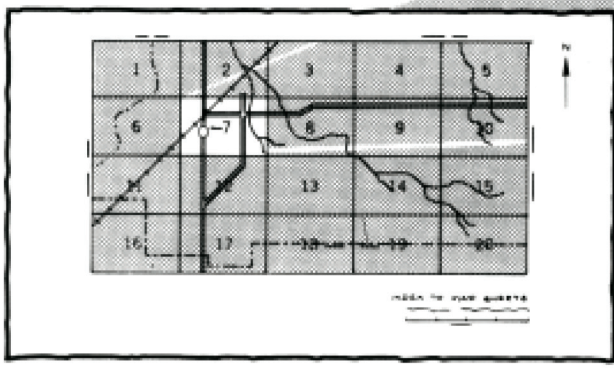
Soil Survey of

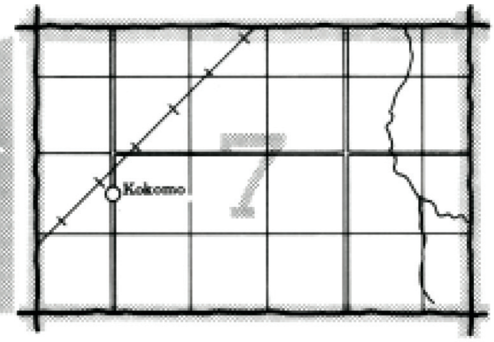
Conway County, Arkansas

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
Arkansas Agricultural Experiment Station

HOW TO USE

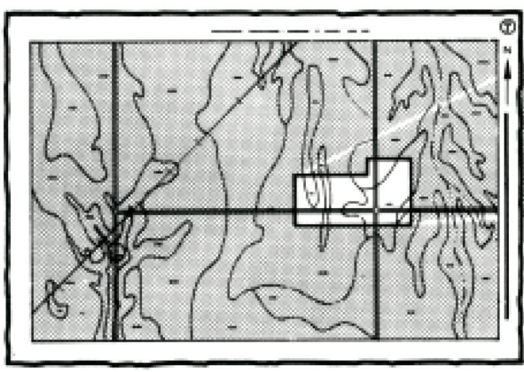
1. Locate your area of interest on the "Index to Map Sheets"

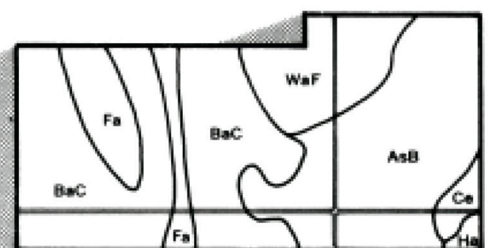




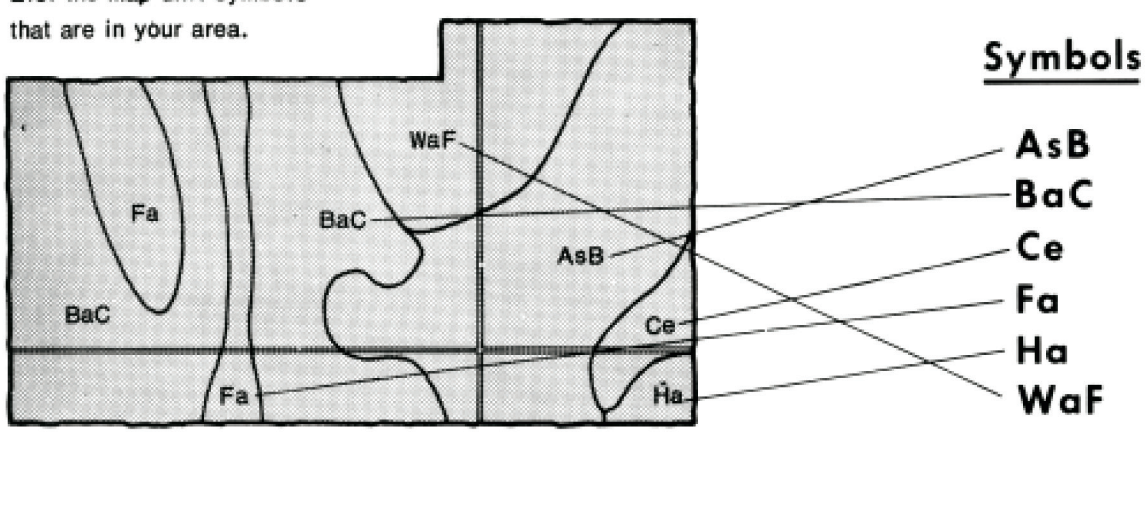
2. Note the number of the map sheet and turn to that sheet.

