils. These soils are on the uplands. They formed in a mantle of loess that is underlain by residuum from sandstone, siltstone, or shale. The slopes range from 12 to 50 percent.

Frondorf soils are in similar positions on the landscape as Loring and Zanesville soils, and they are commonly adjacent to Collins soils that are on the flood plains. Loring and Zanesville soils have a fragipan, and bedrock is at a depth of more than 40 inches. Collins soils have a coarse-silty control section.

Typical pedon of Frondorf silt loam, 12 to 20 percent slopes; about 1 mile east of Marion, 267 yards south of Kentucky Highway 120, 134 yards west of Pleasant Hill Road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; common fine roots; strongly acid; abrupt smooth boundary.
E—3 to 6 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.
BE—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; clear smooth boundary.
Bt—10 to 21 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; few fine pores; thin discontinuous clay films on faces of peds; 5 percent sandstone fragments; very strongly acid; clear smooth boundary.
2Bw—21 to 28 inches; yellowish brown (10YR 5/6) channery loam; weak fine subangular blocky structure; friable; few fine roots; 25 percent sandstone fragments, 1 inch to 6 inches across; very strongly acid; clear smooth boundary.
2R—28 to 30 inches; soft sandstone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Reaction is strongly acid or very strongly acid unless limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The texture is silt loam or silty clay loam.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. The texture is silt loam or silty clay loam. The content of coarse sandstone fragments ranges from 0 to 5 percent to a depth of 12 to 24 inches and from 15 to 75 percent to a depth of more than 24 inches. The 2Bw horizon has the same colors as those of the Bt horizon. The texture is silt loam, silty clay loam, sandy clay loam, or loam, or the gravelly or channery analogs of these textures.

Grenada Series

The Grenada series consists of deep, moderately well drained, and slowly permeable soils. These soils are on the uplands. They formed in loess. The slopes range from 2 to 6 percent.

Grenada soils are in similar positions on the landscape as Loring and Calloway soils and are commonly adjacent to Otwell soils that are on stream terraces. Loring soils do not have an E horizon. Calloway soils are nearly level, often concave, and have a subsoil that is more gray than that of Grenada soils. Otwell soils do not have an E horizon, and they formed in mixed alluvium.

Typical pedon of Grenada silt loam, 2 to 6 percent slopes; about 2 miles north of Shady Grove, 1 mile northwest of Tradewater Valley Church, 167 yards north of a barn:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Bw1—7 to 16 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; very strongly acid; gradual smooth boundary.

Bw2—16 to 23 inches; yellowish brown (10YR 5/6) silt loam; common medium faint light yellowish brown (10YR 6/4) mottles; moderate fine and medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

E—23 to 25 inches; light gray (10YR 6/1) silt; some strong brown (7.5YR 5/6) ped interiors; weak fine subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

Btx1—25 to 33 inches; yellowish brown (10YR 5/6) silt loam; common medium faint brown (7.5YR 4/4) mottles, common medium distinct light gray (10YR 7/2) mottles, and light brownish gray (10YR 6/2) mottles; very coarse prismatic structure parting to moderate medium subangular blocky; firm, brittle and compact; thin patchy clay film on faces of peds; common black stains on ped faces; very strongly acid; clear smooth boundary.

Btx2—33 to 46 inches; brown (7.5YR 4/4) silt loam; common medium distinct light gray (10YR 7/2) mottles and few medium distinct pale brown (10YR 6/3) mottles; very coarse prismatic structure parting to moderate fine and medium subangular blocky; firm, brittle and compact; thin patchy clay film on faces of peds; common black stains on faces of peds; very strongly acid; gradual wavy boundary.

C—46 to 60 inches; brown (7.5YR 4/4) silt loam; common medium distinct light gray (10YR 6/1) mottles; massive; firm; common black stains; medium acid.

The thickness of the solum ranges from 33 to 60 inches. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 30 inches. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 6. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2 and has mottles in shades of brown. The texture is silt or silt loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Mottles are in shades of brown, gray, and yellow. The texture is silt loam or silty clay loam.

Hammack Series

The Hammack series consists of deep, well drained, and moderately permeable soils. These soils are on upland ridgetops and side slopes. They formed in a mantle of loess that is underlain by residuum from cherty limestone. The slopes range from 6 to 20 percent.

Hammack soils are in similar positions on the landscape as Baxter, Nicholson, and Crider soils and are commonly adjacent to Lindside and Newark soils that are on the flood plains. Baxter soils are cherty throughout. Nicholson soils have a fragipan. Crider soils have less than 15 percent chert in the 2Bt horizon. Lindside and Newark soils formed in alluvium in depressions and along streams.

Typical pedon of Hammack silt loam, 6 to 12 percent slopes, eroded; about 1 mile east of Frances, 333 yards south of Kentucky Highway 70, 100 feet north of unpaved road:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

Bt—8 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; thin continuous clay film on faces of peds; strongly acid; abrupt smooth boundary.

2B/E—24 to 40 inches; brown (7.5YR 5/4) very gravelly silty clay loam; common fine distinct light gray (10YR 7/2) coatings on surfaces of peds; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay film on peds and coarse fragments; 60 percent chert fragments; few black stains; strongly acid; gradual smooth boundary.

2Bt1—40 to 56 inches; red (2.5YR 4/6) very gravelly clay; common fine distinct brown (7.5YR 5/4) mottles; moderate very fine angular blocky structure; firm; few fine roots; thin continuous clay film on peds and coarse fragments; 50 percent chert fragments; medium acid; gradual smooth boundary.

2Bt2—56 to 80 inches; red (2.5YR 4/6) very gravelly clay; moderate medium distinct brown (7.5YR 5/4) mottles and few fine distinct pale brown (10YR 6/3) mottles; moderate very fine and fine angular blocky structure; very firm; thin continuous clay film on peds and coarse fragments; 40 percent chert fragments; medium acid.

The solum is 80 inches or more thick. Reaction ranges from very strongly acid to medium acid except where the surface layer has been limed. The content of chert ranges from 0 to 5 percent in the A horizon and upper part of the Bt horizon, from 35 to 80 percent in the 2B/E horizon, and from 0 to 80 percent in the 2Bt horizon. The weighted average of chert ranges from 15 to 50 percent in the 2Bt horizon.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The texture is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. The texture is silty clay loam or silt loam. The 2B/E horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. Mottles are in shades of brown and gray. The texture is gravelly or very gravelly silty clay loam or silt loam. The E part makes up 5 to 15 percent of the horizon and consists of silt coatings. It has hue of 10YR or 7.5YR, value of 6 or 7, and chroma of 1 to 4. The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 or 6. Mottles are in shades of gray, yellow, and brown. The fine-earth texture is clay or silty clay.

Hammack soils mapped in Crittenden County are taxadjuncts to the Hammack series because they have more chert in the lower part of the control section than is typical for the series. However, this difference does not affect the use, management, or behavior of these soils.

Henshaw Series

The Henshaw series consists of deep, somewhat poorly drained, and moderately slowly permeable soils. These soils are on stream terraces. They formed in loamy alluvium. The slopes range from 0 to 2 percent.

Henshaw soils are in similar positions on the landscape as Uniontown, Otwell, and Weinbach soils. Uniontown soils do not have low chroma mottles in the upper 10 inches of the argillic horizon. Otwell and Weinbach soils have a fragipan.

Typical pedon of Henshaw silt loam, rarely flooded; about 12 miles north of Marion, 300 feet south of Kentucky Highway 365, 0.4 mile southwest of crossing of the Tradewater River:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; mildly alkaline; abrupt smooth boundary.

Bt1—7 to 16 inches; light olive brown (2.5Y 5/6) silty clay loam; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—16 to 26 inches; light olive brown (2.5Y 5/6) silty clay loam; common coarse distinct light brownish gray (10YR 6/2) mottles; moderate medium and coarse subangular blocky structure; firm; thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt3—26 to 42 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; thin discontinuous clay films on faces of peds; few fine black concretions; medium acid; gradual smooth boundary.

Cg—42 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few black stains; moderately alkaline.

The thickness of the solum ranges from 40 to 55 inches. Depth to bedrock is more than 10 feet. Depth to carbonates ranges from 40 to 60 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The B horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons, this horizon has few to many mottles and has chroma of 2 or less. The texture is silt loam or silty clay loam. Reaction ranges from strongly acid to neutral.

The C horizon has hue of 2.5Y to 10YR, value of 5 or 6, and chroma of 2 or 3. Mottles are in shades of brown and gray. The texture is silt loam or silty clay loam. Reaction ranges from neutral to moderately alkaline.

Huntington Series

The Huntington series consists of deep, well drained, and moderately permeable soils. These soils are on the flood plains. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Huntington soils are in similar positions on the landscape as Robinsonville, Lindside, and Nolin soils. Robinsonville soils have a coarse-loamy control section. Lindside soils have low chroma mottles in the control section. These soils are moderately well drained. Nolin soils do not have a mollic epipedon.

Typical pedon of Huntington silt loam, frequently flooded; about 10 miles north of Marion, 400 feet west of Kentucky Highway 91, 200 feet south of the Ohio River:

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; few fine roots; mildly alkaline; abrupt smooth boundary.

BA—11 to 22 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; firm; few fine roots; mildly alkaline; gradual smooth boundary.

Bw1—22 to 44 inches; brown (10YR 4/3) silt loam; dark grayish brown (10YR 4/2) ped surfaces; moderate medium and coarse subangular blocky structure; firm; mildly alkaline; gradual smooth boundary.

Bw2—44 to 60 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; firm; mildly alkaline.

The thickness of the solum ranges from 40 to 70 inches. The mollic epipedon is 10 to 20 inches thick. Reaction ranges from slightly acid to mildly alkaline.

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

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The texture is dominantly silt loam but can range from silt loam to silty clay loam. The Bw horizon has hue of 10YR, value of 4, and chroma of 3 or 4. In some pedons, ped coatings have hue of 10YR, value of 3 or 4, and chroma of 2. The texture is silt loam or silty clay loam.

Some pedons have a C horizon that has colors similar to those of the Bw horizon. The texture is silt loam or stratified fine sandy loam, loam, and silty clay loam.

Karnak Series

The Karnak series consists of deep, poorly drained, and very slowly permeable or slowly permeable soils. These soils are on the flood plains. They formed in slack-water alluvium. The slopes range from 0 to 2 percent.

Karnak soils are in similar positions on the landscape as Belknap soils and are commonly adjacent to McGary and Weinbach soils that are on stream terraces. Belknap soils have a coarse-silty control section. McGary and Weinbach soils are less gray than Karnak soils and do not have vertic properties.

Typical pedon of Karnak silty clay loam, occasionally flooded; about 16.5 miles east of Marion, 467 yards southeast of junction of Kentucky Highway 120 and Bald Knob Road, 1.2 miles west of the crossing of the Tradewater River:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; firm; common fine roots; neutral; abrupt smooth boundary.

Bg1—8 to 22 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine roots; few fine black concretions; slightly acid; gradual smooth boundary.

Bg2—22 to 46 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/4, 5/6) mottles; moderate fine angular blocky structure; firm; neutral; gradual smooth boundary.

Cg—46 to 60 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; massive; very firm; common fine black concretions; neutral.

The thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 5 feet. Reaction ranges from medium acid to neutral.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. In some pedons, this horizon has mottles of higher chroma, and in some pedons, it has hue of 7.5YR. The texture is silty clay or clay.

The C horizon has colors and textures similar to those of the B horizon.

Karnak soils mapped in Crittenden County are taxadjuncts to the Karnak series because they have a higher pH in the solum than is typical for the series. However, this difference has little effect on the use, management, or behavior of these soils.

Lenberg Series

The Lenberg series consists of moderately deep, well drained, moderately slowly permeable soils. These soils are on the uplands. They formed in acid, clayey shale that is interbedded with sandstone in some places. The slopes range from 20 to 50 percent.

Lenberg soils are in similar positions on the landscape as Frondorf, Zanesville, and Caneyville soils. Frondorf and Zanesville soils have less clay in the subsoil than Lenberg soils; in addition, Zanesville soils have a fragipan and are deeper to bedrock. Caneyville soils are underlain by limestone bedrock.

Typical pedon of Lenberg silt loam, in an area of Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery; about 8 miles east of Marion, 2 miles north of Kentucky Highway 120, 200 feet east of Cave Spring Road on Bald Alley Hill:

O—1 inch to 0; partly decomposed litter.

A—0 to 4 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

Bt1—4 to 12 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate fine subangular blocky structure; friable; few medium roots; thin patchy clay film on peds and coarse fragments; 15 percent shale fragments, 0.25 inch to 1 inch in diameter; strongly acid; gradual smooth boundary.

Bt2—12 to 23 inches; yellowish brown (10YR 5/6) channery silty clay; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay film on peds and coarse fragments; 25 percent shale fragments, 0.5 inch to 2 inches in diameter; very strongly acid; gradual smooth boundary.

Bt3—23 to 26 inches; yellowish brown (10YR 5/4) channery silty clay; common medium distinct light brownish gray (10YR 6/2) and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay film on peds and coarse fragments; 30 percent shale fragments, 1 inch to 2 inches in diameter; very strongly acid; gradual wavy boundary.

C—26 to 37 inches; olive brown (2.5Y 4/4) very channery silty clay; common fine distinct light brownish gray (2.5Y 6/2) mottles; 50 percent shale fragments; very strongly acid; gradual smooth boundary.

Cr—37 inches; grayish brown (2.5Y 5/2) shale.

The thickness of the solum ranges from 20 to 40 inches. Depth to soft shale bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from

0 to 30 percent in the solum. Reaction is very strongly acid or strongly acid.

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

Some pedons have an E horizon that has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 8. In some pedons, this horizon has mottles in shades of red, brown, and yellow. Mottles are in shades of gray below the upper 10 inches of the argillic horizon. The texture ranges from silty clay loam to clay.

The C horizon is mottled in shades of red, brown, yellow, olive, or gray. The texture is silty clay or clay, or the gravelly analogs of these textures.

Lindside Series

The Lindside series consists of deep, moderately well drained, and moderately permeable soils. These soils are on the flood plains. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Lindside soils are in similar positions on the landscape as Huntington, Nolin, and Newark soils. Huntington soils have a mollic epipedon. These soils are well drained. Newark soils have a control section that has a lower chroma than that of Lindside soils. These soils are somewhat poorly drained. Nolin soils have a subsoil that is less gray. These soils are well drained.

Typical pedon of Lindside silty clay loam, frequently flooded; about 10 miles north of Marion, 600 yards west of Kentucky Highway 91, 667 yards south of the Ohio River:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

BA—9 to 16 inches; brown (10YR 4/3) silty clay loam; few fine faint dark grayish brown mottles; weak medium subangular blocky structure; firm; neutral; clear smooth boundary.

Bw1—16 to 29 inches; brown (10YR 4/3) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate medium and coarse subangular blocky structure; firm; neutral; clear smooth boundary.

Bw2—29 to 34 inches; brown (10YR 4/3) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; neutral; clear smooth boundary.

C—34 to 60 inches; brown (10YR 5/3) silty clay loam; many medium distinct gray (10YR 5/1) and common fine faint brown mottles; massive; firm; slightly acid.

The thickness of the solum ranges from 25 to 50 inches. Depth to bedrock is more than 60 inches. Reaction ranges from strongly acid to neutral throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The texture is silt loam or silty clay loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Mottles have hue of 10YR, value of 4 to 7, and chroma of 1 to 3. The texture is silt loam or silty clay loam.

The C horizon has colors and textures similar to those of the B horizon. In some pedons, this horizon is stratified.

Loring Series

The Loring series consists of deep, moderately well drained soils. These soils are moderately permeable above the fragipan and moderately slowly permeable in the fragipan. These Loring soils are on the uplands. They formed in loess. The slopes range from 2 to 12 percent.

Loring soils are in similar positions on the landscape as Frondorf, Memphis, and Zanesville soils and are commonly adjacent to Otwell soils on stream terraces. Frondorf and Memphis soils are well drained. In addition, Frondorf soils are on steeper side slopes than Loring soils, and bedrock is at a depth of less than 40 inches. Zanesville soils formed in loess that is underlain by residuum from sandstone and shale. Otwell soils formed from mixed alluvium.

Typical pedon of Loring silt loam, 2 to 6 percent slopes; about 7.2 miles east of Marion, 2.2 miles west of Piney Creek, 600 feet north of Kentucky Highway 120:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak coarse subangular blocky structure parting to moderate medium granular; friable; few fine roots; slightly acid; abrupt smooth boundary.

BA—8 to 13 inches; yellowish brown (10YR 5/6) and dark brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; few thin patchy clay films in pores; strongly acid; clear wavy boundary.

Bt1—13 to 23 inches; strong brown (7.5YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; thin discontinuous clay films on vertical faces of peds; very strongly acid; gradual wavy boundary.

Bt2—23 to 29 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct pale brown (10YR 6/3) and light brownish gray (10YR 6/2) mottles, and few fine faint yellowish brown mottles; moderate medium angular and subangular blocky structure; firm; few thin discontinuous clay films on vertical faces of peds; very strongly acid; clear irregular boundary.

Btx1—29 to 41 inches; strong brown (7.5YR 4/6) silt loam; many medium distinct light gray (2.5YR 7/2) mottles; moderate very coarse prismatic structure parting to thick platy; firm; thin continuous clay film on vertical faces of peds; very strongly acid; gradual wavy boundary.

Btx2—41 to 63 inches; strong brown (7.5YR 4/6) silt loam; many medium distinct light gray (2.5YR 7/2) mottles; moderate very coarse prismatic structure; firm and brittle; thin patchy clay film on vertical faces of peds; very strongly acid; gradual wavy boundary.

2C—63 to 78 inches; yellowish brown (10YR 5/6) silt loam; few coarse distinct light gray (2.5YR 7/2) mottles; massive; firm; strongly acid.

The thickness of the solum ranges from 45 to 70 inches. The thickness of the loess is more than 48 inches. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 35 inches. Reaction ranges from very strongly acid to medium acid except where lime has been added.

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

The BA and Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. In some pedons, mottles of low chroma are in the lower part of the Bt horizon. Texture is silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Mottles are in shades of gray, yellow, and brown. The texture is silt loam or silty clay loam.

The 2C horizon has colors and textures similar to those of the Btx horizon.

Lowell Series

The Lowell series consists of deep, well drained, and moderately slowly permeable soils. These soils are on upland side slopes. They formed in residuum of limestone interbedded with shale. The slopes range from 15 to 40 percent.

Lowell soils are associated on the landscape with Faywood soils. Faywood soils are more shallow to bedrock than Lowell soils.

Typical pedon of Lowell silt loam, in an area of Faywood-Lowell-Rock outcrop complex, 15 to 40 percent slopes; about 5 miles east of Marion, 250 feet north of Kentucky Highway 120, 267 yards west of junction of Kentucky Highway 120 and Kentucky Highway 654:

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; 5 percent coarse limestone fragments; very strongly acid; abrupt smooth boundary.

BE—2 to 5 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; 5 percent coarse limestone fragments; strongly acid; clear smooth boundary.

Bt1—5 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few thin patchy clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2—18 to 30 inches; brown (7.5YR 4/4) silty clay loam; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; firm; few thin patchy clay films on faces of peds; few black stains; slightly acid; gradual smooth boundary.

Bt3—30 to 48 inches; brown (7.5YR 4/4) silty clay; few fine faint yellowish brown mottles; moderate fine angular blocky structure; very firm; few thin patchy clay films on faces of peds; neutral; abrupt smooth boundary.

R—48 inches; limestone bedrock.

The thickness of the solum ranges from 30 to 60 inches. Depth to bedrock ranges from 40 to 80 inches or more. Reaction ranges from very strongly acid to slightly acid to a depth of 30 inches and from strongly acid to mildly alkaline at a depth of more than 30 inches. The content of coarse fragments ranges from 0 to 5 percent in the upper part of the solum and from 0 to 15 percent in the lower part. In some pedons, the C horizon has up to 50 percent coarse fragments.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

In some pedons, the BE horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. In some pedons, olive or gray mottles are in the lower part of the Bt horizon. The texture ranges from silty clay loam to clay.

Some pedons have a BC or C horizon that has matrix and mottles in shades of brown, olive, or gray. The texture is silty clay or clay.

McGary Series

The McGary series consists of deep, somewhat poorly drained, and slowly permeable or very slowly permeable soils. These soils are on low stream terraces. They formed in clayey alluvium. The slopes range from 0 to 2 percent.

McGary soils are in similar positions on the landscape as Otwell and Weinbach soils and are commonly adjacent to Belknap and Collins soils on the flood plains. Otwell and Weinbach soils have a fragipan. Belknap and Collins soils have a coarse-silty control section.

Typical pedon of McGary silty clay loam, occasionally flooded; in a wooded area; about 17.4 miles east of Marion, 600 feet north of Kentucky Highway 120, 0.7 mile northwest of the crossing of the Tradewater River:

A—0 to 6 inches; light olive brown (2.5Y 5/4) silty clay loam; few medium faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine and medium roots; extremely acid; clear smooth boundary.

BE—6 to 9 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct light yellowish brown (2.5YR 6/4) mottles; weak thin platy structure; friable; many fine and medium roots, and few coarse roots; few fine black iron and manganese concretions; extremely acid; clear wavy boundary.

Btg—9 to 17 inches; gray (10YR 6/1) silty clay; many medium distinct yellowish brown (10YR 5/4) mottles and common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium and coarse subangular blocky structure; firm; common fine and medium roots; common distinct grayish brown (10YR 5/2) clay film on vertical faces of peds; very strongly acid; gradual wavy boundary.

Bt1—17 to 25 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct brownish yellow (10YR 6/8) and gray (10YR 6/1) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine and medium roots; common distinct grayish brown (10YR 5/2) clay film on vertical faces of peds and root channels; very strongly acid; gradual wavy boundary.

Bt2—25 to 44 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct gray (10YR 6/1), brownish yellow (10YR 6/8), and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; very firm; few fine and medium roots; common prominent gray (10YR 5/1) clay film on vertical faces of peds; very strongly acid; clear wavy boundary.

BC—44 to 50 inches; light olive brown (2.5Y 5/4) silty clay; many medium distinct gray (5Y 6/1) and light olive gray (5Y 6/2) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine roots; few faint clay films on vertical faces of peds; slightly acid; gradual wavy boundary.

C—50 to 72 inches; light olive brown (2.5Y 5/4) silty clay; common medium distinct gray (10YR 6/1) and brownish yellow (10YR 6/6) mottles; moderate coarse angular and subangular blocky structure; very firm; few fine roots; mildly alkaline.

The thickness of the solum ranges from 30 to 55 inches. Depth to bedrock is more than 5 feet. Depth to carbonates ranges from 40 to 80 inches. Reaction ranges from extremely acid to medium acid in the upper part of the profile except where lime has been added and from slightly acid to mildly alkaline in the lower part.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4.

Some pedons have a BE horizon that has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2; or hue of 2.5Y, value of 4 to 6, and chroma of 2. The texture is silty clay loam or silty clay. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4. This horizon has mottles of low chroma throughout. The texture is silty clay loam or silty clay.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. The texture is silty clay or clay.

McGary soils mapped in Crittenden County are taxadjuncts to the McGary series because colors in the A, Bt, and C horizons are more brown, have more acid in the upper parts, and have no carbonates within 40 inches of the surface. This is outside of the defined range for the series but does not affect the use, management, and behavior of these soils.

Melvin Series

The Melvin series consists of deep, poorly drained, and moderately permeable soils. These soils are on the flood plains. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Melvin soils are in similar positions on the landscape as Newark, Lindside, and Nolin soils. These soils have a control section that is less gray than that of Melvin soils.

Typical pedon of Melvin silty clay loam, frequently flooded; about 10 miles north of Marion, 800 yards south of the Ohio River, 800 yards west of Kentucky Highway 91:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bg—9 to 21 inches; gray (10YR 5/1) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; few fine brown concretions; slightly acid; clear smooth boundary.

Cg—21 to 60 inches; gray (10YR 6/1) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few fine roots in upper 12 inches; few fine black and brown concretions; slightly acid.

The thickness of the solum ranges from 20 to 40 inches, and depth to bedrock is more than 5 feet. Reaction ranges from medium acid to neutral.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The texture is silt loam or silty clay loam.

The Bg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of brown and yellow. The texture is silt loam or silty clay loam.

The Cg horizon has colors and textures similar to those of the B horizon. In some pedons, this horizon is stratified loam, sand and gravel, or clay.

Memphis Series

The Memphis series consists of deep, well drained, and moderately permeable soils. These soils are on the uplands. They formed in loess. The slopes range from 2 to 30 percent.

Memphis soils are in similar positions on the landscape as Loring, Frondorf, and Zanesville soils. Loring and Zanesville soils have a fragipan. In Frondorf soils, bedrock is at a depth of less than 40 inches.

Typical pedon of Memphis silt loam, 2 to 6 percent slopes; in a pasture; about 8 miles north of Mattoon, 1.5 miles west of Kentucky Highway 365, 400 feet north of Bell Mines Road:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; strongly acid; abrupt smooth boundary.

Bt1—7 to 14 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; thin continuous clay film on faces of peds; medium acid; gradual smooth boundary.

Bt2—14 to 25 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few black stains; thin continuous brown (7.5YR 4/4) clay film on faces of peds; strongly acid; gradual smooth boundary.

Bt3—25 to 42 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; thin continuous brown (7.5YR 4/4) clay film on faces of peds; very strongly acid; gradual smooth boundary.

BC—42 to 49 inches; strong brown (7.5YR 5/6) silt loam; weak fine subangular blocky structure; firm; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; gradual smooth boundary.

C—49 to 61 inches; strong brown (7.5YR 5/6) silt loam; massive; friable; very strongly acid.

The thickness of the solum ranges from 32 to 60 inches, and depth to bedrock is more than 5 feet. Reaction ranges from very strongly acid to medium acid except where lime has been added.

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

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The texture is silt loam or silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The texture is silt or silt loam.

The Memphis soils mapped in Crittenden County are taxadjuncts to the Memphis series because they have a lower base saturation than is typical for the series. However, this difference has little effect on the use, management, and behavior of these soils.

Newark Series

The Newark series consists of deep, somewhat poorly drained, and moderately permeable soils. These soils are on the flood plains and in upland depressions. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Newark soils are in similar positions on the landscape as Melvin, Lindside, and Nolin soils. Melvin soils have a control section that is more gray than that of Newark soils, and Lindside and Nolin soils have a control section that is less gray.

Typical pedon of Newark silty clay loam, frequently flooded; about 10 miles north of Marion, 100 feet west of Kentucky Highway 91, 1,000 yards south of the Ohio River:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bw—9 to 16 inches; brown (10YR 4/3) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; slightly acid; clear smooth boundary.

Bg—16 to 30 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine black and brown concretions; medium acid; clear smooth boundary.

Cg—30 to 46 inches; gray (10YR 5/1) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; few fine roots; common fine black concretions; medium acid; clear smooth boundary.

C—46 to 60 inches; brown (10YR 4/3) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; medium acid.

The thickness of the solum ranges from 22 to 40 inches. Depth to bedrock is more than 5 feet. Reaction ranges from medium acid to mildly alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The texture is silt loam or silty clay loam.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Mottles are in shades of brown and gray. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Mottles are in shades of brown. The texture is silt loam or silty clay loam.

The Cg horizon has the same colors as those of the Bg horizon. Mottles are in shades of brown and gray. The texture is silt loam or silty clay loam.

Nicholson Series

The Nicholson series consists of deep, moderately well drained, and slowly permeable soils. These soils are on the uplands. They formed in loess that is underlain by residuum from cherty limestone. The slopes range from 2 to 20 percent.

Nicholson soils are in similar positions on the landscape as Baxter and Hammack soils. Baxter soils are cherty throughout. Baxter and Hammack soils do not have a fragipan.

Typical pedon of Nicholson silt loam, 6 to 12 percent slopes, severely eroded; about 8 miles east of Dycusburg, 150 feet northwest of Kentucky Highway 902, and 0.8 mile west of Caldwell Springs Creek:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; friable; many fine and medium roots; mildly alkaline; clear smooth boundary.

Bt1—6 to 10 inches; yellowish brown (10YR 5/6) silt loam; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; many fine roots; neutral; clear smooth boundary.

Bt2—10 to 20 inches; yellowish brown (10YR 5/6) silt loam; common medium faint pale brown (10YR 6/3) and dark yellowish brown (10YR 4/6) mottles; moderate medium and coarse subangular blocky structure; firm; thin discontinuous yellowish brown (10YR 5/6) clay films on vertical faces of peds; few fine roots; very strongly acid; clear wavy boundary.

Btx1—20 to 28 inches; dark brown (7.5YR 4/4) silt loam; many coarse distinct gray (10YR 6/1) and common coarse distinct brownish yellow (10YR 6/8) mottles; moderate very coarse prismatic structure parting to moderate medium blocky; very firm and brittle; few fine roots in gray streaks; thin discontinuous clay films in pores and on vertical faces of peds; manganese coatings on ped faces; very strongly acid; gradual wavy boundary.

Btx2—28 to 43 inches; dark brown (7.5YR 4/4) silt loam; moderate medium distinct gray (10YR 6/1) mottles and few fine distinct brownish yellow (10YR 6/8) mottles; moderate very coarse prismatic structure parting to moderate coarse blocky; very firm and brittle; few thin continuous clay films on vertical faces of peds; few fine roots in gray streaks; very strongly acid; gradual smooth boundary.

Btx3—43 to 59 inches; strong brown (7.5YR 4/6) silt loam; moderate medium distinct light brownish gray (10YR 6/2) and few fine distinct brownish yellow (10YR 6/8) mottles; moderate very coarse prismatic structure parting to moderate coarse blocky; very firm and brittle; thin and thick distinct continuous clay film on vertical faces of peds; strongly acid; abrupt smooth boundary.

2Bt—59 to 78 inches; red (2.5YR 4/6) clay; moderate fine and medium angular blocky structure; very gravelly clay in upper 2 inches; many thin and thick continuous clay films on vertical faces of peds; strongly acid.

The thickness of the solum ranges from 40 to 80 inches. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 16 to 30 inches. Reaction in the solum ranges from very strongly acid to slightly acid except where lime has been added.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The texture is silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 4 to 8. Mottles are in shades of brown and gray. The texture is silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. Mottles are in shades of brown and gray. The texture is silty clay or clay, or the gravelly analogs of these textures.

Some pedons have a 2C horizon at a depth of more than 55 inches that has colors and textures similar to those of the 2Bt horizon. The content of coarse fragments range from 0 to 35 percent.

Nicholson soils mapped in Crittenden County are taxadjuncts to the Nicholson series because they have a thicker layer of silty soil over the clayey 2Bt horizon than is typical for the series. However, this difference has little effect on the use, management, and behavior of these soils.

Nolin Series

The Nolin series consists of deep, well drained, and moderately permeable soils. These soils are on the flood plains. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Nolin soils are in similar positions on the landscape and have similar characteristics as Huntington, Lindside, and Robinsonville soils. Huntington soils have a mollic epipedon. Lindside soils have a control section that is more gray than that of Nolin soils. Robinsonville soils have a coarse-loamy control section.

Typical pedon of Nolin silty clay loam, frequently flooded; about 10 miles north of Marion, 100 yards west of Kentucky Highway 91, 667 yards south of the Ohio River:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium granular structure; firm; few fine roots; neutral; clear smooth boundary.

Bw1—8 to 20 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; very firm; few fine roots; medium acid; gradual smooth boundary.

Bw2—20 to 33 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; very firm; few fine roots; medium acid; gradual smooth boundary.

Bw3—33 to 51 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; medium acid; gradual smooth boundary.

C—51 to 60 inches; brown (10YR 4/3) silty clay loam; massive; firm; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 5 feet. Reaction ranges from medium acid to neutral.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The texture is silt loam or silty clay loam.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In some pedons, this horizon has mottles in shades of brown and yellow. The texture is silt loam or silty clay loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. In some pedons, this horizon has mottles of low chroma. The texture is silt loam or silty clay loam.

Otwell Series

The Otwell series consists of deep, moderately well drained, and very slowly permeable soils. These soils are on stream terraces. They formed in mixed alluvium. The slopes range from 0 to 12 percent.

Otwell soils are in similar positions on the landscape as Wheeling and Weinbach soils. Wheeling soils do not have a fragipan. Weinbach soils have more gray in the upper part of the B horizon than Otwell soils.

Typical pedon of Otwell silt loam, 2 to 6 percent slopes, occasionally flooded; about 17.5 miles east of Marion, 100 feet north of Kentucky Highway 120, 0.1 mile west of the crossing of the Tradewater River:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

BE—7 to 11 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct brown (10YR 4/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; strongly acid; gradual smooth boundary.

Bt1—11 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; few fine pores; common clay film on faces of peds and in pores; strongly acid; gradual smooth boundary.

Bt2—21 to 26 inches; yellowish brown (10YR 5/6) silty clay loam; common fine faint light yellowish brown mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; few fine pores; common clay film on faces of peds and in pores; very strongly acid; clear wavy boundary.

Btx1—26 to 34 inches; light olive brown (2.5Y 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots in gray part; thin continuous clay film on faces of peds; very strongly acid; gradual diffuse boundary.