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



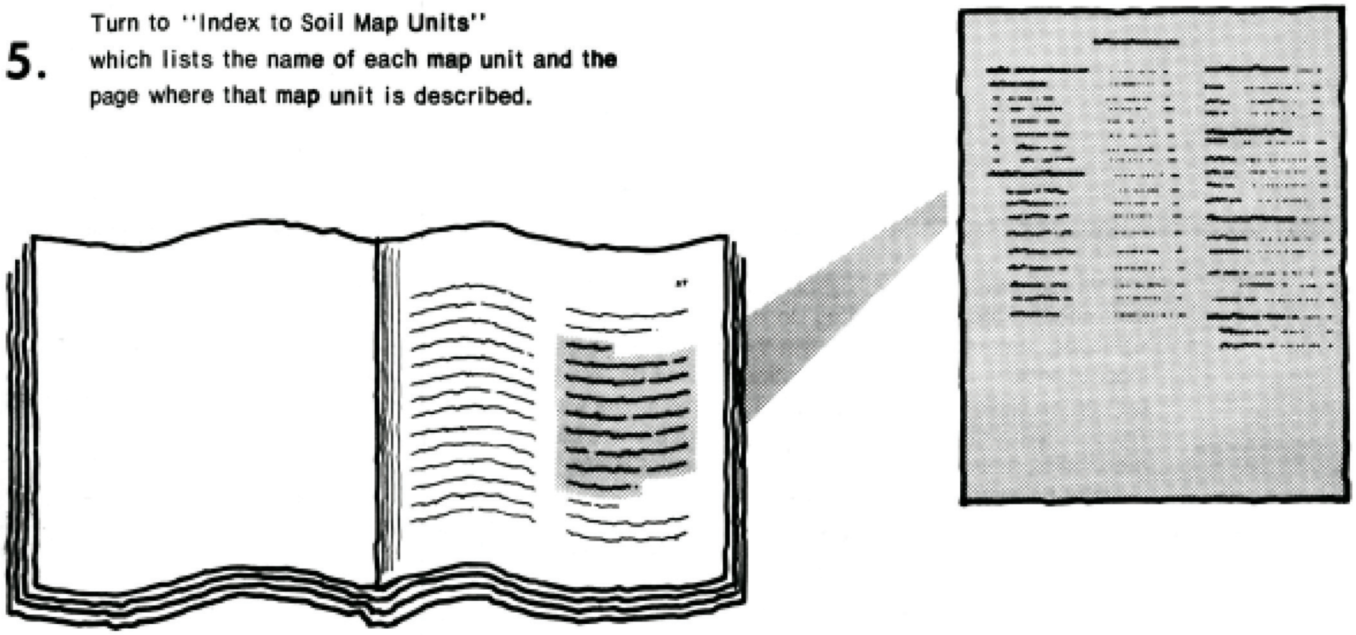


4. List the map unit symbols that are in your area.

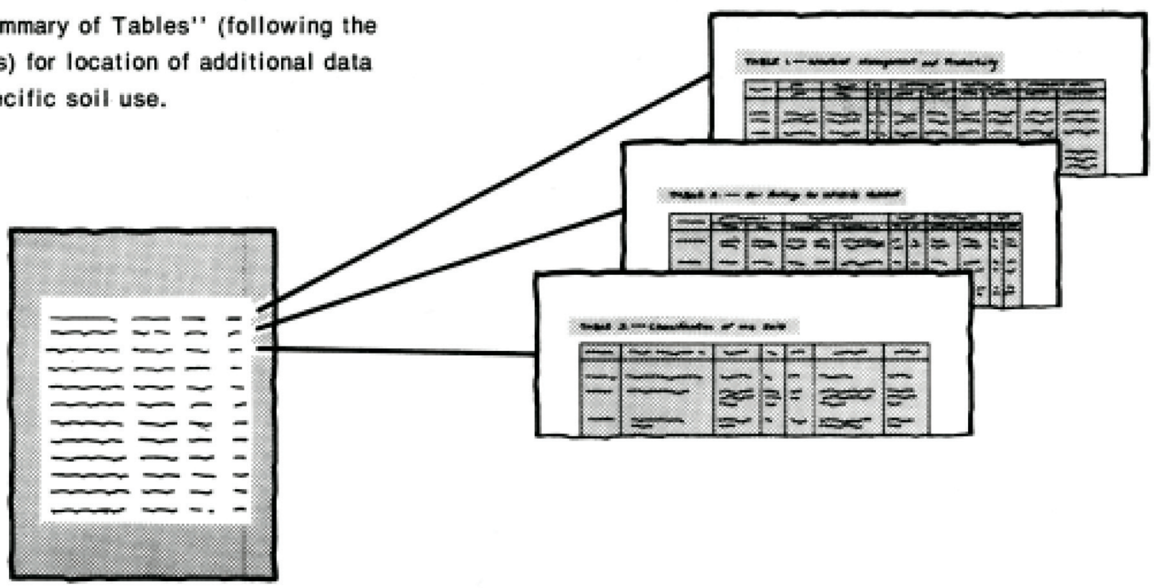


THIS SOIL SURVEY

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

Major fieldwork for this soil survey was completed in the period 1972-76. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Conway County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

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Issued May 1980

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Foreword

The Soil Survey of Conway County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

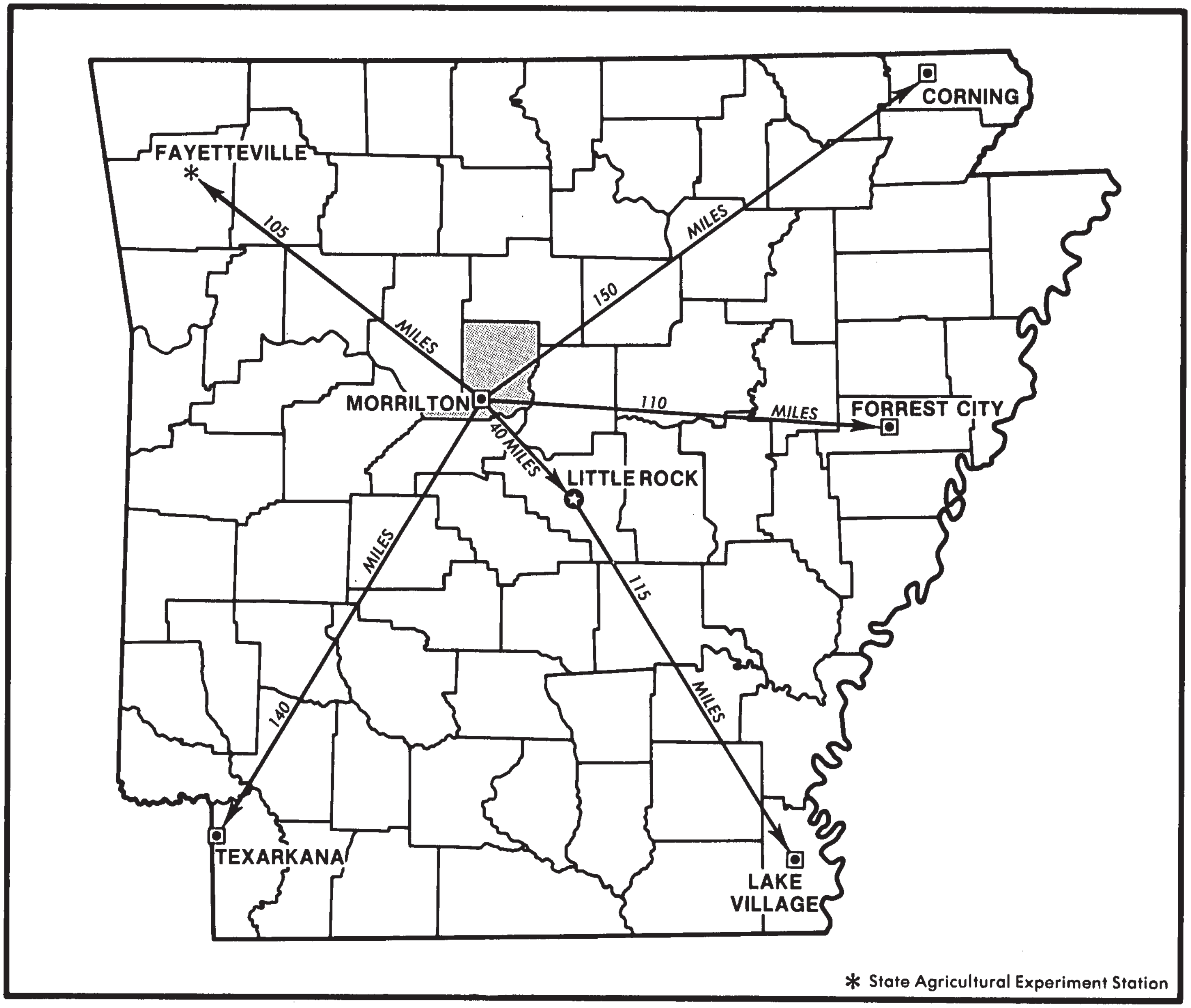
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to 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 kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

M.J. Spears
State Conservationist
Soil Conservation Service



Location of Conway County in Arkansas.

SOIL SURVEY OF CONWAY COUNTY, ARKANSAS

by

William R. Townsend and Curtis R. Wilson,

Soil Conservation Service

UNITED STATES DEPARTMENT OF AGRICULTURE,

SOIL CONSERVATION SERVICE AND FOREST SERVICE,

IN COOPERATION WITH THE

ARKANSAS AGRICULTURAL EXPERIMENT STATION

CONWAY COUNTY is in central Arkansas (see map on facing page). It ranges from about 18 to 31 miles in width and from about 3 to 27 miles in length. The county has a total area of 364,160 acres, or 569 square miles. The land area is 358,912 acres, or 561 square miles.