Btx2—34 to 54 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; thin continuous clay film on faces of peds; very strongly acid; clear smooth boundary.

C—54 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light gray (10YR 6/1) mottles; massive; firm; strongly acid.

The thickness of the solum ranges from 40 to 70 inches. Depth to bedrock is more than 5 feet. Reaction in the solum is very strongly acid or strongly acid except where lime has been added.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The BE and Bt horizons have hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The texture is mostly silty clay loam but can range from silty clay loam to silt loam. These horizons have mottles in shades of brown. Mottles in shades of gray are below the upper 10 inches of the argillic horizon. The Btx horizon has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 4 or 6. In some pedons, this horizon has few to many mottles and has chroma of 2 or less. The texture is generally silty clay loam, but in some pedons, it ranges from silty clay loam to silt loam.

The C horizon has colors and textures similar to those of the Btx horizon. Reaction ranges from strongly acid to slightly acid.

Robinsonville Series

The Robinsonville series consists of deep, well drained, and moderately permeable or moderately rapidly permeable soils. These soils are on the flood plains. They formed in sandy alluvium. The slopes range from 0 to 2 percent.

Robinsonville soils are in similar positions on the landscape as Huntington, Nolin, and Lindside soils. These soils have a fine-silty control section.

Typical pedon of Robinsonville fine sandy loam, frequently flooded; about 10 miles north of Marion, 200 feet west of Kentucky Highway 91, 500 feet south of the Ohio River:

Ap—0 to 12 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; neutral; clear smooth boundary.

C1—12 to 20 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; neutral; clear smooth boundary.

C2—20 to 33 inches; dark grayish brown (10YR 4/2) loam; many fine faint brown mottles; weak fine granular structure; friable; neutral; clear smooth boundary.

C3—33 to 48 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; friable; neutral; gradual smooth boundary.

C4—48 to 60 inches; brown (10YR 4/3) loamy fine sand; few fine faint yellowish brown mottles; weak very fine granular structure; very friable; mildly alkaline.

Depth to bedrock is more than 5 feet. Reaction ranges from slightly acid to moderately alkaline.

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

The C horizon has hue of 10YR, value of 4, and chroma of 2 to 4. The texture is stratified fine sandy loam, loam, or loamy fine sand. In some pedons, this horizon has thin strata of silt loam or loamy very fine sand.

Uniontown Series

The Uniontown series consists of deep, well drained and moderately well drained, and moderately permeable or moderately slowly permeable soils. These soils are on low stream terraces. They formed in alluvium. The slopes range from 2 to 20 percent.

Uniontown soils are in similar positions on the landscape as Henshaw, Otwell, and Weinbach soils. Henshaw soils have low chroma in the upper 10 inches of the argillic horizon. Otwell and Weinbach soils have a fragipan.

Typical pedon of Uniontown silt loam, 2 to 6 percent slopes, rarely flooded; about 12 miles north of Marion, 722 yards east of Kentucky Highway 135, 0.8 mile southwest of the crossing of the Tradewater River:

Ap—0 to 10 inches; grayish brown (10YR 5/2) silt loam; weak very fine granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; thin continuous clay film on faces of peds; very firm; few fine roots; strongly acid; clear smooth boundary.

Bt2—23 to 36 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; very friable; thin continuous yellowish brown (10YR 5/4) clay film on faces of peds; few black stains; slightly acid; clear smooth boundary.

C1—36 to 54 inches; yellowish brown (10YR 5/6) silt loam; many medium faint yellowish brown (10YR 5/4) mottles; massive; firm; neutral; gradual smooth boundary.

C2—54 to 60 inches; yellowish brown (10YR 5/6) silt loam; many medium faint yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) mottles; massive; firm; mildly alkaline.

The thickness of the solum ranges from 30 to 40 inches. Depth to bedrock is more than 5 feet. Except where lime has been added, reaction is strongly acid to slightly acid in the upper part of the profile and is neutral to moderately alkaline in the lower part. The texture is silt loam or silty clay loam throughout.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. Mottles are in shades of brown.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. Mottles are in shades of brown and gray.

Waverly Series

The Waverly series consists of deep, poorly drained, and moderately permeable soils. These soils are on the flood plains. They formed in loamy alluvium. The slopes range from 0 to 2 percent.

Waverly soils are in similar positions on the landscape as Belknap, Collins, and Melvin soils. Belknap soils are somewhat poorly drained. Collins soils are moderately well drained. Melvin soils have a fine-silty, nonacid control section.

Typical pedon of Waverly silt loam, occasionally flooded; about 3 miles northwest of Shady Grove, 500 feet southwest of Kentucky Highway 120, 300 feet north of Piney Creek:

Ap—0 to 9 inches; brown (10YR 5/3) silt loam; common medium distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; few fine roots; few fine black concretions; medium acid; abrupt smooth boundary.

Bg1—9 to 20 inches; light gray (10YR 6/1) silt loam; common fine distinct brown (10YR 5/3) and few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; about 4 percent common fine brown concretions; very strongly acid; gradual smooth boundary.

Bg2—20 to 44 inches; light gray (10YR 6/1) silt loam; common fine distinct brown (10YR 5/3) and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; about 8 percent common fine black and brown concretions; very strongly acid; gradual smooth boundary.

Cg—44 to 60 inches; light gray (10YR 6/1) silt loam; common fine faint grayish brown (10YR 5/2) mottles; massive; firm; about 6 percent common fine black and brown concretions; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 5 feet. Reaction is very strongly acid or strongly acid except where lime has been added. The texture is silt loam throughout.

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

The Bg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, gray, and yellow.

The Cg horizon has colors similar to those of the Bg horizon.

Weinbach Series

The Weinbach series consists of deep, somewhat poorly drained, and very slowly permeable soils. These soils are on stream terraces. They formed in mixed alluvium. The slopes range from 0 to 2 percent.

Weinbach soils are in similar positions on the landscape as Otwell and McGary soils and are commonly adjacent to Melvin soils on the flood plains. Otwell soils are moderately well drained or well drained. These soils are less gray in the upper part of the subsoil than Weinbach soils. Melvin and McGary soils do not have a fragipan. In addition, Melvin soils are poorly drained, and McGary soils have a fine control section.

Typical pedon of Weinbach silt loam, rarely flooded; about 17.5 miles east of Marion, 200 feet north of Kentucky Highway 120, 0.1 mile west of the crossing of the Tradewater River:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

E—7 to 14 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium granular structure; friable; few fine roots; few fine yellowish brown concretions; very strongly acid; gradual smooth boundary.

BE—14 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and few fine faint yellowish brown mottles; moderate medium subangular blocky structure; firm; fine yellowish brown concretions; very strongly acid; clear wavy boundary.

Btx1—22 to 35 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles and continuous coatings on surfaces of peds; moderate very coarse prismatic structure parting to moderate coarse subangular blocky; firm, brittle and compact; few fine roots between prisms; thin continuous clay film on faces of peds; few fine black concretions; very strongly acid; gradual smooth boundary.

Btx2—35 to 40 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles and yellowish brown (10YR 5/6) mottles; continuous light brownish gray (10YR 6/2) coatings on surfaces of peds; moderate very coarse prismatic structure parting to moderate coarse subangular blocky; firm, brittle and compact; few fine roots between prisms; thin continuous clay film on faces of peds; few fine black concretions; very strongly acid; gradual smooth boundary.

BC—40 to 49 inches; yellowish brown (10YR 5/4) silty clay loam; many fine distinct light brownish gray (10YR 6/2) mottles and continuous coatings on surfaces of peds; moderate fine subangular blocky structure; firm; few fine yellowish brown concretions; very strongly acid; gradual smooth boundary.

C—49 to 60 inches; mottled yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silty clay loam; massive; firm; few fine black stains; medium acid.

The thickness of the solum ranges from 40 to 65 inches. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 20 to 30 inches. Reaction in the solum is very strongly acid or strongly acid except where lime has been added.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 4.

The BE horizon is mottled and has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. The texture is silt loam or silty clay loam. The Btx horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. In some pedons, this horizon has mottles with chroma of 1 to 6. The texture in most pedons is silty clay loam, but it can range from silty clay loam to silt loam.

The BC and C horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6.

Wheeling Series

The Wheeling series consists of deep, well drained, and moderately permeable soils. These soils are on stream terraces. They formed in mixed alluvium. The slopes range from 2 to 12 percent.

Wheeling soils are in similar positions on the landscape as Otwell and Weinbach soils and are commonly adjacent to Newark and Melvin soils on the flood plains. Otwell and Weinbach soils have a fine-silty control section and have a fragipan. Otwell soils are moderately well drained. Weinbach soils are somewhat poorly drained. Newark and Melvin soils have a fine-silty control section and do not have an argillic horizon. Newark soils are somewhat poorly drained. Melvin soils are poorly drained.

Typical pedon of Wheeling silt loam, 2 to 6 percent slopes, rarely flooded; about 2 miles east of Tolu, 500 feet north of Kentucky Highway 135, 100 feet west of a farm road:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots, pores, and worm casts; thin brown (10YR 4/3) continuous clay film on faces of peds; medium acid; clear smooth boundary.

Bt2—22 to 36 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; few fine roots and pores; thin dark yellowish brown (10YR 4/4) discontinuous clay films on faces of peds; few black stains on ped faces; strongly acid; gradual smooth boundary.

Bt3—36 to 50 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; firm; few fine roots; thin discontinuous clay films on faces of peds; few black stains; few mica flakes; strongly acid; gradual smooth boundary.

C—50 to 60 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; firm; few black stains; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 5 feet. Reaction is strongly acid or medium acid except where lime has been added.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. This horizon has a weak or moderate, medium or coarse, subangular blocky structure. The texture ranges from loam to silty clay loam throughout.

The C horizon has colors similar to those of the Bt horizon. The texture is stratified and ranges from loam to loamy sand.

Zanesville Series

The Zanesville series consists of deep, well drained or moderately well drained, and slowly permeable soils. These soils are on upland side slopes. They formed in shallow loess that is underlain by residuum from sandstone and shale. The slopes range from 6 to 20 percent.

Zanesville soils are in similar positions on the landscape as Loring and Frondorf soils, and are commonly adjacent to Collins soils on the flood plains. Loring soils formed in loess more than 48 inches thick. In Frondorf soils, bedrock is at a depth of less than 40 inches. Collins soils formed in alluvium.

Typical pedon of Zanesville silt loam, 6 to 12 percent slopes, eroded; about 6 miles north of Marion, 100 feet east of Kentucky Highway 504, 50 feet north of a gravel road:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; few fine roots; very strongly acid; abrupt smooth boundary.

Bt—6 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common thin clay film on faces of peds; very strongly acid; clear wavy boundary.

Btx1—22 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse distinct light brownish gray (10YR 6/2) and light gray (10YR 7/2) mottles; very coarse prismatic structure parting to moderate medium and coarse subangular blocky; very firm and brittle; few fine roots between prisms; thin continuous clay film on prisms; very strongly acid; clear smooth boundary.

Btx2—28 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; very coarse prismatic structure parting to moderate medium subangular blocky; very firm, brittle and compact; few fine roots between prisms; thin clay film on prisms; very strongly acid; gradual wavy boundary.

2C—38 to 58 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium platy structure; firm; few fine pores; 10 percent coarse sandstone fragments; very strongly acid.

R—58 inches; gray sandstone.

The thickness of the solum ranges from 35 to 60 inches. Depth to bedrock ranges from 50 to 80 inches. Depth to the fragipan ranges from 20 to 30 inches except where the soil is severely eroded. Reaction is strongly acid or very strongly acid throughout except where lime has been added.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Some pedons have an A1 horizon that has value and chroma that are lower than that of the Ap horizon.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The texture is silt loam or silty clay loam. The Btx horizon has colors that are similar to those of the Bt horizon. It has mottles or gray streaks that have chroma of 2 or less. The texture is silt loam, silty clay loam, or sandy clay loam.

The 2C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The texture is similar to that of the Btx horizon. The content of coarse fragments in the 2C horizon ranges from 5 to 45 percent.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; 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.

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—

	Inches
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.

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

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

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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, i.e., 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.

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.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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

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

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms. The Lco horizon is a limnic layer that contains many fecal pellets.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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 the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are 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, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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.

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 7.5 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 (7.5 centimeters) in diameter.

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 upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

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, a plowed surface horizon, most of which was originally part of a B horizon.

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 accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

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 A or B 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, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the plants that are the less palatable to livestock.

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.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

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 that are 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

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

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

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.

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 affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves 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). Subsurface tunnels or pipelike cavities are formed 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.

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 the 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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium 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

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

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

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

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

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

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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 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 underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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

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

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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

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.

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

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (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. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

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

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

Thin layer (in tables). Otherwise suitable soil material 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 by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Tests were performed by the National Soil Survey Laboratory, Lincoln, Nebraska. The symbol > means more than. Absence of an entry indicates material was not detected. TR indicates trace]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	42.1	24.4	33.3	71	-4	21	3.31	1.53	4.83	6	3.5
February---	46.3	27.7	37.0	74	3	29	3.00	1.53	4.27	6	3.1
March------	56.2	36.0	46.1	83	15	105	4.56	2.36	6.47	8	2.3
April------	69.0	47.1	58.1	88	29	257	4.24	2.39	5.87	8	0.2
May--------	77.8	55.6	66.7	92	37	518	4.28	2.51	5.85	8	0.0
June-------	86.2	64.1	75.2	98	48	756	3.81	1.63	5.65	6	0.0
July-------	89.3	68.0	78.7	99	55	890	3.28	1.92	4.49	6	0.0
August-----	88.0	66.6	77.3	99	54	846	3.16	1.33	4.70	5	0.0
September--	81.7	60.1	70.9	96	43	627	2.78	1.23	4.10	5	0.0
October----	70.4	47.8	59.1	89	28	299	2.33	1.08	3.43	5	0.0
November---	56.7	37.4	47.1	81	14	53	3.75	1.79	5.43	6	0.6
December---	46.4	29.2	37.8	70	4	20	3.67	1.72	5.34	7	0.9
Yearly:											
Average--	67.5	47.0	57.3	---	---	---	---	---	---	---	---
Extreme--	---	---	---	101	-5	---	---	---	---	---	---
Total----	---	---	---	---	---	4,421	42.17	34.96	49.05	76	10.6

* 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 (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-80 at Fords Ferry Dam, Kentucky]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 28	April 4	April 15
2 years in 10 later than--	March 22	March 31	April 11
5 years in 10 later than--	March 10	March 24	April 4
First freezing temperature in fall:			
1 year in 10 earlier than--	November 6	October 26	October 18
2 years in 10 earlier than--	November 11	October 31	October 21
5 years in 10 earlier than--	November 20	November 9	October 28

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-80 at Fords Ferry Dam, Kentucky]

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	230	213	192
8 years in 10	239	219	197
5 years in 10	254	229	206
2 years in 10	270	239	216
1 year in 10	278	244	221

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

Map symbol	Soil name	Acres	Percent
BaE	Baxter gravelly silt loam, 20 to 50 percent slopes	10,261	4.5
Be	Belknap silt loam, occasionally flooded	3,284	1.4
Ca	Calloway silt loam, 0 to 2 percent slopes	507	0.2
CcE	Caneyville-Crider-Rock outcrop complex, 15 to 40 percent slopes	2,506	1.1
Cl	Clifty silt loam, occasionally flooded	2,397	1.0
Co	Collins silt loam, occasionally flooded	3,871	1.7
CrB	Crider silt loam, 2 to 6 percent slopes	276	0.1
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded	527	0.2
CrC3	Crider silt loam, 6 to 12 percent slopes, severely eroded	428	0.2
CrD2	Crider silt loam, 12 to 20 percent slopes, eroded	356	0.2
CrD3	Crider silt loam, 12 to 20 percent slopes, severely eroded	258	0.1
FlE	Faywood-Lowell-Rock outcrop complex, 15 to 40 percent slopes	3,651	1.6
FrD	Frondorf silt loam, 12 to 20 percent slopes	10,795	4.7
FrE	Frondorf silt loam, 20 to 30 percent slopes	5,145	2.2
FsD3	Frondorf silty clay loam, 12 to 20 percent slopes, severely eroded	3,598	1.6
GrB	Grenada silt loam, 2 to 6 percent slopes	6,176	2.7
HaC2	Hammack silt loam, 6 to 12 percent slopes, eroded	490	0.2
HaD2	Hammack silt loam, 12 to 20 percent slopes, eroded	2,671	1.2
HmC3	Hammack silty clay loam, 6 to 12 percent slopes, severely eroded	1,916	0.8
HmD3	Hammack silty clay loam, 12 to 20 percent slopes, severely eroded	6,615	2.9
Hn	Henshaw silt loam, rarely flooded	180	0.1
Hu	Huntington silt loam, frequently flooded	2,213	1.0
Ka	Karnak silty clay loam, occasionally flooded	540	0.2
LfE	Lenberg-Frondorf silt loams, 20 to 50 percent slopes, extremely bouldery	21,108	9.2
Ld	Lindside silt loam, occasionally flooded	5,436	2.4
Ln	Lindside silty clay loam, frequently flooded	255	0.1
LoB	Loring silt loam, 2 to 6 percent slopes	25,297	11.0
LoC2	Loring silt loam, 6 to 12 percent slopes, eroded	8,482	3.7
Mc	McGary silty clay loam, occasionally flooded	2,225	1.0
Me	Melvin silt loam, occasionally flooded	631	0.3
Ml	Melvin silty clay loam, frequently flooded	574	0.2
MmB	Memphis silt loam, 2 to 6 percent slopes	1,724	0.7
MmC2	Memphis silt loam, 6 to 12 percent slopes, eroded	3,818	1.7
MmC3	Memphis silt loam, 6 to 12 percent slopes, severely eroded	2,076	0.9
MmD2	Memphis silt loam, 12 to 30 percent slopes, eroded	1,282	0.6
MmD3	Memphis silt loam, 12 to 30 percent slopes, severely eroded	3,338	1.4
Na	Newark silt loam, occasionally flooded	4,449	1.9
Ne	Newark silty clay loam, frequently flooded	860	0.4
NhB	Nicholson silt loam, 2 to 6 percent slopes	1,101	0.5
NhC2	Nicholson silt loam, 6 to 12 percent slopes, eroded	2,813	1.2
NhC3	Nicholson silt loam, 6 to 12 percent slopes, severely eroded	5,544	2.4
NhD2	Nicholson silt loam, 12 to 20 percent slopes, eroded	311	0.1
NhD3	Nicholson silt loam, 12 to 20 percent slopes, severely eroded	1,558	0.7
Nn	Nolin silt loam, occasionally flooded	4,862	2.1
No	Nolin silty clay loam, frequently flooded	1,282	0.6
OtA	Otwell silt loam, 0 to 2 percent slopes, occasionally flooded	596	0.3
OtB	Otwell silt loam, 2 to 6 percent slopes, occasionally flooded	1,971	0.9
OtC3	Otwell silt loam, 6 to 12 percent slopes, severely eroded, occasionally flooded	1,187	0.5
Pt	Pits, limestone	164	---
Pu	Pits-Udorthents complex	536	0.2
Ro	Robinsonville fine sandy loam, frequently flooded	1,090	0.5
Ru	Robinsonville-Huntington complex, frequently flooded	583	0.3
UnB	Uniontown silt loam, 2 to 6 percent slopes, rarely flooded	115	*
UoC3	Uniontown silty clay loam, 6 to 12 percent slopes, severely eroded, rarely flooded	311	0.1
Wa	Waverly silt loam, occasionally flooded	904	0.4
We	Weinbach silt loam, rarely flooded	1,700	0.7
WhB	Wheeling silt loam, 2 to 6 percent slopes, rarely flooded	452	0.2
WhC2	Wheeling silt loam, 6 to 12 percent slopes, eroded, rarely flooded	178	*

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	3,768	1.6
ZaC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	38,233	16.6
ZaD2	Zanesville silt loam, 12 to 20 percent slopes, eroded	2,518	1.1
ZaD3	Zanesville silt loam, 12 to 20 percent slopes, severely eroded	8,215	3.6
	Total (Land)	230,208	100.0
	Water	7,360	---
	Total	237,568	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY CLASSES 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]

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
BaE----------- Baxter	VIIe	---	---	---	---	---	4.0
Be------------- Belknap	IIw	125	40	---	45	4.5	9.0
Ca------------- Calloway	IIw	95	30	35	30	4.0	9.0
CcE:							
Caneyville-----	VIe	---	---	---	---	---	3.5
Crider---------	VIe	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---
Cl------------- Clifty	IIs	110	30	35	2,900	4.5	9.0
Co------------- Collins	IIw	120	40	40	---	5.0	10.0
CrB------------ Crider	IIe	130	50	45	3,500	5.5	11.0
CrC2----------- Crider	IIIe	115	40	45	3,200	5.0	10.0
CrC3----------- Crider	IVe	85	30	35	2,400	4.5	8.0
CrD2----------- Crider	IVe	100	35	40	2,600	4.0	7.0
CrD3----------- Crider	VIe	---	---	---	---	3.0	5.5
FlE:							
Faywood--------	VIe	---	---	---	---	---	4.0
Lowell---------	VIe	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---
FrD------------ Frondorf	IVe	80	25	30	---	2.5	5.0
FrE------------ Frondorf	VIe	---	---	---	---	2.0	4.0
FsD3----------- Frondorf	VIe	---	---	---	---	2.0	4.0
GrB------------ Grenada	IIe	115	35	45	2,550	4.5	9.0
HaC2----------- Hammack	IIIe	95	30	40	2,200	5.0	10.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
HaD2------------ Hammack	IVe	80	20	30	1,600	4.0	8.0
HmC3------------ Hammack	IVe	80	20	25	1,800	4.0	8.0
HmD3------------ Hammack	VIe	---	---	---	---	3.0	6.0
Hn-------------- Henshaw	IIw	115	50	50	---	4.5	8.0
Hu-------------- Huntington	IIw	135	45	50	---	5.0	10.0
Ka-------------- Karnak	IIIw	95	25	25	---	3.5	8.0
LfE------------- Lenberg-Frondorf	VIIe	---	---	---	---	---	2.5
Ld-------------- Lindside	IIw	130	45	40	2,800	4.0	9.0
Ln-------------- Lindside	IIw	120	40	40	2,400	4.0	8.0
LoB------------- Loring	IIe	120	40	50	2,600	5.0	9.0
LoC2------------ Loring	IIIe	95	25	40	2,400	4.5	8.0
Mc-------------- McGary	IIIw	95	25	20	---	3.5	8.0
Me, Ml---------- Melvin	IIIw	100	35	20	---	4.0	9.0
MmB------------- Memphis	IIe	135	40	45	3,000	5.0	10.0
MmC2------------ Memphis	IIIe	115	30	35	2,800	4.5	9.0
MmC3------------ Memphis	IVe	80	---	20	---	3.5	7.5
MmD2------------ Memphis	VIe	---	---	---	---	4.0	7.0
MmD3------------ Memphis	VIIe	---	---	---	---	3.0	6.0
Na-------------- Newark	IIw	115	40	45	2,500	4.5	8.5
Ne-------------- Newark	IIw	110	30	40	---	4.0	8.5

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
NhB------------- Nicholson	IIe	130	40	40	3,000	3.5	9.0
NhC2------------ Nicholson	IIIe	115	35	35	2,200	4.5	8.0
NhC3------------ Nicholson	IVe	90	30	30	1,800	3.5	6.0
NhD2------------ Nicholson	IVe	100	30	30	---	4.5	8.0
NhD3------------ Nicholson	VIe	---	---	---	---	3.0	5.0
Nn-------------- Nolin	IIw	115	40	45	2,700	5.0	10.0
No-------------- Nolin	IIw	85	30	40	2,200	5.0	9.5
OtA------------- Otwell	IIw	105	35	---	---	4.0	8.0
OtB------------- Otwell	IIe	105	35	40	2,600	4.0	8.0
OtC3------------ Otwell	IVe	75	20	20	---	3.5	7.0
Pt-------------- Pits	VIIIs	---	---	---	---	---	---
Pu-------------- Pits- Udorthents	VIIs	---	---	---	---	---	---
Ro-------------- Robinsonville	IIw	125	35	40	---	5.0	9.5
Ru-------------- Robinsonville- Huntington	IIw	125	35	40	---	5.0	9.5
UnB------------- Uniontown	IIe	120	40	45	2,800	5.0	9.0
UoC3------------ Uniontown	IVe	100	25	25	2,200	4.0	7.5
Wa-------------- Waverly	IIIw	95	30	20	---	4.0	8.0
We-------------- Weinbach	IIIw	100	30	25	---	3.5	7.5
WhB------------- Wheeling	IIe	130	40	45	3,100	5.0	10.0
WhC2------------ Wheeling	IIIe	115	35	40	2,800	4.5	9.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
ZaC2------------ Zanesville	IIIe	95	30	30	2,300	4.5	9.0
ZaC3------------ Zanesville	IVe	60	20	25	2,000	3.0	7.0
ZaD2------------ Zanesville	IVe	85	20	30	2,100	4.0	8.0
ZaD3------------ Zanesville	VIe	---	---	---	---	3.0	6.5

* 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.

TABLE 6.--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	---	---	---	---
II	68,977	37,112	29,468	2,397
III	26,650	20,076	6,574	---
IV	66,346	66,346	---	---
V	---	---	---	---
VI	31,966	31,966	---	---
VII	35,243	34,707	---	536
VIII	1,026	---	---	1,026