The county is bounded on the east by Faulkner and Van Buren Counties, on the south by Perry County, on the west by Yell and Pope Counties, and on the north by Van Buren County.

The topography ranges from level bottom land along the flood plain of the Arkansas River, in the southern part of the county, to steep mountains in the Ozark National Forest, in the northwestern part of the county. Petit Jean Mountain, the highest point in the county, is in the southwestern part.

In 1970, the population of the county was 16,805. Morrilton, the county seat, had a population of 6,814. Plumerville, Menifee, Oppelo, Springfield, Center Ridge, Blackwell, and Cleveland had populations of less than 750. Most of the workers in the county, including more than half of the farmers, are employed in industries or supporting businesses in the general area.

General nature of the county

In the following paragraphs, farming, physiography and drainage, and climate in Conway County are described.

Farming

Conway County was formed as a territory on October 20, 1825, from Pulaski County. It was named for Henry Wharton Conway, Delegate to Congress. Cadron was the first county seat. In November 1883, the county seat was moved to Morrilton after having been at Cadron, Marion, Harrisburg, Lewisburg, and Springfield.

Early settlers in Conway County farmed the soils that had good natural drainage and that were above the flood plain of the Arkansas River and its tributaries. These soils were mainly in the upland valleys. The early settlers were subsistence farmers at first, but they soon started to grow cotton as a cash crop. Most of the better drained areas were cleared for cotton, and the steep, stony, or wet areas were left in woodland.

Farming has become more diversified. The soils on bottom lands are generally farmed more intensively than those on uplands. In the upland areas, beef cattle, forage crops, dairy cattle, and hogs provide most of the farm income.

On the bottom lands of the Arkansas River, flood control, improved crop varieties, mechanization, insecticides, and other technology have led to expansion of crops and pasture into most of the area. Most of the lowlands have been cleared, and on most farms natural drainage has been improved for more reliable crop production.

Soybeans is the main crop on the bottom lands, but farmers also grow rice, cotton, wheat, sorghums, oats, and spinach. Most of the farmers raise beef cattle as well as crops.

In 1970, about 54 percent of the county was in farms. The rest was cities and other built-up areas; transportation facilities; areas being developed for nonfarm uses, such as recreation or housing; State-owned land (Petit Jean State Park); and federally administrated land (the Ozark National Forest).

Physiography and drainage

The Arkansas River enters Conway County on its west boundary and flows east through the southwestern part of the county. It forms part of the boundary between Conway and Perry Counties. Several old filled-in oxbow lakes on the flood plain of the Arkansas River are evidence that the river has meandered from west to east. In addition, there are several sloughs and bayous. The main drainageways are Point Remove Creek, Cadron Creek, Miller Bayou, and Welbourne Branch.

The flow of the Arkansas River is controlled by large flood-control impoundments in its upstream watershed. A series of lakes and dams form navigable pools, and the river is open the year round to barge traffic. This river provides opportunities for fishing, boating, and waterfowl hunting. It yields sand and gravel in quantities large enough to be profitably dredged. All of the streams in Conway County eventually drain into the Arkansas River.

The alluvial soils on lowlands are level to undulating, and some are subject to flooding. The most fertile soils in the County—Dardanelle, Gallion, and Roxana—formed on these bottom lands.

Undulating uplands formed along tributaries of the Arkansas River. This area of loamy, unconsolidated sediment is level to gently sloping, and the slopes are dominantly less than 3 percent. Leadvale, Muskogee, and Sallisaw are the main soils in the sloping areas, and Guthrie, Taft, Spadra, and Wrightsville soils are on the flats. This area is drained by streams that flow from the hilly uplands.

The topography of the hilly or mountainous part of the county is gently sloping to steep ridges, crests, and side slopes. Elevation of this area ranges from 450 feet above sea level on the lower foot slopes to 1,207 feet on Petit Jean Mountain. The rocks are mostly horizontal to slightly dipping. Folding with some normal faults were major factors in shaping the landscape in this area. With few exceptions, valleys in the area are quite narrow, as are the ridgetops and mountaintops. The principal streams that drain this area are the East and West Forks of Point Remove Creek and Cypress Creek near Petit Jean Mountain. Enders, Linker, and Mountainburg are the main soils in this area.

Most of the tributary streams in the uplands are intermittent, but some flow the year round. Livestock water is obtained from the creeks and from wells and ponds. Domestic water supplies are from wells, though in most places the ground water supply is insufficient for irrigation. Water for irrigation on the bottom lands is obtained from deep wells and from surface water impounded in reservoirs.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Morrilton for the period 1951 to 1975. 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 43 degrees F, and the average daily minimum temperature is 33 degrees. The lowest temperature on record, which occurred at Morrilton on February 2, 1951, is -15 degrees. In summer the average temperature is 80 degrees, and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred on July 13, 1954, is 111 degrees.

Growing degree days, shown in table 1, 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.

Of the total annual precipitation, 24 inches, or about 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 6.08 inches at Morrilton on August 13, 1957. Thunderstorms occur on about 60 days each year, and most occur in summer.

Average seasonal snowfall is 4 inches. The greatest snow depth at any one time during the period of record was 8 inches. On the average, 2 days have at least 1 inch of snow on the ground, but 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 percentage of possible sunshine is 70 in summer and 50 in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit 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 provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for *cultivated farm crops, woodland,* and *urban uses*. Cultivated farm crops are those grown extensively by farmers in the survey area. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments.

Map unit descriptions

The seven units on the general soil map of Conway County are described in the following paragraphs.

1. Mountainburg-Enders

Well drained, gently sloping to steep, loamy soils on low hills that have narrow to broad winding ridgetops, steep side slopes, and narrow drainageways

This map unit consists of soils on low hills, hilltops, steep side slopes, and narrow drainageways. These soils formed in residuum weathered from sandstone and shale. Natural drainageways are mainly fast-flowing, intermittent streams.

This unit occupies about 29 percent of the county. About 57 percent of the unit is Mountainburg soils, 23 percent is Enders soils, and the remaining 20 percent is soils of minor extent.

Mountainburg soils, on ridgetops and hillsides, are well drained and shallow. They have a surface layer of dark brown gravelly or stony fine sandy loam and a subsoil of strong brown very gravelly sandy clay loam. Enders soils, on crests and adjacent side slopes, are well drained and deep. They have a surface layer of dark brown gravelly fine sandy loam and a subsoil of yellowish red silty clay.

The minor soils in this unit are the well drained Linker and Nella soils.

This unit is mainly mixed woodland and small areas of pasture. Shallow depth to bedrock and very low available water capacity are the main limitations to plant growth on Mountainburg soils. The clayey subsoil and medium available water capacity are the main limitations to plant growth on Enders soils.

This unit has poor potential for row crops. Shallow depth to bedrock and very low available water capacity limit root penetration on Mountainburg soils. The clayey subsoil and medium available water capacity are the main limitations on Enders soils. Mountainburg soils have poor potential as woodland because of very low available water capacity and shallow depth to rock. Enders soils have fair potential as woodland because of medium available water capacity, the clayey subsoil, and the hazard of erosion.

This unit has poor potential for most urban uses. Mountainburg soils have severe limitations for streets, dwellings, industrial sites, and septic tank absorption fields because of shallow depth to rock, slope, and large stones. Enders soils have severe limitations for streets, dwellings, industrial sites, and septic tank absorption fields because of shrink-swell potential and slope.

2. Linker-Mountainburg

Well drained, nearly level to moderately sloping, loamy soils on broad plateaus, mountains, hilltops, and benches

This map unit consists of soils on broad plateaus, mountains, hilltops, and benches. These soils formed in loamy residuum weathered from sandstone, with interbedded shales. Natural drainageways are mainly moderately flowing, intermittent streams.

This unit occupies about 34 percent of the county. About 60 percent of the unit is Linker soils, 20 percent is Mountainburg soils, and the remaining 20 percent is soils of minor extent.

Linker soils, on benches and plateaus, are well drained and moderately deep. They have a surface layer of brown fine sandy loam and a subsoil of red clay loam and sandy clay loam. Mountainburg soils, on ledges, ridgetops, and shallow benches, are well drained and shallow. They have a surface layer of dark brown gravelly fine sandy loam and a subsoil of strong brown very gravelly sandy clay loam.

The minor soils in this unit are the moderately well drained Cane and Leadvale soils and the well drained Enders soils.

This unit is used mainly for pasture crops, except for small areas of mixed woodland. Moderate to shallow depth over rock is the main limitation which restricts root penetration into the soil.

This unit has fair to poor potential for row crops. The main limitations are low to very low available water capacity and moderate to shallow depth to rock. This unit has fair to poor potential as woodland because of depth to rock and available water capacity.

Linker soils in this unit have fair potential for most urban uses. Moderate depth to rock is a moderate limitation for streets, dwellings, and industrial sites and a severe limitation for septic tank absorption fields. Mountainburg soils have poor potential for most urban uses. Shallow depth to rock is a severe limitation for streets, dwellings, industrial sites, and septic tank absorption fields. These limitations are difficult to overcome.

3. Guthrie-Barling-Spadra

Poorly drained, moderately well drained, and well drained, depressional and level to nearly level, loamy soils in depressions and on terraces and flood plains of local streams

This map unit consists of soils on stream terraces and flood plains. These soils formed in alluvial materials weathered from sandstone, siltstone, and shale. Natural drainageways are moderately flowing, perennial streams.

This unit occupies about 7 percent of the county. About 32 percent of the unit is Guthrie soils, 24 percent is Barling soils, 19 percent is Spadra soils, and the remaining 25 percent is soils of minor extent.

Guthrie soils, in depressions and on terraces, are poorly drained and deep. They have a surface layer of dark grayish brown silt loam and a subsoil of gray silty clay loam. Barling soils, on flood plains, are moderately well drained and deep. They have a surface layer of dark brown silt loam and a subsoil of gray and yellowish brown silt loam. Spadra soils, on higher stream terraces, are well drained and deep. They have a surface layer of dark yellowish brown fine sandy loam and a subsoil of dark brown and reddish brown loam.

The minor soils in this unit are the moderately well drained Leadvale soils and the somewhat poorly drained Taft soils.

This unit is used mainly for pasture, and some areas are cropland intermingled with woodland. Flooding and wetness are the main limitations.

This unit has fair to good potential for row crops. Farming operations are delayed by flooding after heavy rains. This unit has good potential as woodland; however, harvesting of timber is usually limited to the drier seasons.

This unit has poor potential for most urban uses. Flooding is a severe limitation for dwellings, industrial sites, and roads. Spadra soils in this unit have moderate limitations for septic tank absorption fields because of flooding, and Guthrie and Barling soils have severe limitations because of flooding and wetness. These limitations can be overcome only by flood control and drainage measures.

4. Leadvale-Taft

Moderately well drained and somewhat poorly drained, level to gently sloping, loamy soils on local stream terraces

This map unit consists of soils on stream terraces and in depressions. These soils formed in loamy materials in the uplands. These loamy materials overlie loamy alluvium from nearby uplands that are underlain largely by shale and siltstone. Natural drainageways are mainly slow-flowing, intermittent streams.

This unit occupies about 9 percent of the county. About 70 percent of the unit is Leadvale soils, 22 percent is Taft soils, and the remaining 8 percent is soils of minor extent.

Leadvale soils, on higher terraces, are moderately well drained and deep. They have a surface layer of dark grayish brown silt loam and a subsoil of yellowish brown silt loam and silty clay loam. Taft soils, on lower terraces and in depressions, are somewhat poorly drained and deep. They have a surface layer of brown silt loam and a subsoil of yellowish brown silty clay loam.

The minor soils in this unit are the poorly drained Guthrie soils and the well drained Linker soils.

This unit is used mainly for pasture crops, and there are intermingled areas of woodland. Wetness is the main limitation to use; the water table is within 24 inches of the surface during winter and early spring.

This unit has fair potential for row crops. Farming operations are commonly delayed several days after a rain because of excess water; surface drains are needed. This unit has good potential as woodland; however, harvesting of timber is usually limited to the drier seasons.

Leadvale soils in this unit have fair potential for most urban uses. Wetness and low strength are moderate limitations for dwellings and industrial sites. Taft soils have poor potential for most urban uses. Wetness is a severe limitation for dwellings, streets, and industrial sites. Both soils have severe limitations for septic tank absorption fields because of wetness and slow permeability. These problems can be lessened through drainage to lower the water table and through proper design of the absorption field.

5. Muskogee-Wrightsville

Moderately well drained and poorly drained, level to gently sloping, loamy soils on terraces and broad flats and in narrow drainageways

This unit consists of level to gently sloping soils on hills and side slopes, on broad flats, and in narrow drainageways. These soils formed in loamy and clayey sediments on stream terraces. Natural drainageways are mainly slow-flowing, intermittent streams.

This unit occupies about 7 percent of the county. About 59 percent of the unit is Muskogee soils, 20 percent is Wrightsville soils, and the remaining 21 percent is soils of minor extent.

Muskogee soils, on higher terraces, are moderately well drained and deep. They have a surface layer of brown silt loam and a subsoil of strong brown to red silty clay loam to clay. Wrightsville soils, on lower terraces, are poorly drained and deep. They have a surface layer of dark grayish brown silt loam and a subsoil of gray and light brownish gray silty clay and silty clay loam.

The minor soils in this unit are the well drained McKamie and Sallisaw soils.

This unit is used mainly for pasture crops, and small areas are woodland. The tight, clayey subsoil is the main limitation to use of Muskogee soils, and wetness is the main limitation to use of Wrightsville soils. The water table is within 18 inches of the surface during winter and early spring.

This unit has fair potential for row crops. Farming operations are commonly delayed several days after rain because of excess water; surface drains are needed. This unit has good potential as woodland; however, harvesting of timber is usually limited to the drier seasons.

The soils in this unit have poor potential for residential and urban uses. High shrink-swell potential and low strength are severe limitations to most urban uses. Wrightsville soils also have severe limitations for most urban uses because of wetness and the seasonal high water table. Both soils have severe limitations for septic tank absorption fields because of wetness and slow permeability. These limitations are difficult to overcome.