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

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

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
								Cu ft/ac/yr	
BaE: Baxter	4R	Moderate	Moderate	Slight	Moderate	Black oak	81	63	Yellow poplar, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, loblolly pine.
						White oak	74	56	
						Northern red oak	---	---	
						Yellow poplar	92	93	
						Hickory	---	---	
						Sassafras	---	---	
						Sugar maple	---	---	
Be: Belknap	6A	Slight	Slight	Slight	Severe	Yellow poplar	90	90	Eastern cottonwood, American sycamore, sweetgum, baldcypress.
						Eastern cottonwood	100	128	
						American sycamore	---	---	
						Sweetgum	---	---	
						Pin oak	90	86	
Ca: Calloway	8W	Slight	Moderate	Slight	Severe	Loblolly pine	80	110	Sweetgum, loblolly pine.
						Cherrybark oak	80	86	
						Shortleaf pine	70	110	
						Sweetgum	80	79	
CcE:									
Caneyville (North aspect)	4R	Severe	Moderate	Slight	Moderate	Black oak	71	53	White oak, yellow poplar, white ash, eastern white pine.
						White oak	64	47	
						Sugar maple	---	---	
						Hickory	---	---	
						White ash	72	54	
						Eastern redcedar	46	---	
						Yellow poplar	90	90	
Crider (North aspect)	8R	Moderate	Moderate	Slight	Severe	Yellow poplar	102	110	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	11	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
Rock outcrop.									
CcE:									
Caneyville (South aspect)	3R	Severe	Moderate	Moderate	Slight	Black oak	65	47	Virginia pine, eastern redcedar.
						White oak	52	36	
						Sugar maple	---	---	
						Hickory	---	---	
						Eastern redcedar	36	---	
						Chinkapin oak	51	35	
						Scarlet oak	53	37	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity class*	
								Cu ft/ac/yr	
CcE:									
Crider (South aspect)	8R	Moderate	Moderate	Slight	Severe	Yellow poplar	102	110	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
Rock outcrop.									
Cl Clifty	8A	Slight	Slight	Slight	Moderate	Shortleaf pine	76	122	Sweetgum, white ash, shortleaf pine, eastern white pine, northern red oak, white oak.
						Yellow poplar	---	---	
						Virginia pine	---	---	
						White oak	64	47	
						Northern red oak	---	---	
						American beech	---	---	
						American sycamore	---	---	
						Black walnut	---	---	
						Red maple	---	---	
Co Collins	8A	Slight	Slight	Slight	Severe	Yellow poplar	102	110	Green ash, eastern cottonwood, cherrybark oak.
						Eastern cottonwood	115	172	
						Cherrybark oak	110	189	
CrB, CrC2, CrC3 Crider	8A	Slight	Slight	Slight	Severe	Yellow poplar	102	110	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
CrD2, CrD3 Crider	8R	Moderate	Moderate	Slight	Severe	Yellow poplar	102	110	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
								Cu ft/ac/yr	
FlE:									
Faywood	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	70	52	White oak, eastern white pine, white ash, northern red oak.
						Scarlet oak	72	54	
						White oak	60	43	
						Hickory	---	---	
						White ash	---	---	
						Chinkapin oak	---	---	
						Sugar maple	---	---	
						Southern red oak	---	---	
Lowell	8R	Moderate	Moderate	Slight	Severe	Virginia pine	78	119	White ash, eastern white pine, white oak, northern red oak, yellow poplar.
						White ash	75	3	
						Hickory	---	---	
						Black oak	88	70	
						Black locust	77	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
Rock outcrop.									
FrD, FrE, FsD3-- Frondorf (North aspect)	8R	Moderate	Moderate	Slight	Moderate	Virginia pine	78	119	Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, northern red oak.
						White oak	74	56	
						Black oak	78	60	
						Yellow poplar	---	---	
						Hickory	---	---	
						Sweetgum	82	84	
FrD, FrE, FsD3-- Frondorf (South aspect)	8R	Moderate	Moderate	Moderate	Moderate	Virginia pine	70	109	Eastern white pine, loblolly pine, shortleaf pine, white oak.
						Post oak	---	---	
						Scarlet oak	---	---	
						Southern red oak	---	---	
						Hickory	---	---	
						Black oak	70	52	
						White oak	68	50	
GrB-- Grenada	8A	Slight	Slight	Slight	Severe	Loblolly pine	85	120	Cherrybark oak, loblolly pine, white oak, shortleaf pine, sweetgum.
						Southern red oak	80	62	
						Cherrybark oak	85	101	
						Shortleaf pine	75	120	
						Sweetgum	80	79	
HaC2-- Hammack	6A	Slight	Slight	Slight	Moderate	Yellow poplar	88	86	Yellow poplar, white oak, northern red oak, loblolly pine, shortleaf pine.
						Black oak	80	62	
						Hickory	---	---	
						Southern red oak	80	62	
						Sugar maple	---	---	
HaD2-- Hammack	6R	Moderate	Moderate	Slight	Moderate	Yellow poplar	88	86	Yellow poplar, white oak, northern red oak, loblolly pine, shortleaf pine.
						Black oak	80	62	
						Hickory	---	---	
						Southern red oak	80	62	
						Sugar maple	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity class*	
								Cu ft/ ac/yr	
HmC3: Hammack	4A	Slight	Slight	Slight	Moderate	Southern red oak	70	52	Eastern white pine, shortleaf pine, loblolly pine, white oak.
						Black oak	70	52	
						Yellow poplar	80	71	
						Hickory	---	---	
						Sugar maple	---	---	
HmD3: Hammack	4R	Moderate	Moderate	Slight	Moderate	Southern red oak	70	52	Eastern white pine, shortleaf pine, loblolly pine, white oak.
						Black oak	70	52	
						Yellow poplar	80	71	
						Hickory	---	---	
						Sugar maple	---	---	
Hn: Henshaw	6W	Slight	Moderate	Slight	Severe	Pin oak	95	92	Green ash, sweetgum, eastern cottonwood, yellow poplar, eastern white pine.
						Green ash	---	---	
						Sweetgum	95	122	
						Hackberry	---	---	
						American sycamore	---	---	
						White oak	---	---	
						Red maple	---	---	
Hu: Huntington	7A	Slight	Slight	Slight	Severe	Yellow poplar	95	98	Yellow poplar, black walnut, black locust, eastern white pine, white ash.
						Northern red oak	85	67	
Ka: Karnak	6W	Slight	Severe	Severe	Severe	Pin oak	90	86	Pin oak, swamp white oak, eastern cottonwood, green ash, baldcypress, sweetgum, pecan.
						Swamp white oak	---	---	
						Eastern cottonwood	---	---	
						Green ash	---	---	
						Silver maple	---	---	
LfE:									
Lenberg (North aspect)	6R	Severe	Severe	Slight	Slight	Virginia pine	61	93	Shortleaf pine, Virginia pine, loblolly pine, white oak.
						White oak	57	40	
						Hickory	---	---	
						Chestnut oak	60	43	
						Scarlet oak	58	41	
						Black oak	60	43	
						Post oak	46	31	
Frondorf (North aspect)	8R	Severe	Severe	Slight	Moderate	Virginia pine	78	119	Yellow poplar, shortleaf pine, white oak, eastern white pine, loblolly pine, northern red oak.
						White oak	74	56	
						Black oak	78	60	
						Yellow poplar	---	---	
						Hickory	---	---	
						Sweetgum	82	84	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
								Cu ft/ac/yr	
LfE:									
Lenberg-------- (South aspect)	6R	Severe	Severe	Slight	Slight	Virginia pine-------	61	93	Shortleaf pine, Virginia pine, loblolly pine, white oak.
						White oak-----------	57	40	
						Hickory-------------	---	---	
						Chestnut oak--------	60	43	
						Scarlet oak---------	58	41	
						Black oak-----------	60	43	
						Post oak------------	46	31	
Frondorf------- (South aspect)	8R	Severe	Severe	Moderate	Moderate	Virginia pine-------	70	109	Eastern white pine, loblolly pine, shortleaf pine, white oak.
						Post oak------------	---	---	
						Scarlet oak---------	---	---	
						Southern red oak----	---	---	
						Hickory-------------	---	---	
						Black oak-----------	70	52	
						White oak-----------	68	50	
Ld, Ln---------- Lindside	4A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	Eastern white pine, yellow poplar, black walnut, northern red oak, shortleaf pine, white ash, white oak.
						Yellow poplar-------	95	98	
						Black walnut--------	---	---	
						White ash-----------	85	---	
						White oak-----------	85	67	
						Red maple-----------	---	---	
LoB, LoC2------- Loring	4A	Slight	Slight	Slight	Severe	Cherrybark oak------	86	103	Loblolly pine, yellow poplar, shortleaf pine, eastern white pine.
						Sweetgum------------	90	106	
						Southern red oak----	74	56	
						Loblolly pine-------	85	120	
Mc-------------- McGary	6W	Slight	Slight	Moderate	Severe	Pin oak-------------	85	80	Eastern white pine, baldcypress, white ash, yellow poplar, American sycamore, eastern cottonwood, green ash.
						Sweetgum------------	90	106	
						White oak-----------	75	57	
						White ash-----------	---	---	
						Red maple-----------	---	---	
						Shellbark hickory---	---	---	
						Swamp white oak-----	---	---	
						Post oak------------	---	---	
Me, Ml---------- Melvin	7W	Slight	Moderate	Severe	Severe	Pin oak-------------	99	97	Pin oak, American sycamore, sweetgum, loblolly pine, eastern cottonwood.
						Eastern cottonwood--	95	116	
						Sweetgum------------	92	112	
						Green ash-----------	---	---	
						Hackberry-----------	---	---	
						Hickory-------------	---	---	
						Red maple-----------	---	---	
						American elm--------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
								Cu ft/ac/yr	
MmB, MmC2, MmC3-Memphis	9A	Slight	Slight	Slight	Severe	Loblolly pine Cherrybark oak Sweetgum	90 90 90	131 115 106	Cherrybark oak, loblolly pine, yellow poplar.
MmD2-Memphis	8R	Moderate	Moderate	Slight	Severe	Cherrybark oak	90	115	Cherrybark oak, loblolly pine, yellow poplar.
MmD3-Memphis	9R	Moderate	Moderate	Slight	Severe	Loblolly pine Cherrybark oak Sweetgum	90 90 90	131 115 106	Cherrybark oak, loblolly pine, yellow poplar.
Na, Ne-Newark	7W	Slight	Moderate	Moderate	Severe	Pin oak Eastern cottonwood Sweetgum Green ash Cherrybark oak Shumard oak Overcup oak	96 89 85 --- --- --- ---	93 100 93 --- --- --- ---	Eastern cottonwood, sweetgum, American sycamore, green ash.
NhB, NhC2-Nicholson	4A	Slight	Slight	Slight	Severe	Black oak White oak Hickory Sweetgum Sugar maple White ash	78 74 --- 84 --- 70	60 56 --- 90 --- 52	White oak, northern red oak, yellow poplar, sweetgum, eastern white pine.
NhC3-Nicholson	4A	Slight	Slight	Slight	Severe	Black oak White oak Hickory Southern red oak	70 --- --- ---	52 --- --- ---	White oak, eastern white pine, white ash.
NhD2-Nicholson	4R	Moderate	Moderate	Slight	Severe	Black oak White oak Hickory Sweetgum Sugar maple White ash	78 74 --- 84 --- 70	60 56 --- 90 --- ---	White oak, northern red oak, yellow poplar.
NhD3-Nicholson	4R	Moderate	Moderate	Slight	Severe	Black oak White oak Hickory Southern red oak	70 --- --- ---	52 --- --- ---	White oak, eastern white pine, white ash.
Nn-Nolin	8A	Slight	Slight	Slight	Severe	Yellow poplar Sweetgum Cherrybark oak Eastern cottonwood American sycamore River birch	107 92 97 --- --- ---	119 112 140 --- --- ---	Yellow poplar, black walnut, eastern white pine, eastern cottonwood, white ash, cherrybark oak, sweetgum.
No-Nolin	8W	Slight	Moderate	Moderate	Severe	Sweetgum Cherrybark oak Eastern cottonwood River birch Black willow American sycamore	92 97 --- --- --- ---	112 140 --- --- --- ---	Eastern cottonwood, white ash, cherrybark oak.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
								Cu ft/ ac/yr	
OtA, OtB, OtC3-- Otwell	3A	Slight	Slight	Slight	Severe	White oak----------- Yellow poplar------- Sugar maple---------	65 --- ---	47 --- ---	Eastern white pine, yellow poplar, white ash.
Ro-------------- Robinsonville	11W	Slight	Moderate	Moderate	Severe	Eastern cottonwood-- Green ash----------- Sweetgum------------ American sycamore---	110 85 105 115	156 --- 156 183	Eastern cottonwood, sweetgum, American sycamore.
Ru:									
Robinsonville--	11W	Slight	Moderate	Moderate	Severe	Eastern cottonwood-- Green ash----------- Sweetgum------------ American sycamore---	110 85 105 115	156 --- 156 183	Eastern cottonwood, sweetgum, American sycamore.
Huntington-----	7A	Slight	Slight	Slight	Severe	Yellow poplar------- Northern red oak----	95 85	98 67	Yellow poplar, black walnut, black locust, eastern white pine.
UnB------------- Uniontown	6A	Slight	Slight	Slight	Severe	Yellow poplar------- Northern red oak---- Black oak----------- Shumard oak--------- Sweetgum------------ Hickory------------- White oak-----------	89 83 82 83 79 --- ---	88 65 64 77 77 --- ---	Yellow poplar, black walnut, white ash, white oak, northern red oak, eastern white pine, sweetgum.
UoC3------------ Uniontown	4A	Slight	Slight	Slight	Severe	Northern red oak---- Black oak----------- White oak----------- Hickory------------- Elm----------------- Red maple----------- Sweetgum------------	70 70 65 --- --- --- ---	52 52 47 --- --- --- ---	White ash, eastern white pine, northern red oak, white oak.
Wa-------------- Waverly	10W	Slight	Moderate	Moderate	Severe	Cherrybark oak------ Eastern cottonwood-- Nuttall oak--------- Willow oak---------- Sweetgum------------	100 105 100 --- ---	151 141 98 --- ---	Cherrybark oak, eastern cottonwood, sweetgum, willow oak.
We-------------- Weinbach	4W	Slight	Moderate	Moderate	Severe	White oak----------- Pin oak------------- Yellow poplar------- Sweetgum------------	75 88 85 88	57 83 81 101	Eastern white pine, baldcypress, white ash, yellow poplar, American sycamore.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity class*	
								Cu ft/ac/yr	
WhB, WhC2------- Wheeling	4A	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow poplar-------	80 90	62 90	Eastern white pine, yellow poplar, black walnut, northern red oak.
ZaC2------------ Zanesville	7A	Slight	Slight	Slight	Severe	Virginia pine------- Black oak----------- White oak----------- Hickory------------- Yellow poplar------- Shortleaf pine------ Sweetgum------------	66 75 69 --- 90 63 ---	102 57 51 --- 90 95 ---	Yellow poplar, white ash, white oak, northern red oak, eastern white pine, shortleaf pine.
ZaC3------------ Zanesville	6D	Slight	Slight	Moderate	Moderate	Virginia pine------- Black oak----------- White oak----------- Scarlet oak--------- Black locust-------- Post oak------------	60 60 60 --- --- ---	91 43 43 --- --- ---	Virginia pine, shortleaf pine, eastern white pine, white oak.
ZaD2------------ Zanesville	7R	Moderate	Moderate	Slight	Severe	Virginia pine------- Black oak----------- White oak----------- Hickory------------- Yellow poplar------- Shortleaf pine------ Sweetgum------------	66 75 69 --- 90 63 ---	102 57 51 --- 90 95 ---	Yellow poplar, white ash, white oak, northern red oak, eastern white pine, shortleaf pine.
ZaD3------------ Zanesville	6D	Moderate	Moderate	Moderate	Moderate	Virginia pine------- Black oak----------- White oak----------- Scarlet oak--------- Black locust-------- Post oak------------	60 60 60 --- --- ---	91 43 43 --- --- ---	Virginia pine, shortleaf pine, eastern white pine, white oak.

* Productivity class is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 8.--RECREATIONAL DEVELOPMENT

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

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BaE: Baxter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Be: Belknap	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Ca: Calloway	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
CcE:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
Cl: Clifty	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Co: Collins	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
CrB: Crider	Slight	Slight	Moderate: slope.	Slight	Slight.
CrC2, CrC3: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CrD2, CrD3: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FlE:					
Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
FrD: Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FrE: Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FsD3: Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GrB------------------ Grenada	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
HaC2----------------- Hammack	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
HaD2----------------- Hammack	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HmC3----------------- Hammack	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
HmD3----------------- Hammack	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hn------------------- Henshaw	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Hu------------------- Huntington	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Ka------------------- Karnak	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LfE:					
Lenberg--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Frondorf-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ld------------------- Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.
Ln------------------- Lindside	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
LoB------------------ Loring	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
LoC2----------------- Loring	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Mc------------------- McGary	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, flooding.
Me------------------- Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ml-------------------- Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
MmB------------------- Memphis	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
MmC2, MmC3------------ Memphis	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MmD2------------------ Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Slight----------	Slight.
MmD3------------------ Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Na-------------------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Ne-------------------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
NhB------------------- Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
NhC2, NhC3------------ Nicholson	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
NhD2, NhD3------------ Nicholson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Nn-------------------- Nolin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
No-------------------- Nolin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
OtA, OtB-------------- Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Moderate: flooding.
OtC3------------------ Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: flooding, slope.
Pt. Pits					
Pu: Pits.					
Udorthents.					
Ro-------------------- Robinsonville	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ru:					
Robinsonville	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Huntington	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
UnB Uniontown	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
UoC3 Uniontown	Severe: flooding.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Wa Waverly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
We Weinbach	Severe: flooding, wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
WhB Wheeling	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
WhC2 Wheeling	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ZaC2, ZaC3 Zanesville	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
ZaD2, ZaD3 Zanesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

TABLE 9.--WILDLIFE HABITAT

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

Map symbol and soil name	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
BaE----------------- Baxter	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Be----------------- Belknap	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ca----------------- Calloway	Fair	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
CcE:										
Caneyville---------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Crider-------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
Cl----------------- Clifty	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Co----------------- Collins	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CrB---------------- Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC2, CrC3--------- Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrD2, CrD3--------- Crider	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FlE:										
Faywood------------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lowell-------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
FrD---------------- Frondorf	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FrE---------------- Frondorf	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
FsD3--------------- Frondorf	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GrB---------------- Grenada	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HaC2--------------- Hammack	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaD2--------------- Hammack	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
HmC3: Hammack	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HmD3: Hammack	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hn: Henshaw	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Hu: Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ka: Karnak	Very poor.	Poor	Poor	Fair	Very poor.	Good	Good	Poor	Fair	Good.
LfE:										
Lenberg	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Frondorf	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ld: Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ln: Lindside	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
LoB: Loring	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC2: Loring	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Mc: McGary	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Me: Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ml: Melvin	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MmB: Memphis	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MmC2, MmC3: Memphis	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MmD2: Memphis	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MmD3: Memphis	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Na, Ne: Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NhB: Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
NhC2, NhC3: Nicholson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NhD2, NhD3: Nicholson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Nn: Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
No: Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
OtA, OtB: Otwell	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
OtC3: Otwell	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Pt. Pits										
Pu: Pits.										
Udorthents.										
Ro: Robinsonville	Poor	Fair	Fair	Good	---	Poor	Very poor.	Fair	Good	Very poor.
Ru: Robinsonville	Poor	Fair	Fair	Good	---	Poor	Very poor.	Fair	Good	Very poor.
Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UnB: Uniontown	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UoC3: Uniontown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wa: Waverly	Poor	Fair	Good	Fair	---	Good	Fair	Fair	Fair	Fair.
We: Weinbach	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
WhB: Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WhC2: Wheeling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ZaC2, ZaC3: Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ZaD2, ZaD3: Zanesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

TABLE 10.--BUILDING SITE DEVELOPMENT

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

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BaE: Baxter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Be: Belknap	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
Ca: Calloway	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
CcE:						
Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
Cl: Clifty	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Co: Collins	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
CrB: Crider	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
CrC2, CrC3: Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CrD2, CrD3: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FlE:						
Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
FrD, FrE, FsD3: Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GrB: Grenada	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HaC2, HmC3: Hammack	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
HaD2, HmD3: Hammack	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hn: Henshaw	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: low strength.	Moderate: wetness.
Hu: Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ka: Karnak	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
LfE:						
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ld: Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ln: Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
LoB: Loring	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Slight.
LoC2: Loring	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
Mc: McGary	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: wetness, flooding.
Me: Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Ml: Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MmB: Memphis	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
MmC2, MmC3: Memphis	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MmD2: Memphis	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: slope.	Severe: low strength.	Severe: slope.
MmD3: Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Na: Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Ne: Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
NhB: Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
NhC2, NhC3: Nicholson	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
NhD2, NhD3: Nicholson	Severe: wetness.	Severe: slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Severe: slope.
Nn: Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
No: Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OtA, OtB: Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
OtC3: Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, slope.	Severe: low strength, flooding.	Moderate: flooding, slope.
Pt. Pits						
Pu: Pits.						
Udorthents.						
Ro: Robinsonville	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ru:						
Robinsonville----	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Huntington-------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
UnB--------------- Uniontown	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
UoC3-------------- Uniontown	Moderate: wetness, slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: low strength.	Moderate: slope.
Wa---------------- Waverly	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
We---------------- Weinbach	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength.	Moderate: wetness.
WhB--------------- Wheeling	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength.	Slight.
WhC2-------------- Wheeling	Moderate: slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Moderate: slope, flooding.	Moderate: slope.
ZaC2, ZaC3-------- Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
ZaD2, ZaD3-------- Zanesville	Severe: slope.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

TABLE 11.--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; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BaE: Baxter	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
Be: Belknap	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Ca: Calloway	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CcE:					
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
Cl: Clifty	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones.
Co: Collins	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
CrB: Crider	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
CrC2, CrC3: Crider	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
CrD2, CrD3: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
FlE:					
Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Lowell	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Rock outcrop.					

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FrD, FrE, FsD3------ Frondorf	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
GrB----------------- Grenada	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
HaC2, HmC3---------- Hammack	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, thin layer.
HaD2, HmD3---------- Hammack	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Hn------------------ Henshaw	Severe: wetness, percs slowly.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Hu------------------ Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Ka------------------ Karnak	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
LfE:					
Lenberg------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Frondorf-----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Ld, Ln-------------- Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
LoB----------------- Loring	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
LoC2---------------- Loring	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: wetness, slope.
Mc------------------ McGary	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Me, Ml-------------- Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MmB----------------- Memphis	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
MmC2, MmC3---------- Memphis	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
MmD2, MmD3---------- Memphis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Na, Ne-------------- Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NhB----------------- Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
NhC2, NhC3---------- Nicholson	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Fair: too clayey, wetness, slope.
NhD2, NhD3---------- Nicholson	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: slope.	Poor: slope.
Nn, No-------------- Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
OtA, OtB------------ Otwell	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
OtC3---------------- Otwell	Severe: flooding, wetness, percs slowly.	Severe: flooding, slope.	Severe: flooding.	Severe: flooding.	Fair: too clayey, slope, wetness.
Pt. Pits					
Pu: Pits.					
Udorthents.					
Ro------------------ Robinsonville	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ru:					
Robinsonville------	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Huntington---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
UnB----------------- Uniontown	Moderate: flooding, wetness, percs slowly.	Severe: flooding.	Severe: wetness.	Moderate: flooding, wetness.	Fair: too clayey, wetness.
UoC3---------------- Uniontown	Moderate: slope, flooding, wetness.	Severe: flooding, slope.	Severe: wetness.	Moderate: flooding, wetness, slope.	Fair: too clayey, slope, wetness.
Wa------------------ Waverly	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
We------------------ Weinbach	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
WhB----------------- Wheeling	Severe: poor filter.	Severe: flooding, seepage.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
WhC2---------------- Wheeling	Severe: poor filter.	Severe: slope, flooding, seepage.	Severe: seepage.	Moderate: slope, flooding.	Fair: slope, thin layer.
ZaC2, ZaC3---------- Zanesville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: depth to rock, slope, wetness.	Fair: slope, too clayey, depth to rock.
ZaD2, ZaD3---------- Zanesville	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