6. Moreland-Roellen

Somewhat poorly drained and poorly drained, level, clayey soils on broad flood plains and low terraces

This map unit consists of soils on broad flats, in backswamps, and in depressions in flood plains and low terraces. These soils formed in clayey alluvium. Natural drainageways are mainly slow-flowing, intermittent streams.

This unit occupies about 6 percent of the county. About 50 percent of the unit is Moreland soils, 24 percent is Roellen soils, and the remaining 26 percent is soils of minor extent.

Moreland soils, on the higher parts of flood plains and terraces, are somewhat poorly drained and deep. They have a surface layer of dark reddish brown silty clay and a subsoil of reddish brown silty clay and silty clay loam. Roellen soils, on the lower parts of flood plains and terraces, are poorly drained and deep. They have a surface layer of very dark grayish brown silty clay and a subsoil of dark gray silty clay.

The minor soils in this unit are the well drained Gallion soils and the very poorly drained Yorktown soils.

This unit is used mainly for cultivated crops, and small areas are pasture and woodland. Wetness is the main limitation to use. The water table is within 12 inches of the surface during winter and early spring.

This unit has good potential for short-season row crops. Farming operations are commonly delayed several days after rain because of excess water, and surface drains are needed. This unit has good potential as woodland. Wetness is the main limitation to equipment use in managing and harvesting the trees, but this limitation is usually overcome by logging during the drier seasons.

This unit has poor potential for most urban uses. Wetness and shrink-swell potential are severe limitations for dwellings, streets, and industrial sites. Very slow or slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult to overcome.

7. Roxana-Crevasse-Dardanelle

Well drained and excessively drained, level to undulating, loamy and sandy soils on old natural levees of the Arkansas River

This map unit consists of level and undulating soils along the Arkansas River. These soils formed in stratified, loamy or sandy alluvium. Natural drainageways are mainly fast-flowing, perennial streams or rivers.

This unit occupies about 8 percent of the county. About 51 percent of the unit is Roxana soils, 12 percent is Crevasse soils, 12 percent is Dardanelle soils, and the remaining 25 percent is soils of minor extent.

Roxana soils, on higher flood plains, are well drained and deep. They have a surface layer of reddish brown silt loam and a substratum of yellowish red silt loam. Crevasse soils, on lower flood plains, are excessively drained and deep. They have a surface layer of yellowish brown loamy fine sand and a substratum of dark yellowish brown and yellowish brown loamy fine sand and sand. Dardanelle soils, on higher flood plains, are well drained and deep. They have a surface layer of dark brown silt loam and a subsoil of dark reddish brown and reddish brown silty clay loam and silt loam.

The minor soils in this unit are the well drained Gallion soils, the very poorly drained Yorktown soils, the somewhat poorly drained Moreland soils, and the poorly drained Roellen soils.

This unit is used mainly for cultivated crops, and small areas are pasture and woodland. Occasional flooding is the main limitation to use of this soil for crop production.

Roxana and Dardanelle soils in this unit have good potential for most crops commonly grown in the county. Crevasse soils have poor potential because of droughtiness and flooding. Potential is good as woodland. There are no significant limitations to woodland use or management.

Roxana soils, where protected by a levee, and Dardanelle soils have good to fair potential for most urban uses. Shrink-swell potential and low strength are moderate limitations for dwellings, roads, and streets. Roxana soils, where not protected by a levee, and Crevasse soils have poor potential for most urban uses because of occasional flooding. Moderate permeability is a moderate limitation for septic tank absorption fields in the Dardanelle soil. There are no significant limitations for septic tank absorption fields in Roxana soils where they are protected by a levee. Crevasse soils have moderate or severe limitations for septic tank absorption fields because of wetness or flooding. These limitations are difficult or expensive to overcome.

Broad land use considerations

Each year a considerable acreage is being developed for urban uses in Morrilton, Oppelo, Plumerville, and other areas in the county. The general soil map is helpful in planning the general outline of urban areas; it cannot, however, be used for the selection of sites for specific urban structures. Generally, the soils that have good potential for cultivated crops also have good potential for urban development. The data about specific soils in this survey area can be helpful in planning future land use patterns.

Areas where the soils have severe limitations for urban development are in the Moreland-Roellen and Guthrie-Barling-Spadra map units. These units are on flood plains that are subject to flooding and on which water occasionally is ponded. Also, urban development is very costly on some soils in the Muskogee-Wrightsville unit and on the steep, stony soils of the Mountainburg-Enders unit. The Linker-Mountainburg unit is made up of nearly level to moderately sloping soils in which hard bedrock is a few feet below the surface. Urban development is costly on these soils. The clayey soils of the Moreland-Roellen unit have poor potential for urban development because of wetness and high shrink-swell potential. The fragipan soils of the Leadvale-Taft unit have fair to poor potential for urban development because of low bearing strength and wetness.

Many areas of the county can be developed for urban uses with reasonable extra cost. These soils include parts of the Roxana-Crevasse-Dardanelle unit that are not subject to flooding; the Leadvale-Taft unit, where central sewer systems are available; and the nearly level and gently sloping areas in the Linker-Mountainburg unit. The Roxana-Crevasse-Dardanelle unit is excellent farmland; this potential should not be overlooked when broad land uses are considered.

In some areas, the soils have good potential for farming but poor potential for nonfarm uses. These are identified as the Guthrie-Barling-Spadra and Moreland-Roellen units on the general soil map. Flooding is a severe limitation for urban development in the Guthrie-Barling-Spadra unit and wetness is a severe limitation for nonfarm uses in the Moreland-Roellen unit. These soils, however, have good potential for farming, and many farmers have provided sufficient drainage for crops.

Vegetables and other specialty crops are suited to soils of the Roxana-Crevasse-Dardanelle unit. The Leadvale-Taft unit has good potential for pasture and hay crops. Soils in the Linker-Mountainburg unit are well drained and warm early in spring. Nurseries are also well suited to these well drained soils where depth to bedrock is not a limitation.

Most of the soils of the county have fair or good potential as woodland. The Guthrie-Barling-Spadra, Leadvale-Taft, Muskogee-Wrightsville, and Moreland-Roellen units contain wet soils, and harvesting is usually limited to drier seasons. The Roxana-Crevasse-Dardanelle unit has good potential for woodland but is mostly used for cultivated crops.

The less sloping areas of the Linker-Mountainburg unit have good potential as sites for parks and extensive recreation areas. Scattered hardwoods enhance the beauty of much of this unit. Undrained areas of the Guthrie-Barling-Spadra and Moreland-Roellen units are good nature study areas. All of these units provide habitat for many important species of wildlife.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Dardanelle series, for example, was named for the town of Dardanelle in Yell County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Linker fine sandy loam, 3 to 8 percent slopes, is one of several phases within the Linker series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes. A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Mountainburg-Rock outcrop complex, 3 to 20 percent slopes, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Rock outcrop is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

1—Barling silt loam, occasionally flooded. This deep, level, moderately well drained soil is on flood plains along tributaries of the Arkansas River. Slopes are 0 to 1 percent. The soil is flooded for brief periods during the period December to April, but no more often than once every 2 years. Individual areas range from about 40 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 16 inches thick. The subsoil is brown, mottled silt loam to a depth of 29 inches; mottled yellowish brown and gray silt loam to a depth of 42 inches; mottled gray, yellowish brown, and pale brown silt loam to a depth of 61 inches; and grayish brown, mottled silt loam to a depth of 77 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils, the somewhat poorly drained Taft soils, and the well drained Spadra soils. Also included are small, low areas of soils that are flooded for short periods more often than once every 2 years.

This soil is moderate in natural fertility and low in organic-matter content. Reaction ranges from strongly acid to slightly acid in the surface layer and from very strongly acid to slightly acid in the subsoil. Permeability is moderate, and available water capacity is high. The water table is seasonally at a depth of 1 to 4 feet.

This soil has good potential for the cultivated crops commonly grown in the county, but nearly all of the acreage is pasture. The principal cultivated crop is soybeans. Among the other suitable crops are cotton and small grain. Suitable pasture crops are bermudagrass, tall fescue, sericea lespedeza, white clover, and annual lespedeza. Excess water and occasional flooding delay farming operations for several days after some heavy rains. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for eastern cottonwood, American sycamore, shortleaf pine, loblolly pine, sweetgum, and cherrybark oak. There are only slight limitations to woodland use and management.

This soil has poor potential for most urban uses. Occasional flooding is a severe limitation for dwellings, roads, streets, industrial sites, and septic tank absorption fields. This limitation can be overcome only by major flood control and drainage measures. Capability unit IIw-1; woodland suitability group 2o7; pasture and hayland group 2A.

2—Cane fine sandy loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on convex hills and toe slopes. Individual areas range from 40 to 150 acres in size.

Typically, the surface layer is yellowish brown fine sandy loam about 5 inches thick. The subsoil is yellowish red, mottled silty clay loam to a depth of 20 inches; compact and brittle, red, mottled silty clay loam to a depth of 28 inches; silty clay loam mottled in shades of brown, red, and gray to a depth of 46 inches; and red, mottled silty clay loam to a depth of 78 inches or more.

Included with this soil in mapping are a few small areas of the well drained Linker soils. Also included are soils that are darker in the upper part of the subsoil and that have slopes of less than 3 percent.

This soil is low in natural fertility and organic-matter content. Reaction ranges from medium acid to very strongly acid except for the surface layer in limed areas. Permeability is moderate above and slow in the compact and brittle layer. Available water capacity is medium. The water table is from 24 to 36 inches below the surface during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. Soybeans is the principal crop. Among the other suitable crops are cotton, corn, and wheat. Most of the acreage is pasture. Suitable pasture plants are bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The firm, brittle layer in the subsoil restricts root penetration and slows the movement of water through the soil. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for loblolly pine, shortleaf pine, and sweetgum. There are no major limitations to woodland use or management.

This soil has fair potential for most urban uses. The seasonal high water table and low strength are moderate limitations for dwellings, streets, and industrial sites. The moderately slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations can be lessened through drainage to lower the water table and through proper design of the absorption field. Capability unit IIIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

3—Cane fine sandy loam, 8 to 12 percent slopes. This deep, moderately well drained, gently sloping soil is on rolling hills and moderately sloping hillsides and toe slopes. Individual areas range from 40 to 200 acres in size.

Typically, the surface layer is yellowish brown fine sandy loam about 5 inches thick. The subsoil is yellowish red, mottled silty clay loam to a depth of 20 inches; compact and brittle, red, mottled silty clay loam to a depth of 28 inches; silty clay loam mottled in shades of brown, red, and gray to a depth of 46 inches; and red, mottled silty clay loam to a depth of 78 inches or more.

Included with this soil in mapping are a few small areas of the well drained Enders, Linker, and Nella soils.

This soil is low in natural fertility and organic-matter content. Reaction ranges from medium acid to very strongly acid except for the surface layer in limed areas. Permeability is moderate above and slow in the compact and brittle layer. Available water capacity is medium.

This soil has fair potential for most crops commonly grown in the county. Soybeans is the principal crop. Among the other suitable crops are cotton, corn, and wheat. Most of the acreage is pasture. Suitable pasture plants are bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization, and tilth is easy to maintain. The firm, brittle layer in the subsoil restricts root penetration and slows the movement of water through the soil. Slope is also a limitation to crop production.

Potential is good for loblolly pine, shortleaf pine, and sweetgum. There are no major limitations to woodland use or management.

This soil has fair to poor potential for most urban uses. The seasonal high water table and low strength are moderate limitations for dwellings and streets. Slope is a severe limitation for industrial sites. The moderately slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations can be lessened through drainage to lower the water table and through proper design of the absorption field. Capability unit IVe-1; woodland suitability group 3o7; pasture and hayland group 8A.

4—Crevasse loamy fine sand. This deep, nearly level, excessively drained soil is on flood plains and low terraces along the Arkansas River. This soil is protected by a levee. Slopes are 0 to 3 percent. Individual areas range from 40 to 120 acres in size.

Typically, the surface layer is yellowish brown loamy fine sand about 7 inches thick. The underlying material is yellowish brown loamy fine sand to a depth of 19 inches, brownish yellow sand to a depth of 43 inches, dark yellowish brown loamy fine sand to a depth of 57 inches, and yellowish brown loamy fine sand to a depth of 67 inches or more.

Included with this soil in mapping are a few small areas of the well drained Dardanelle, Gallion, and Roxana soils.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid, and the underlying material is slightly acid or neutral. Permeability is rapid, and available water capacity is low.

This soil has poor potential for row crops. Nearly all of the acreage is in pasture. Suitable pasture plants are bahiagrass and bermudagrass. Crops respond well to fertilization, and tilth is easy to maintain. This soil is severely limited by droughtiness.

Potential is good for eastern cottonwood and American sycamore. There are no limitations to woodland use or management.

This soil has good potential for most urban uses. There are no limitations for houses, industrial sites, and roads and streets. Wetness is a moderate limitation for septic tank absorption fields. This limitation can be overcome through drainage. Capability unit IIIs-1; woodland suitability group 2s6; pasture and hayland group 3B.

5—Crevasse loamy fine sand, frequently flooded. This deep, nearly level to undulating, excessively drained soil is on flood plains and low terraces along the Arkansas River. This soil is not protected by a levee and is flooded frequently for brief periods during the period October through March. Slopes are 0 to 3 percent. Individual areas range from 40 to 160 acres in size.

Typically, the surface layer is yellowish brown loamy fine sand about 7 inches thick. The underlying material is yellowish brown loamy fine sand to a depth of 19 inches, brownish yellow sand to a depth of 43 inches, dark yellowish brown loamy fine sand to a depth of 57 inches, and yellowish brown loamy fine sand to a depth of 67 inches or more.

Included with this soil in mapping are a few small areas of the well drained Gallion and Roxana soils.

This soil is low in natural fertility and organic-matter content. The surface layer is slightly acid, and the underlying material is slightly acid or neutral. Permeability is rapid, and available water capacity is low.

This soil has poor potential for row crops. Nearly all of the acreage is woodland. Suitable pasture plants are bahiagrass and bermudagrass (fig. 1). Crops respond well to fertilization, and tilth is easy to maintain. Flooding is the main limitation for crop and pasture production.

Potential is good for eastern cottonwood and American sycamore. Frequent flooding is a moderate limitation to woodland use or management.