TABLE 12.--CONSTRUCTION MATERIALS

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

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BaE: Baxter	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Be: Belknap	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ca: Calloway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
CcE:				
Caneyville	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
Cl: Clifty	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Co: Collins	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
CrB: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CrC2, CrC3: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CrD2, CrD3: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FlE:				
Faywood	Poor: depth to rock, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, too clayey.
Lowell	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
FrD: Frondorf	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FrE------------------ Frondorf	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FsD3----------------- Frondorf	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
GrB------------------ Grenada	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HaC2, HmC3----------- Hammack	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
HaD2, HmD3----------- Hammack	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Hn------------------- Henshaw	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Hu------------------- Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ka------------------- Karnak	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
LfE:				
Lenberg--------------	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Frondorf-------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ld, Ln--------------- Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
LoB------------------ Loring	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LoC2----------------- Loring	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Mc------------------- McGary	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Me, Ml--------------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MmB------------------ Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MmC2, MmC3------------ Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
MmD2, MmD3------------ Memphis	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Na, Ne---------------- Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NhB------------------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
NhC2, NhC3------------ Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
NhD2, NhD3------------ Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Nn, No---------------- Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OtA, OtB-------------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
OtC3------------------ Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Pt. Pits				
Pu: Pits.				
Udorthents.				
Ro-------------------- Robinsonville	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Ru: Robinsonville--------	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Huntington-----------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
UnB------------------- Uniontown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
UoC3------------------ Uniontown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Wa-------------------- Waverly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
We: Weinbach	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
WhB: Wheeling	Fair: low strength.	Probable	Probable	Good.
WhC2: Wheeling	Fair: low strength.	Probable	Probable	Fair: slope.
ZaC2, ZaC3: Zanesville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
ZaD2, ZaD3: Zanesville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

TABLE 13.--WATER MANAGEMENT

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

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
BaE: Baxter	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
Be: Belknap	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
Ca: Calloway	Slight	Severe: thin layer.	Percs slowly	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
CcE:					
Caneyville	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Crider	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Rock outcrop.					
Cl: Clifty	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Co: Collins	Moderate: seepage.	Severe: piping.	Flooding	Erodes easily, wetness.	Erodes easily.
CrB: Crider	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CrC2, CrC3, CrD2, CrD3: Crider	Moderate: seepage.	Severe: piping.	Deep to water	Slope	Slope.
FlE:					
Faywood	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Lowell	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.					
FrD, FrE, FsD3: Frondorf	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
GrB: Grenada	Slight	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
HaC2, HaD2, HmC3, HmD3: Hammack	Moderate: seepage.	Severe: piping.	Deep to water	Slope, large stones.	Slope.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Hn: Henshaw	Slight	Severe: piping, wetness.	Favorable	Erodes easily, wetness.	Wetness, erodes easily.
Hu: Huntington	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Ka: Karnak	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
LfE:					
Lenberg	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Frondorf	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ld, Ln: Lindside	Moderate: seepage.	Severe: piping.	Flooding	Wetness, erodes easily.	Erodes easily.
LoB: Loring	Slight	Moderate: piping.	Slope, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
LoC2: Loring	Slight	Moderate: piping.	Slope, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Mc: McGary	Slight	Severe: wetness.	Percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily.
Me, Ml: Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
MmB: Memphis	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
MmC2, MmC3, MmD2, MmD3: Memphis	Moderate: seepage.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Na, Ne: Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
NhB: Nicholson	Slight	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
NhC2, NhC3, NhD2, NhD3: Nicholson	Slight	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Nn, No: Nolin	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
OtA, OtB---------- Otwell	Slight---------	Moderate: wetness.	Percs slowly, flooding.	Erodes easily, wetness.	Erodes easily, rooting depth.
OtC3-------------- Otwell	Slight---------	Moderate: wetness.	Percs slowly, flooding.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Pt. Pits					
Pu: Pits.					
Udorthents.					
Ro---------------- Robinsonville	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable.
Ru: Robinsonville----	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable.
Huntington-------	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable.
UnB--------------- Uniontown	Moderate: seepage.	Severe: piping.	Slope----------	Erodes easily, wetness.	Erodes easily.
UoC3-------------- Uniontown	Moderate: seepage.	Severe: piping.	Slope----------	Slope, erodes easily, wetness.	Slope, erodes easily.
Wa---------------- Waverly	Moderate: seepage.	Severe: piping, wetness.	Flooding-------	Erodes easily, wetness.	Wetness, erodes easily.
We---------------- Weinbach	Slight---------	Moderate: piping, wetness.	Percs slowly---	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
WhB--------------- Wheeling	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable.
WhC2-------------- Wheeling	Moderate: seepage.	Severe: piping.	Deep to water	Slope----------	Slope.
ZaC2, ZaC3, ZaD2, ZaD3------------ Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BaE-------------- Baxter	0-8	Gravelly silt loam.	ML, GM, CL-ML, GM-GC	A-4	0-10	60-90	55-80	45-70	45-70	25-35	4-10
	8-22	Gravelly silty clay loam, gravelly silt loam.	CL, SM-SC, GC, CL-ML	A-4, A-6	0-10	60-90	55-80	55-80	45-80	25-40	5-20
	22-68	Gravelly silty clay, gravelly clay.	CH, CL, GC, SC	A-7	0-10	55-90	45-85	45-85	45-80	40-60	20-35
Be--------------- Belknap	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-100	20-30	2-8
	10-60	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	80-100	<35	NP-12
Ca--------------- Calloway	0-29	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
	29-44	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	90-95	30-40	12-20
	44-60	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	90-100	25-35	5-15
CcE: Caneyville------	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	30-34	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Crider----------	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	9-70	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	70-82	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
Rock outcrop.											
Cl--------------- Clifty	0-8	Silt loam--------	ML, CL-ML, CL	A-4	0	90-100	85-95	65-85	50-75	20-35	2-10
	8-62	Gravelly silt loam, gravelly loam, gravelly sandy clay loam.	ML, CL-ML, GM, GM-GC	A-4	0-15	55-75	50-70	45-65	35-60	20-35	2-10
Co--------------- Collins	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	85-100	70-90	<30	NP-8
	9-60	Silt loam, silt	ML, CL-ML	A-4	0	100	100	100	90-100	<35	NP-10
CrB, CrC2-------- Crider	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	9-70	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	70-82	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CrC3------------- Crider	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	6-28	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	28-72	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CrD2------------- Crider	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	9-70	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	70-82	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CrD3------------- Crider	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	6-28	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	28-72	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
FlE: Faywood---------	0-5	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	5-38	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lowell----------	0-5	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	5-30	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	30-48	Clay, silty clay	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
FrD, FrE--------- Frondorf	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-10
	10-28	Channery silty clay loam, channery silt loam, channery loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FsD3------------- Frondorf	0-7	Silty clay loam	CL	A-6, A-7	0-5	90-100	90-100	85-100	75-100	35-45	15-22
	7-23	Channery silty clay loam, channery silt loam, channery loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GrB-------------- Grenada	0-7	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	90-100	<30	NP-6
	7-23	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	95-100	90-100	27-40	8-19
	23-25	Silt loam--------	CL-ML, CL	A-4	0	100	100	95-100	90-100	20-30	5-10
	25-60	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0	100	100	95-100	90-100	25-45	5-24

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HaC2, HaD2------- Hammack	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	25-35	4-10
	8-24	Silt loam, silty clay loam.	ML, CL	A-6, A-7, A-4	0	100	95-100	90-100	85-95	30-45	6-20
	24-40	Very gravelly silt loam, very gravelly silty clay loam.	GM, GC, ML, CL	A-6, A-7, A-4, A-2	15-35	25-80	22-75	22-75	18-70	30-45	6-20
	40-80	Very gravelly silty clay, very gravelly clay, gravelly clay.	GC, CL, CH	A-7, A-2	10-40	40-75	30-75	30-70	25-70	45-70	20-40
HmC3, HmD3------- Hammack	0-8	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	34-45	15-20
	8-16	Silt loam, silty clay loam.	ML, CL	A-6, A-7, A-4	0	100	95-100	90-100	85-95	30-45	6-20
	16-32	Very gravelly silt loam, very gravelly silty clay loam.	GM, GC, ML, CL	A-6, A-7, A-4, A-2	15-35	25-80	22-75	22-75	18-70	30-45	6-20
	32-72	Very gravelly silty clay, very gravelly clay, gravelly clay.	GC, CL, CH	A-7, A-2	10-40	40-75	30-75	30-70	25-70	45-70	20-40
Hn--------------- Henshaw	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	80-100	20-35	3-10
	7-42	Silty clay loam, silt loam.	CL	A-6, A-4	0	95-100	95-100	95-100	85-100	30-40	8-18
	42-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
Hu--------------- Huntington	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	11-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
Ka--------------- Karnak	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	10-25
	8-50	Silty clay, clay	CH, MH, CL, ML	A-7	0	100	100	95-100	95-100	45-80	20-40
	50-60	Silty clay, silty clay loam.	CL, CH, MH, ML	A-7	0	100	100	95-100	85-100	40-80	15-40
LfE: Lenberg---------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	75-100	75-95	65-90	20-45	2-22
	4-12	Silty clay loam, silty clay, gravelly clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	12-26	Silty clay, clay, gravelly clay.	CL, CH, ML, MH	A-7	0-5	75-100	55-100	55-95	50-90	45-70	19-40
	26-37	Channery silty clay, clay, silty clay.	CL, CH, SC, GC	A-7	0-40	60-95	40-95	40-95	36-90	45-70	20-40
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LfE:											
Frondorf--------	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-10
	10-28	Channery silty clay loam, channery silt loam, channery loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ld--------------- Lindside	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	9-60	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
Ln--------------- Lindside	0-9	Silty clay loam	CL, ML, CL-ML	A-6, A-4	0	100	95-100	90-100	80-95	25-40	7-15
	9-60	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
LoB, LoC2-------- Loring	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	<35	NP-15
	8-29	Silt loam, silty clay loam.	CL, ML	A-6, A-7, A-4	0	100	100	95-100	90-100	32-48	10-20
	29-63	Silt loam, silty clay loam.	CL, ML	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	10-22
	63-78	Silt loam--------	CL, ML	A-4, A-6, A-7	0	100	100	95-100	70-100	28-45	7-20
Mc--------------- McGary	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-36	5-15
	6-50	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	46-58	24-32
	50-72	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	38-54	20-32
Me--------------- Melvin	0-10	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	10-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
Ml--------------- Melvin	0-9	Silty clay loam	CL	A-6, A-7	0	95-100	90-100	80-100	80-95	35-42	15-22
	9-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
MmB, MmC2, MmD2-- Memphis	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	7-49	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	49-61	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15
MmC3, MmD3------- Memphis	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	90-100	<30	NP-10
	7-42	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	90-100	35-48	15-25
	42-60	Silt loam--------	ML, CL	A-4, A-6	0	100	100	100	90-100	30-40	6-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Na------ Newark	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	8-30	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-98	22-42	3-20
	30-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
Ne------ Newark	0-9	Silty clay loam	CL	A-6	0	95-100	90-100	85-100	80-95	30-40	11-20
	9-30	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-98	22-42	3-20
	30-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NhB, NhC2, NhD2-- Nicholson	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	8-22	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	22-55	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-100	25-45	5-20
	55-70	Silty clay, clay, channery clay.	CH, CL	A-6, A-7	0-10	80-100	70-100	60-100	55-100	34-70	16-40
NhC3, NhD3------- Nicholson	0-6	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	6-20	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	20-59	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-100	25-45	5-20
	59-78	Silty clay, clay, channery clay.	CH, CL	A-6, A-7	0-10	80-100	70-100	60-100	55-100	34-70	16-40
Nn------ Nolin	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	8-42	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	42-60	Loam, silt loam, gravelly loam.	ML, CL, CL-ML, GM	A-4, A-6	0-10	50-100	50-100	40-95	35-95	<30	NP-15
No------ Nolin	0-8	Silty clay loam	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	8-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
OtA, OtB--------- Otwell	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	7-26	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	26-54	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	15-30
	54-80	Stratified loam to silty clay.	CL	A-6, A-7	0	95-100	75-100	75-100	65-95	35-50	15-30
OtC3------------ Otwell	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	7-19	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	19-47	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	15-30
	47-73	Stratified loam to silty clay.	CL	A-6, A-7	0	95-100	75-100	75-100	65-95	35-50	15-30
Pt. Pits											
Pu: Pits.											
Udorthents.											

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ro---------------- Robinsonville	0-12	Fine sandy loam	SM, ML	A-4	0	100	100	85-95	40-55	<25	NP-3
	12-60	Stratified fine sandy loam to loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	75-95	30-65	<25	NP-3
Ru:											
Robinsonville---	0-12	Fine sandy loam	SM, ML	A-4	0	100	100	85-95	40-55	<25	NP-3
	12-60	Stratified fine sandy loam to loamy fine sand.	SM, ML	A-2, A-4	0	100	95-100	75-95	30-65	<25	NP-3
Huntington------	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	11-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
UnB-------------- Uniontown	0-10	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	90-100	80-100	20-35	2-10
	10-36	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	95-100	90-100	85-100	30-45	7-20
	36-60	Silt loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	90-100	90-100	85-100	75-100	30-45	7-20
UoC3------------- Uniontown	0-9	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	35-45	15-22
	9-30	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	95-100	90-100	85-100	30-45	7-20
	30-60	Silt loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	90-100	90-100	85-100	75-100	30-45	7-20
Wa---------------- Waverly	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	90-100	65-95	<25	NP-9
	9-60	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	95-100	85-100	20-30	3-10
We---------------- Weinbach	0-14	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-40	5-15
	14-22	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	70-90	25-35	8-15
	22-40	Silt loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	70-90	25-42	8-20
	40-60	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	15-25
WhB, WhC2-------- Wheeling	0-10	Silt loam--------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	<35	NP-10
	10-60	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
ZaC2, ZaD2------- Zanesville	0-6	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	6-22	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	22-46	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	46-58	Sandy clay loam, clay loam, channery sandy clay loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-B	0-10	65-100	50-100	40-100	20-85	20-40	2-20
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ZaC3, ZaD3------- Zanesville	0-4	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	4-18	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	18-46	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	46-58	Sandy clay loam, clay loam, channery sandy clay loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-B	0-10	65-100	50-100	40-100	20-85	20-40	2-20
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	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
BaE----------------	0-8	12-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-6.5	Low------------	0.28	5	2-4
Baxter	8-22	18-40	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.5	Moderate------	0.24		
	22-68	35-60	1.30-1.55	0.6-2.0	0.10-0.14	4.5-5.5	Moderate------	0.24		
Be-----------------	0-10	8-18	1.30-1.50	0.2-2.0	0.22-0.24	4.5-7.3	Low------------	0.37	5	1-3
Belknap	10-60	8-25	1.25-1.50	0.2-2.0	0.20-0.22	4.5-6.0	Low------------	0.37		
Ca-----------------	0-29	10-30	1.40-1.55	0.6-2.0	0.20-0.23	4.5-6.0	Low------------	0.49	3	.5-2
Calloway	29-44	10-32	1.35-1.55	0.06-0.2	0.09-0.12	4.5-6.0	Low------------	0.43		
	44-60	16-32	1.45-1.55	0.06-0.2	0.09-0.12	4.5-6.0	Low------------	0.43		
CcE:										
Caneyville-------	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low------------	0.43	3	2-4
	5-30	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate------	0.28		
	30-34	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate------	0.28		
	34	---	---	---	---	---	---------------	----		
Crider-----------	0-9	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low------------	0.32	5	2-4
	9-70	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low------------	0.28		
	70-82	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate------	0.28		
Rock outcrop.										
Cl-----------------	0-8	12-27	1.20-1.40	2.0-6.0	0.10-0.18	4.5-6.0	Low------------	0.32	5	1-4
Clifty	8-52	18-35	1.20-1.45	2.0-6.0	0.08-0.16	4.5-6.0	Low------------	0.28		
Co-----------------	0-9	7-16	1.40-1.50	0.6-2.0	0.16-0.24	4.5-5.5	Low------------	0.43	5	.5-2
Collins	9-60	5-18	1.40-1.50	0.6-2.0	0.20-0.24	4.5-5.5	Low------------	0.43		
CrB, CrC2, CrD2--	0-9	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low------------	0.32	5	2-4
Crider	9-70	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low------------	0.28		
	70-82	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate------	0.28		
CrC3, CrD3--------	0-6	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low------------	0.32	5	2-4
Crider	6-28	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low------------	0.28		
	28-72	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate------	0.28		
FlE:										
Faywood----------	0-5	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low------------	0.37	3	1-4
	5-38	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate------	0.28		
	38	---	---	---	---	---	---------------	----		
Lowell-----------	0-5	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low------------	0.37	3	1-4
	5-30	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate------	0.28		
	30-48	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate------	0.28		
	48	---	---	---	---	---	---------------	----		
Rock outcrop.										
FrD, FrE----------	0-10	18-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-5.5	Low------------	0.37	3	1-3
Frondorf	10-28	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low------------	0.17		
	28	---	---	---	---	---	---------------	----		
FsD3--------------	0-7	27-35	1.20-1.40	0.6-2.0	0.18-0.23	4.5-5.5	Low------------	0.32	3	.5-2
Frondorf	7-23	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low------------	0.17		
	23	---	---	---	---	---	---------------	----		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
GrB--------------	0-7	12-16	1.40-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.49	3	.5-2
Grenada	7-23	18-30	1.40-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.43		
	23-25	12-16	1.35-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.49		
	25-60	15-32	1.45-1.60	0.06-0.2	0.10-0.12	4.5-6.0	Low-----------	0.37		
HaC2, HaD2-------	0-8	12-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low-----------	0.37	4	2-4
Hammack	8-24	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-6.5	Low-----------	0.32		
	24-40	18-35	1.20-1.45	0.6-2.0	0.05-0.10	4.5-6.0	Low-----------	0.24		
	40-80	40-60	1.35-1.65	0.6-2.0	0.08-0.12	4.5-6.0	Moderate-----	0.24		
HmC3, HmD3-------	0-8	27-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Low-----------	0.32	4	.5-2
Hammack	8-16	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-6.5	Low-----------	0.32		
	16-32	18-35	1.20-1.45	0.6-2.0	0.05-0.10	4.5-6.0	Low-----------	0.24		
	32-72	40-60	1.35-1.65	0.6-2.0	0.08-0.12	4.5-6.0	Moderate-----	0.24		
Hn---------------	0-7	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-6.5	Low-----------	0.43	4	.5-2
Henshaw	7-42	18-34	1.20-1.40	0.2-0.6	0.15-0.19	5.1-7.3	Low-----------	0.43		
	42-60	15-34	1.20-1.40	0.2-0.6	0.17-0.22	6.6-8.4	Low-----------	0.43		
Hu---------------	0-11	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low-----------	0.28	5	3-6
Huntington	11-60	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low-----------	0.32		
Ka---------------	0-8	20-35	1.20-1.40	0.2-0.6	0.19-0.23	5.6-7.3	Moderate-----	0.32	5	1-3
Karnak	8-50	40-60	1.30-1.50	<0.2	0.09-0.13	5.6-7.3	High----------	0.32		
	50-60	35-60	1.35-1.55	0.06-0.2	0.10-0.18	5.6-7.8	High----------	0.32		
LfE:										
Lenberg----------	0-4	12-27	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low-----------	0.43	3	.5-3
	4-12	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-5.5	Moderate-----	0.37		
	12-26	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate-----	0.37		
	26-37	40-60	1.40-1.65	0.2-0.6	0.10-0.16	4.5-5.5	Moderate-----	0.28		
	37	---	---	---	---	---	--------------	----		
Frondorf---------	0-10	18-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-5.5	Low-----------	0.37	3	1-3
	10-28	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low-----------	0.17		
	28	---	---	---	---	---	--------------	----		
Ld---------------	0-9	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-7.3	Low-----------	0.32	5	2-4
Lindside	9-60	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-7.3	Low-----------	0.37		
Ln---------------	0-9	27-35	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.8	Low-----------	0.32	5	2-4
Lindside	9-60	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-7.8	Low-----------	0.37		
LoB, LoC2--------	0-8	8-18	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.49	3	.5-2
Loring	8-29	18-32	1.40-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low-----------	0.43		
	29-63	15-30	1.50-1.70	0.06-0.2	0.06-0.13	4.5-6.0	Low-----------	0.43		
	63-78	10-25	1.30-1.60	0.2-2.0	0.06-0.13	4.5-6.5	Low-----------	0.43		
Mc---------------	0-6	27-40	1.35-1.50	0.6-2.0	0.22-0.24	<4.5-6.0	Low-----------	0.43	3	1-4
McGary	6-50	35-50	1.60-1.75	0.06-0.2	0.11-0.13	<4.5-6.0	High----------	0.32		
	50-72	35-50	1.60-1.75	<0.2	0.14-0.16	6.1-7.8	High----------	0.32		
Me---------------	0-10	12-27	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43	5	.5-3
Melvin	10-60	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43		
Ml---------------	0-9	27-35	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.37	5	.5-3
Melvin	9-60	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43		
MmB, MmC2, MmD2--	0-7	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.49	5	1-2
Memphis	7-49	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low-----------	0.49		
	49-61	12-25	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low-----------	0.49		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
MmC3, MmD3------- Memphis	0-7	8-22	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49	5	1-2
	7-42	20-35	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.49		
	42-60	12-25	1.30-1.50	0.6-2.0	0.20-0.23	4.5-6.0	Low----------	0.49		
Na--------------- Newark	0-8	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
	8-30	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	30-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
Ne--------------- Newark	0-9	27-35	1.20-1.40	0.6-2.0	0.18-0.22	5.6-7.8	Low----------	0.37	5	1-4
	9-30	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	30-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
NhB, NhC2, NhD2-- Nicholson	0-8	12-30	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.43	3	2-4
	8-22	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.43		
	22-55	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.5	Low----------	0.43		
	55-70	35-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-6.0	Moderate-----	0.37		
NhC3, NhD3------- Nicholson	0-6	12-30	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.43	3	2-4
	6-20	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.43		
	20-59	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.5	Low----------	0.43		
	59-78	35-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-6.0	Moderate-----	0.37		
Nn--------------- Nolin	0-8	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	2-4
	8-47	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43		
	47-60	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.1-8.4	Low----------	0.43		
No--------------- Nolin	0-8	27-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.43	5	2-4
	8-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.43		
OtA, OtB--------- Otwell	0-7	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	.5-2
	7-26	22-30	1.30-1.50	0.06-0.2	0.18-0.22	4.5-5.5	Moderate-----	0.43		
	26-54	18-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Moderate-----	0.43		
	54-80	20-30	1.50-1.65	0.06-0.2	0.06-0.08	4.5-5.5	Moderate-----	0.43		
OtC3------------- Otwell	0-7	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	.5-2
	7-19	22-30	1.30-1.50	0.06-0.2	0.18-0.22	4.5-5.5	Moderate-----	0.43		
	19-47	18-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Moderate-----	0.43		
	47-73	20-30	1.50-1.65	0.06-0.2	0.06-0.08	4.5-5.5	Moderate-----	0.43		
Pt. Pits.										
Pu: Pits.										
Udorthents.										
Ro--------------- Robinsonville	0-12	2-10	1.40-1.50	2.0-6.0	0.15-0.18	6.1-8.4	Low----------	0.28	5	.5-2
	12-60	5-15	1.50-1.60	0.6-6.0	0.14-0.18	6.1-8.4	Low----------	0.32		
Ru: Robinsonville---	0-12	2-10	1.40-1.50	2.0-6.0	0.15-0.18	6.1-8.4	Low----------	0.28	5	.5-2
	12-60	5-15	1.50-1.60	0.6-6.0	0.14-0.18	6.1-8.4	Low----------	0.32		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
Ru:										
Huntington------	0-11	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low----------	0.28	5	3-6
	11-60	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low----------	0.32		
UnB-------------	0-10	12-20	1.20-1.40	0.6-2.0	0.19-0.33	5.1-7.3	Low----------	0.43	4	.5-2
Uniontown	10-36	18-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37		
	36-60	10-30	1.20-1.40	0.2-2.0	0.18-0.22	6.6-8.4	Low----------	0.37		
UoC3------------	0-9	27-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.37	3	.5-2
Uniontown	9-30	18-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37		
	30-60	10-30	1.20-1.40	0.2-2.0	0.18-0.22	6.6-8.4	Low----------	0.37		
Wa--------------	0-9	6-18	1.40-1.50	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43	5	1-3
Waverly	9-60	10-18	1.40-1.55	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43		
We--------------	0-14	18-27	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	4	1-3
Weinbach	14-22	20-30	1.40-1.60	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43		
	22-40	20-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low----------	0.43		
	40-60	22-35	1.60-1.80	<0.06	0.14-0.18	4.5-5.5	Moderate-----	0.43		
WhB, WhC2--------	0-10	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low----------	0.37	4	.5-1
Wheeling	10-60	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32		
ZaC2, ZaD2-------	0-6	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-5.5	Low----------	0.43	3	1-2
Zanesville	6-22	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37		
	22-46	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
	46-58	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Low----------	0.28		
	58	---	---	---	---	---	-------------	----		
ZaC3, ZaD3-------	0-4	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-5.5	Low----------	0.43	3	1-2
Zanesville	4-18	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37		
	18-46	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
	46-58	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Low----------	0.28		
	58	---	---	---	---	---	-------------	----		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
BaE: Baxter	B	None	---	---	>6.0	---	---	>60	---	High	High.
Be: Belknap	C	Occasional	Brief	Jan-Jun	1.0-3.0	Apparent	Jan-Jun	>60	---	High	High.
Ca: Calloway	C	None	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High	Moderate.
CcE:											
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Crider	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Rock outcrop.											
Cl: Clifty	B	Occasional	Brief	Jan-May	>6.0	---	---	>60	---	Low	High.
Co: Collins	C	Occasional	Brief	Jan-Apr	2.0-5.0	Apparent	Jan-Apr	>60	---	Moderate	Moderate.
CrB, CrC2, CrC3, CrD2, CrD3: Crider	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FlE:											
Faywood	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Lowell	C	None	---	---	>6.0	---	---	>40	Hard	High	Moderate.
Rock outcrop.											
FrD, FrE, FsD3: Frondorf	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
GrB: Grenada	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	Moderate	Moderate.
HaC2, HaD2, HmC3, HmD3: Hammack	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Hn: Henshaw	C	Rare	---	---	1.0-2.0	Apparent	Nov-Mar	>60	---	High	Moderate.
Hu: Huntington	B	Frequent	Brief	Dec-May	>6.0	---	---	>60	---	Low	Moderate.
Ka: Karnak	D	Occasional	Long	Mar-May	0-3.0	Apparent	Apr-Jun	>60	---	High	Moderate.
LfE:											
Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Frondorf	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
Ld: Lindside	C	Occasional	Brief	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
Ln---------------- Lindside	C	Frequent----	Brief-----	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
LoB, LoC2--------- Loring	C	None---------	---	---	2.0-3.0	Perched	Dec-Mar	>60	---	Moderate	Moderate.
Mc---------------- McGary	C	Occasional	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	Low.
Me---------------- Melvin	D	Occasional	Brief-----	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
Ml---------------- Melvin	D	Frequent----	Brief-----	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
MmB, MmC2, MmC3--- Memphis	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
MmD2-------------- Memphis	C	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
MmD3-------------- Memphis	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Na---------------- Newark	C	Occasional	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
Ne---------------- Newark	C	Frequent----	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
NhB, NhC2, NhC3, NhD2, NhD3-------- Nicholson	C	None---------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High-----	Moderate.
Nn---------------- Nolin	B	Occasional	Brief-----	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
No---------------- Nolin	B	Frequent----	Brief-----	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
OtA, OtB, OtC3---- Otwell	C	Occasional	Brief-----	Jan-May	2.0-3.5	Perched	Jan-Apr	>60	---	Moderate	High.
Pt. Pits											
Pu: Pits.											
Udorthents.											
Ro---------------- Robinsonville	B	Frequent----	Brief-----	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
Ru: Robinsonville----	B	Frequent----	Brief-----	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
Huntington-------	B	Frequent----	Brief-----	Dec-May	>6.0	---	---	>60	---	Low------	Moderate.
UnB, UoC3--------- Uniontown	B	Rare---------	---	---	2.5-6.0	Apparent	Nov-May	>60	---	Low------	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
Wa----------------- Waverly	B/D	Occasional	Brief to long.	Jan-Mar	0.5-1.0	Apparent	Dec-Apr	>60	---	High-----	Moderate.
We----------------- Weinbach	C	Rare--------	---	---	1.0-3.0	Perched	Jan-Apr	>60	---	High-----	High.
WhB, WhC2--------- Wheeling	B	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
ZaC2, ZaC3, ZaD2, ZaD3------------ Zanesville	C	None--------	---	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	Moderate	High.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS

[Tests were performed by the National Soil Survey Laboratory, Lincoln, Nebraska. The symbol > means more than. Absence of an entry indicates material was not detected. TR indicates trace]

Soil name, sample number, horizon, and depth (in inches)	Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002 mm)	Total: Clay (< 0.002 mm)	Particle-size distribution, Sand: Very coarse (2.1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-.002 mm)	Textural class	Coarse fragments <2 mm
	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct		Pct
Crider silt loam:* (82KY-055-3)												
Ap ----------- 0-9	1.7	83.1	15.2	0.2	0.2	0.2	0.4	0.7	1.0	83.8	sil	---
BA ----------- 9-14	1.3	79.6	19.1	---	0.1	0.2	0.4	0.6	0.7	80.2	sil	---
Bt1 ----------- 14-19	1.0	75.1	23.9	---	---	0.1	0.3	0.6	0.4	75.7	sil	---
Bt2 ----------- 19-31	1.2	73.9	24.9	---	---	0.2	0.4	0.6	0.6	74.5	sil	---
2Bt3 ---------- 31-39	1.3	76.1	22.6	---	---	0.1	0.5	0.7	0.6	76.8	sil	---
2Bt4 ---------- 39-52	2.9	74.5	22.6	---	0.2	0.3	1.2	1.2	1.7	75.7	sil	---
2Bt5 ---------- 52-70	5.0	71.1	23.9	0.3	0.4	0.4	2.2	1.7	3.3	72.8	sil	---
2Bt6 ---------- 70-82	7.1	65.0	27.9	0.6	0.7	0.6	3.0	2.2	4.9	67.2	sicl	---
Loring silt loam:* (82KY-055-5)												
Ap ----------- 0-8	3.7	83.9	12.4	0.4	0.6	0.9	0.8	1.0	2.7	84.9	sil	---
BA ----------- 8-13	1.9	74.1	24.0	---	0.3	0.5	0.5	0.6	1.3	74.7	sil	---
Bt1 ----------- 13-23	1.8	72.4	25.8	---	0.3	0.3	0.5	0.7	1.1	73.1	sil	---
Bt2 ----------- 23-29	1.9	75.1	23.0	---	0.2	0.3	0.5	0.9	1.0	76.0	sil	---
Btx1 ---------- 29-41	1.4	76.1	22.5	---	0.2	0.4	0.5	0.3	1.1	76.4	sil	---
Btx2 ---------- 41-63	2.4	77.8	19.8	---	0.1	0.3	0.9	1.1	1.3	78.9	sil	---
2C ----------- 63-78	10.9	73.2	15.9	0.4	0.2	0.6	5.4	4.3	6.6	77.5	sil	---
McGary silty clay loam:* (82KY-055-1)												
A ------------ 0-6	9.8	61.9	28.3	1.1	1.9	2.2	2.0	2.6	7.2	64.5	sicl	---
BE ------------ 6-9	10.0	58.9	31.1	1.2	1.8	1.8	1.6	3.6	6.4	62.5	sicl	---
Btg ----------- 9-17	6.6	50.8	42.6	0.5	1.1	1.2	1.2	2.6	4.0	53.4	sic	---
Bt1 ----------- 17-25	5.0	46.9	48.1	0.5	0.8	0.8	0.9	2.0	3.0	48.9	sic	---
Bt2-(upper) --- 25-39	4.0	47.7	48.3	---	0.3	0.8	1.0	1.9	2.1	49.6	sic	---
Bt2-(lower) --- 39-44	4.3	50.1	45.6	---	0.4	0.7	0.9	2.3	2.0	52.4	sic	---
BC-(upper) ---- 44-47	5.0	54.3	40.7	0.4	0.4	0.7	0.9	2.6	2.4	56.9	sic	---
BC-(lower) ---- 47-50	5.9	54.4	39.8	0.2	0.6	0.9	1.4	2.8	3.1	57.2	sicl	---
C-(upper) ----- 50-64	2.8	58.0	39.2	---	0.3	0.5	0.9	1.1	1.7	59.1	sicl	---
C-(lower) ----- 64-72	2.5	48.1	49.4	0.2	0.2	0.5	0.7	0.9	1.6	49.0	sic	---

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, sample number, horizon, and depth (in inches)	Total			Particle-size distribution								Coarse fragments
				Sand								
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (< 0.002 mm)	Very coarse (2.1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-.002 mm)	Textural class	<2 mm
	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct		Pct
Melvin silt loam:**												
(82KY-055-7)												
Ap ------------ 0-10	2.2	74.8	23.0	0.7	0.4	0.3	0.3	0.5	1.7	75.3	sil	---
Bg ------------ 10-32	3.6	76.6	19.8	1.2	0.9	0.5	0.5	0.5	3.1	77.1	sil	---
Cg1 ------------ 32-48	3.9	70.1	26.0	1.3	1.0	0.6	0.5	0.5	3.4	70.6	sil	---
Cg2 ------------ 48-60	3.1	68.4	28.5	0.3	0.9	0.7	0.6	0.6	2.5	69.0	sicl	---
Memphis silt loam:*												
(82KY-055-8)												
Ap ------------ 0-7	1.9	81.5	16.6	---	---	0.3	0.3	1.3	0.6	82.8	sil	---
Bt1 ------------ 7-14	1.0	70.5	28.5	---	---	---	0.1	0.9	0.1	71.4	sicl	---
Bt2 ------------ 14-25	1.1	68.8	30.1	---	---	---	0.1	1.0	0.1	69.8	sicl	---
Bt3 ------------ 25-42	1.2	76.3	22.5	---	---	---	---	1.2	---	77.5	sil	---
BC ------------ 42-49	1.0	80.5	18.5	---	---	---	0.1	0.9	0.1	81.4	sil	---
C ------------ 49-61	1.0	81.2	17.8	---	---	---	---	1.0	---	82.2	sil	---
Nicholson silt loam:*												
(82KY-055-4)												
Ap ------------ 0-6	2.2	75.4	22.4	0.2	0.2	0.3	0.7	0.8	1.4	76.2	sil	TR
Bt1 ------------ 6-10	2.2	74.1	23.7	---	0.1	0.4	0.7	1.0	1.2	75.1	sil	---
Bt2 ------------ 10-20	3.0	76.0	21.0	---	0.2	0.6	1.0	1.2	1.8	77.2	sil	---
Btx1 ----------- 20-28	3.3	74.8	21.9	---	0.2	0.6	1.1	1.4	4.4	76.2	sil	---
Btx2 ----------- 28-43	5.6	73.1	21.3	---	0.3	1.0	3.1	1.2	12.2	74.3	sil	3
Btx3 ----------- 43-59	16.3	64.6	19.1	1.0	0.7	2.3	8.2	4.1	12.2	68.7	sil	5
2Bt ------------ 59-78	20.1	25.4	54.5	0.5	0.5	2.5	11.2	5.4	14.7	30.8	c	10

* Soils sampled are the typical pedon for the series. See the section "Soil Series and Their Morphology" for location of pedon sampled.