This soil has poor potential for all urban uses. Flooding is a severe limitation for streets, industrial sites, and septic tank absorption fields and can be overcome only by major flood control measures. Capability unit Vw-1; woodland suitability group 2s6; pasture and hayland group 3B.

6—Dardanelle silt loam. This deep, level to nearly level, well drained soil is on old natural levees within the flood plain of the Arkansas River. Levees protect this soil from flooding. Slopes are 0 to 2 percent. Individual areas range from 40 to 100 acres in size.

Typically, the surface layer is dark brown and dark reddish brown silt loam about 12 inches thick. The subsoil is dark reddish brown silt loam to a depth of 25 inches, reddish brown silty clay loam to a depth of 50 inches, and reddish brown silt loam to a depth of 67 inches or more.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Moreland soils and the well drained Roxana soils. Also included are small, low areas of soils that are flooded for short periods at least once every 2 years.

This soil is high in natural fertility and medium in organic-matter content. The surface layer and upper part of the subsoil range from medium acid to neutral, and the lower part of the subsoil ranges from medium acid to moderately alkaline. Permeability is moderate, and available water capacity is medium.

This soil has good potential for most crops commonly grown in the county. Nearly all of the acreage is cultivated. The principal crop is soybeans. Among the other suitable crops are cotton, corn, small grain, and truck crops. Suitable pasture plants are bahiagrass, bermudagrass, white clover, and tall fescue. Crops respond well to fertilization, and tilth is easy to maintain. There are no major limitations to crop production.

Potential is good for American sycamore, eastern cottonwood, black walnut, and sweetgum. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. Low strength for roads and streets and moderate shrink-swell potential for houses and industrial sites are the main limitations. These limitations can be overcome by proper design of roadbeds and proper housing foundations. Permeability is a moderate limitation for septic tank absorption fields. Capability unit I-1; woodland suitability group 1o4; pasture and hayland group 2A.

7—Enders gravelly fine sandy loam, 1 to 3 percent slopes. This deep, well drained, nearly level soil is on toe slopes and plateaus. Individual areas range from 40 to 100 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam and strong brown gravelly loam about 8 inches thick. The subsoil is yellowish red silty clay loam to a depth of 19 inches; yellowish red silty clay to a depth of 28 inches; mottled red, gray, and brownish yellow silty clay to a depth of 48 inches; and variegated red, gray, and yellowish red gravelly silty clay to a depth of 56 inches. The underlying material is yellowish brown weak laminar shale extending to a depth of 83 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils and the well drained Linker soils.

This soil is low in natural fertility and organic-matter content. The surface layer and subsoil range from strongly acid to extremely acid except for the surface layer in limed areas. Permeability is very slow, and available water capacity is medium. Runoff is medium, and the erosion hazard is moderate.

This soil has fair potential for row crops. Nearly all of the acreage is pasture. The principal crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Major limitations are the clayey subsoil and medium available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is fair for loblolly pine, shortleaf pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has poor potential for most urban uses. The clayey subsoil and high shrink-swell potential are severe limitations for streets, dwellings, and industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIe-2; woodland suitability group 4o1; pasture and hayland group 8C.

8—Enders gravelly fine sandy loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on ridgetops, side slopes, and plateaus. Individual areas range from 40 to 160 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam and strong brown gravelly loam about 8 inches thick. The subsoil is yellowish red silty clay loam to a depth of 19 inches; yellowish red silty clay to a depth of 28 inches; mottled red, gray, and brownish yellow silty clay to a depth of 48 inches; and variegated red, gray, and yellowish red gravelly silty clay to a depth of 56 inches. The underlying material is yellowish brown weak laminar shale extending to a depth of 83 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils and the well drained Linker and Mountainburg soils.

This soil is low in natural fertility and organic-matter content. The surface layer and subsoil range from strongly acid to extremely acid except for the surface layer in limed areas. Permeability is very slow, and available water capacity is medium. Runoff is medium, and the erosion hazard is moderate.

This soil has poor potential for row crops. Nearly all of the acreage is pasture. The principal crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Winter small grain can be grown. Major limitations are the clayey subsoil and medium available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potenial is fair for loblolly pine, shortleaf pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has poor potential for most urban uses. The clayey subsoil and high shrink-swell potential are severe limitations for streets, dwellings, and industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IVe-2; woodland suitability group 4o1; pasture and hayland group 8C.

9—Enders gravelly fine sandy loam, 8 to 12 percent slopes. This deep, well drained, moderately sloping soil is on ridgetops, side slopes, and plateaus. Individual areas range from 40 to 200 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam and strong brown gravelly loam about 8 inches thick. The subsoil is yellowish red silty clay loam to a depth of 19 inches; yellowish red silty clay to a depth of 28 inches; mottled red, gray, and brownish yellow silty clay to a depth of 48 inches; and variegated red, gray, and yellowish red gravelly silty clay to a depth of 56 inches. The underlying material is yellowish brown weak laminar shale extending to a depth of 83 inches or more.

Included with this soil in mapping are a few small areas of the well drained Linker, Mountainburg, and Nella soils.

This soil is low in natural fertility and organic-matter content. The surface layer and subsoil range from strongly acid to extremely acid except for the surface layer in limed areas. Permeability is very slow, and available water capacity is medium. Runoff is medium, and the erosion hazard is severe.

This soil has poor potential for row crops. Nearly all of the acreage is pasture. The principal crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Major limitations are the clayey subsoil and medium available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is fair for loblolly pine, shortleaf pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has poor potential for most urban uses. The clayey subsoil, high shrink-swell potential, and slope are severe limitations for streets, dwellings, and industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit VIe-1; woodland suitability group 4o1; pasture and hayland group 8C.

10—Enders gravelly fine sandy loam, 12 to 45 percent slopes. This deep, well drained, moderately steep to steep soil is on ridgetops and side slopes. Individual areas range from 40 to 200 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam and strong brown gravelly loam about 8 inches thick. The subsoil is yellowish red silty clay loam to a depth of 19 inches; yellowish red silty clay to a depth of 28 inches; mottled red, gray, and brownish yellow silty clay to a depth of 48 inches; and variegated red, gray, and yellowish red gravelly silty clay to a depth of 56 inches. The underlying material is yellowish brown weak laminar shale extending to a depth of 83 inches or more.

Included with this soil in mapping are a few small areas of the well drained Linker, Mountainburg, and Nella soils.

This soil is low in natural fertility and organic-matter content. The surface layer and subsoil range from strongly acid to extremely acid except for the surface layer in limed areas. Permeability is very slow, and available water capacity is medium. Runoff is medium, and the erosion hazard is severe.

This soil has very poor potential for row crops. Nearly all of the acreage is mixed hardwoods and pines with an understory of little bluestem (fig. 2). Suitable pasture crops are bahiagrass, sericea lespedeza, and annual lespedeza. Major limitations are slope, erosion hazard, the clayey subsoil, and medium available water capacity. Crops respond well to fertilization, and tilth is difficult to maintain.

Potential is fair for loblolly pine, shortleaf pine, and redcedar. Steep slopes limit the use of equipment. Steep slopes, the clayey subsoil, and medium available water capacity are the main limitations.