** Location of pedon sampled: 6 miles east of Dycusburg, 400 feet north of Livingston Creek, 200 feet east of Tabor Road, 1 mile south of Kentucky Highway 902.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS

[Tests were performed by the National Soil Survey Laboratory, Lincoln, Nebraska. Absence of an entry indicates material was not detected. TR indicates trace]

Soil name, report number, horizon, and depth (in inches)	Reaction		Extractable bases					Cation-exchange capacity		Extractable acidity	Al	Base saturation		Organic matter	$CaCO_3$ equivalent
	H_2O (1:1)	$CaCl_2$ (1:2)	Ca	Mg	K	Na	Sum	NH_4OAc	Sum of cations			NH_4OAc	Sum of cations		
	pH	pH	--------Milliequivalents per 100 grams of soil--------									Pct	Pct	Pct	Pct
Crider silt loam:*															
(82KY-055-3)															
Ap ------------ 0-9	6.8	6.6	9.3	0.6	0.2	0.2	10.3	10.5	14.7	4.4	---	98	70	2.28	---
BA ------------ 9-14	5.9	5.5	5.7	0.7	0.2	0.3	6.9	9.0	12.0	5.1	---	77	57	0.94	---
Bt1 ----------- 14-19	5.8	5.4	6.7	1.3	0.2	0.2	8.4	11.2	13.6	5.2	---	75	62	0.60	---
Bt2 ----------- 19-31	5.4	5.0	5.7	3.0	0.3	0.3	9.3	12.6	16.5	7.2	0.3	74	56	0.30	---
2Bt3 ---------- 31-39	5.3	4.5	4.3	3.1	0.2	0.3	7.9	11.4	14.7	6.8	0.6	69	54	0.22	---
2Bt4 ---------- 39-52	5.1	4.4	3.2	2.7	0.2	0.3	6.4	10.6	13.0	6.6	0.9	60	49	0.24	---
2Bt5 ---------- 52-70	4.9	4.3	2.6	2.5	0.2	0.1	5.4	10.2	13.5	8.1	1.3	53	40	0.17	---
2Bt6 ---------- 70-82	4.8	4.2	2.2	2.6	0.2	0.1	5.1	11.2	14.0	8.9	1.6	46	36	0.22	---
Loring silt loam:*															
(82KY-055-5)															
Ap ------------ 0-8	6.1	5.7	6.5	0.6	0.2	TR	7.3	9.3	14.0	6.7	0.4	78	52	1.74	---
BA ------------ 8-13	5.2	4.9	5.0	1.9	0.2	TR	7.1	11.4	15.6	8.5	2.9	62	46	0.68	---
Bt1 ----------- 13-23	4.5	4.3	1.9	3.8	0.2	0.1	6.0	13.7	19.6	13.6	4.0	44	31	0.37	---
Bt2 ----------- 23-29	4.5	3.8	1.0	3.4	0.2	0.1	4.7	13.5	18.4	13.7	4.0	35	26	0.25	---
Btx1 ---------- 29-41	4.6	4.1	1.0	4.5	0.2	0.3	6.0	15.0	18.7	12.7	2.3	40	32	0.18	---
Btx2 ---------- 41-63	5.0	4.2	1.8	5.4	0.2	0.5	7.9	13.9	18.3	10.4	0.1	57	43	0.15	---
2C ------------ 63-78	5.5	4.7	2.1	4.3	0.1	0.5	7.0	9.0	12.0	5.0	0.4	78	58	0.10	---
McGary silty clay loam:*															
(82KY-055-1)															
A ------------ 0-6	4.4	4.0	1.1	1.9	0.2	0.3	3.5	15.1	17.3	13.8	5.3	23	20	1.77	---
BE ------------ 6-9	4.4	3.9	0.6	1.6	0.1	0.1	2.4	14.6	15.8	13.4	6.5	16	15	0.89	---
Btg ----------- 9-17	4.5	3.9	0.6	3.3	0.2	0.4	4.5	20.1	23.4	18.9	9.4	22	19	0.62	---
Bt1 ----------- 17-25	4.8	3.9	0.6	5.6	0.3	0.8	7.3	23.9	26.9	19.6	10.5	31	27	0.67	---
Bt2-(upper)---- 25-39	4.5	3.8	1.3	7.7	0.4	1.4	10.8	24.7	28.9	18.1	8.0	44	37	0.55	---
Bt2-(lower)---- 39-44	4.6	4.2	2.4	10.0	0.4	3.1	15.9	22.1	27.3	11.4	2.4	72	58	0.33	---
BC-(upper)----- 44-47	6.3	6.2	6.1	15.8	0.3	7.1	29.3	20.9	34.2	4.9	---	100	86	0.35	---
BC-(lower)----- 47-50	5.2	5.0	2.9	12.8	0.3	6.0	22.0	21.1	29.6	7.6	0.4	100	74	0.27	---
C-(upper)------ 50-64	7.5	7.3	12.6	19.1	0.3	6.2	38.2	15.8	40.5	2.3	---	100	94	0.42	TR
C-(lower)------ 64-72	7.8	7.5	14.2	18.4	0.3	6.2	39.1	16.9	42.3	3.2	---	100	92	0.42	TR

See footnotes at end of table.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth (in inches)	Reaction		Extractable bases					Cation-exchange capacity		Extractable acidity	Al	Base saturation		Organic matter	$CaCO_3$ equivalent
	H_2O (1:1)	$CaCl_2$ (1:2)	Ca	Mg	K	Na	Sum	NH_4OAc	Sum of cations			NH_4OAc	Sum of cations		
	pH	pH	--------Milliequivalents per 100 grams of soil--------									Pct	Pct	Pct	Pct
Melvin silt loam:**															
(82KY-055-7)															
Ap ------------- 0-10	5.8	5.6	9.5	1.5	0.2	0.1	11.3	14.4	18.9	7.6	---	78	60	1.50	---
Bg ------------- 10-32	5.4	4.9	6.2	1.9	0.1	0.3	8.5	12.1	16.0	7.5	0.4	70	53	0.67	---
Cg1 ------------ 32-48	5.1	4.4	6.3	3.6	0.2	0.4	10.5	16.4	20.1	9.6	1.1	64	52	0.37	---
Cg2 ------------ 48-60	6.3	5.6	9.3	7.9	0.2	1.0	18.4	19.2	24.7	6.3	---	96	74	0.22	---
Memphis silt loam:*															
(82KY-055-8)															
Ap ------------ 0-7	5.4	4.8	5.0	1.4	0.4	0.1	6.9	10.5	14.8	7.9	TR	66	47	2.64	---
Bt1 ------------ 7-14	5.9	5.5	7.8	3.2	0.3	0.1	11.4	14.2	19.2	7.8	---	80	59	1.07	---
Bt2 ------------ 14-25	5.5	5.1	5.8	5.2	0.4	0.1	11.5	15.4	20.9	9.4	0.3	75	55	0.40	---
Bt3 ------------ 25-42	4.9	4.4	2.9	3.6	0.3	0.3	7.1	12.0	17.9	10.8	1.2	59	40	0.20	---
BC ------------ 42-49	4.9	4.5	2.4	3.0	0.2	0.2	5.8	10.7	15.0	9.2	1.3	54	39	0.22	---
C ------------ 49-61	4.9	4.5	2.3	2.9	0.2	0.2	5.6	10.4	15.2	9.6	1.2	54	37	0.17	---
Nicholson silt loam:*															
(82KY-055-4)															
Ap ------------ 0-6	7.4	7.0	15.7	1.2	0.3	0.1	17.3	14.8	20.8	3.5	---	83	100	2.35	TR
Bt1 ------------ 6-10	7.2	6.8	12.7	1.5	0.2	0.2	14.6	14.2	18.2	3.6	---	80	100	1.20	TR
Bt2 ------------ 10-20	4.7	4.2	1.9	2.3	0.2	0.2	4.6	12.5	15.2	10.6	3.4	30	37	0.31	---
Btx1 ----------- 20-28	4.9	4.2	1.4	3.5	0.2	0.5	5.6	15.4	17.8	12.2	4.6	31	36	0.20	---
Btx2 ----------- 28-43	5.0	4.0	1.9	4.0	0.2	0.5	6.6	14.4	17.4	10.8	3.0	38	46	0.13	---
Btx3 ----------- 43-59	5.2	4.2	2.6	3.4	0.1	0.4	6.5	10.7	13.9	7.4	1.0	47	61	0.12	---
2Bt ----------- 59-78	5.4	4.8	6.6	6.3	0.2	0.9	14.0	18.7	24.3	10.3	0.6	58	75	0.25	---

* Soils sampled are the typical pedon for the series. See the section "Soil Series and Their Morphology" for location of pedon sampled.

** Location of pedon sampled: 6 miles east of Dycusburg, 400 feet north of Livingston Creek, 200 feet east of Tabor Road, 1 mile south of Kentucky Highway 902.

TABLE 19.--ENGINEERING INDEX TEST DATA

[Tests were performed by the Soil Mechanics Laboratory, South National Technical Center, Fort Worth, Texas. Absence of an entry indicates that data were not determined. NP means nonplastic]

Soil name, report number, horizon, and depth (in inches)	Classification		Particle-size distribution											Liquid limit	Plasticity index	Moisture density		Specific gravity
			Percentage passing sieve--								Percentage smaller than--							
	AASHTO	Unified	3 inch	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Maximum dry density	Optimum moisture	
														Pct		Lb/ft^3	Pct	
Belknap silt loam:*																		
(82KY-055-6)																		
C, Cg1, and																		
Cg2 ------------ 10-40	A-4(0)	ML	100	100	100	100	100	100	99	95	56	17	10	---	NP	104.5	16.0	2.70
Crider silt loam:*																		
(82KY-055-3)																		
Bt1 and																		
Bt2 ------------ 14-31	A-7-6(18)	CL	100	100	100	100	100	100	100	95	63	30	23	42	17	104.0	18.5	2.68
2Bt3 and																		
2Bt4 ----------- 31-52	A-6(16)	CL	100	100	100	100	100	100	100	95	63	25	17	39	15	106.5	17.0	2.70
Loring silt loam:*																		
(82KY-055-5)																		
Bt1 ------------ 13-23	A-7-6(17)	CL	100	100	100	100	100	100	100	95	63	30	23	41	16	104.5	19.0	2.73
Btx1 ------------ 29-41	A-6(13)	CL	100	100	100	100	100	100	100	95	63	24	23	36	13	106.5	17.5	2.73
Btx2 ------------ 41-63	A-6(12)	CL	100	100	100	100	100	100	100	95	63	24	17	33	12	107.0	17.5	2.74
McGary silty clay loam:*																		
(82KY-055-1)																		
Btg and																		
Bt1 ------------ 9-25	A-7-6(34)	CH	100	100	100	100	100	100	100	95	79	56	43	57	31	97.0	24.0	2.62
Bt2 ------------ 25-44	A-7-6(27)	CL	100	100	100	100	100	100	100	95	82	56	40	48	26	100.5	21.0	2.73
Melvin silt loam:**																		
(82KY-055-7)																		
Bg and																		
Cg1 ------------ 10-48	A-4(10)	CL	100	100	100	100	100	100	100	98	76	30	17	31	10	105.5	17.0	2.70
Memphis silt loam:*																		
(82KY-055-8)																		
Bt1, Bt2, and																		
Bt3 ------------ 7-42	A-6(23)	CL	100	100	100	100	100	100	100	95	69	30	23	46	21	103.0	20.0	2.68
BC and																		
C ------------ 42-61	A-6(11)	CL	100	100	100	100	100	100	100	95	60	17	17	34	11	106.5	18.0	2.74

See footnotes at end of table.

TABLE 19.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth (in inches)	Classification		Particle-size distribution											Liquid limit	Plasticity index	Moisture density		Specific gravity
	AASHTO	Unified	Percentage passing sieve--								Percentage smaller than--					Maximum dry density	Optimum moisture	
			3 inch	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm					
														Pct		Lb/ft^3	Pct	
Nicholson silt loam:* (82KY-055-4)																		
Btx1 and Btx2 ----------- 20-43	A-6(15)	CL	100	100	100	100	100	100	100	95	63	25	17	36	15	107.5	17.5	2.68
Btx3 ------------ 43-59	A-6(8)	CL	100	100	100	100	100	100	98	87	56	24	17	28	11	113.0	15.0	2.69
2Bt ------------ 59-78	A-6(19)	CH	100	100	100	99	98	72	72	61	50	43	36	58	35	95.0	26.0	2.70
Zanesville silt loam:*** (82KY-055-2)																		
Bt1 and Bt2 ------------ 4-18	A-6(16)	CL	100	100	100	100	100	100	100	95	63	24	17	40	15	104.5	19.0	2.69
Btx1 ------------ 18-33	A-6(11)	CL	100	100	100	100	100	100	100	87	50	19	17	33	13	109.0	16.5	2.69
Btx2 ------------ 33-46	A-4(6)	CL	100	100	100	100	100	100	99	79	50	19	13	27	10	114.0	13.5	2.69

* Soils sampled are the typical pedon for the series. See the section "Soil Series and Their Morphology" for location of pedon sampled.

** Location of pedon sampled: 6 miles east of Dycusburg, 400 feet north of Livingston Creek, 200 feet east of Tabor Road, 1 mile south of Kentucky Highway 902.

*** Location of pedon sampled: 13 miles east of Marion, 400 feet east of Kentucky Highway 120, 1.5 miles north of the intersection of Kentucky Highways 120 and 139.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
* Baxter	Fine, mixed, mesic Typic Paleudalfs
Belknap	Coarse-silty, mixed, acid, mesic Aeric Fluvaquents
Calloway	Fine-silty, mixed, thermic Glossaquic Fragiudalfs
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Clifty	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Collins	Coarse-silty, mixed, acid, thermic Aquic Udifluvents
* Crider	Fine-silty, mixed, mesic Typic Paleudalfs
Faywood	Fine, mixed, mesic Typic Hapludalfs
Frondorf	Fine-loamy, mixed, mesic Ultic Hapludalfs
Grenada	Fine-silty, mixed, thermic Glossic Fragiudalfs
* Hammack	Fine-silty, mixed, mesic Glossic Paleudalfs
Henshaw	Fine-silty, mixed, mesic Aquic Hapludalfs
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
* Karnak	Fine, montmorillonitic, nonacid, mesic Vertic Haplaquepts
Lenberg	Fine, mixed, mesic Ultic Hapludalfs
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Loring	Fine-silty, mixed, thermic Typic Fragiudalfs
Lowell	Fine, mixed, mesic Typic Hapludalfs
* McGary	Fine, mixed, mesic Aeric Ochraqualfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
* Memphis	Fine-silty, mixed, thermic Typic Hapludalfs
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
* Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs
Robinsonville	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Uniontown	Fine-silty, mixed, mesic Typic Hapludalfs
Waverly	Coarse-silty, mixed, acid, thermic Typic Fluvaquents
Weinbach	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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