This soil has poor potential for most urban uses. The clayey subsoil, high shrink-swell potential, and slope are severe limitations for streets, dwellings, and industrial sites. Very slow permeability and slope are severe limitations for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit VIIe-1; woodland suitability group 4r3; pasture and hayland group 8D.

11—Gallion silt loam. This deep, level, well drained soil is on natural levees and low terraces of the Arkansas River. Levees protect the soil from flooding. Slopes are 0 to 1 percent. Individual areas range from 40 to 300 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is reddish brown silty clay loam to a depth of 21 inches, yellowish red silt loam to a depth of 32 inches, and yellowish red very fine sandy loam to a depth of 45 inches. The underlying material is reddish brown and yellowish red very fine sandy loam to a depth of 75 inches or more.

Included with this soil in mapping are a few small areas of the well drained Dardanelle soils, the somewhat poorly drained Moreland soils, and the well drained Roxana soils, and small areas of soils that are flooded less often than once every 2 years. Also included are small areas of soils that have a 10- to 15-inch surface layer of very fine sandy loam over very dark brown silt loam and areas of soils that are loam or clay loam in the lower part of the subsoil.

This soil is high in natural fertility and low in organic-matter content. The surface layer ranges from medium acid to neutral, and the subsoil and underlying material range from medium acid to moderately alkaline. Permeability is moderate, and available water capacity is high.

This soil has good potential for most crops commonly grown in the county. Nearly all of the acreage is cultivated. The principal crop is soybeans. Among the other suitable crops are cotton, corn, small grain, and truck crops. Suitable pasture plants are bahiagrass, bermudagrass, white clover, and tall fescue. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for eastern cottonwood, pecan, sweetgum, and American sycamore. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. Low strength and moderate shrink-swell potential for roads and streets and moderate shrink-swell potential for houses and industrial sites are the main limitations. Permeability is a moderate limitation for septic tank absorption fields. These limitations can be overcome by proper design of road beds and of building foundations. Capability unit I-1; woodland suitability group 2o4; pasture and hayland group 2A.

12—Guthrie silt loam, occasionally flooded. This deep, poorly drained, level to nearly level soil is on stream terraces and upland flats and in depressions. The soil is flooded for brief periods during the period January to April, but no more often than once every 2 years. Slopes are 0 to 2 percent. Individual areas range from 40 to 400 acres in size.

Typically, the surface layer is dark grayish brown, mottled silt loam about 8 inches thick. The subsoil is grayish brown, mottled silt loam to a depth of 17 inches; brittle gray, mottled silty clay loam to a depth of 47 inches; and gray, mottled silty clay loam to a depth of 84 inches or more.

Included with these soils in mapping are a few small areas of the moderately well drained Barling and Leadvale soils and the somewhat poorly drained Taft soils.

This soil is low in natural fertility and organic-matter content. It is very strongly acid except for the surface layer in limed areas. Permeability is slow, and available water capacity is medium. The water table is seasonally high, and this soil is wet during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. The main limitation is wetness; surface drains are needed. Most of the acreage is mixed hardwood (fig. 3). The principal row crop is soybeans. Suitable pasture crops are common bermudagrass, bahiagrass, white clover, sericea lespedeza, and tall fescue. Crops respond well to fertilization. If this soil is adequately drained and managed properly, row crops that leave large amounts of residue can be grown year after year.

Potential is good for eastern redcedar, sweetgum, and loblolly pine. Wetness is the main limitation to equipment use in managing and harvesting the trees, but this limitation is usually overcome by logging during the drier seasons.

This soil has poor potential for most urban and residential uses. Flooding and the seasonal high water table are severe limitations for dwellings, streets, and industrial sites. Flooding, slow permeability, and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations can be overcome by major flood control and drainage measures. Capability unit IVw-1; woodland suitability group 2w9; pasture and hayland group 8F.

13—Leadvale silt loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on slightly concave toe slopes, benches, and terraces. Individual areas range from 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is yellowish brown silt loam and silty clay loam to a depth of 22 inches; compact and brittle yellowish brown, mottled silty clay loam to a depth of 40 inches; and strong brown, mottled silty clay loam to a depth of 70 inches or more.

Included with this soil in mapping are a few small areas of the poorly drained Taft soils. Also included are small areas of soils that have redder colors in the upper part of the subsoil.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderately slow above and slow in the compact and brittle layer. Available water capacity is medium. The water table is between depths of 24 and 36 inches during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. Soybeans is the principal crop. Among the other suitable crops are cotton, corn, and wheat. Most of the area is pasture. Suitable pasture plants are bahiagrass, common bermudagrass, tall fescue, white clover, and sericea lespedeza. The firm, brittle layer in the subsoil restricts root penetration and slows the movement of water through the soil. Wetness is a major limitation because the water table is within 24 inches of the surface during winter and early spring. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for loblolly pine, shortleaf pine, and eastern redcedar. There are no major limitations to woodland use or management.

This soil has fair potential for most urban uses. The seasonal high water table and low strength are moderate limitations for dwellings and industrial sites. Low strength is a severe limitation for streets. The moderately slow permeability and seasonal high water table are severe limitations for septic tank absorption fields. These limitations can be lessened through proper design of the absorption field and through drainage to lower the water table. Capability unit IIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

14—Leadvale silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on slightly concave toe slopes, benches, and terraces (fig. 4). Individual areas range from 40 to 120 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is yellowish brown silt loam and silty clay loam to a depth of 22 inches; compact and brittle yellowish brown, mottled silty clay loam to a depth of 40 inches; and strong brown, mottled silty clay loam to a depth of 70 inches or more.

Included with this soil in mapping are a few small areas of the poorly drained Taft soils. Also included are small areas of soils that have redder colors in the upper part of the subsoil.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderately slow above and slow in the compact and brittle layer. Available water capacity is medium. The water table is perched during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. Soybeans is the principal crop. Among the other suitable crops are cotton, corn, and wheat. Most of the area is in pasture. Adapted pasture plants are bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization, and tilth is easy to maintain. The firm, brittle layer in the subsoil restricts root penetration and slows the movement of water through the soil.

Potential is good for loblolly pine, shortleaf pine, and eastern redcedar. There are no major limitations to woodland use or management.

This soil has fair potential for most urban uses. The seasonal high water table and low strength are moderate limitations for dwellings. Low strength is a severe limitation for streets, and low strength, seasonal high water table, and slope are moderate limitations for industrial sites. The moderately slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations can be lessened through drainage to lower the water table and through proper design of the absorption field. Capability unit IIIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

15—Linker fine sandy loam, 1 to 3 percent slopes. This moderately deep, well drained, nearly level soil is on mountaintops, lower side slopes, and benches. Individual areas range from 40 to 300 acres in size.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is strong brown fine sandy loam to a depth of 8 inches; red sandy clay loam to a depth of 18 inches; red clay loam to a depth of 28 inches; and red, mottled gravelly sandy clay loam to a depth of 38 inches. Hard sandstone bedrock is at a depth of 38 inches.

Included with this soil in mapping are a few small areas of the moderately well drained Cane soils and the well drained Mountainburg soils. Also included are small areas of soils that have a silty subsoil, areas of soils that are underlain by shale, and areas of soils that have darker colors in the subsoil.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is low.

This soil has fair potential for row crops and small grain. Nearly all of the acreage is pasture. The principal crops are common bermudagrass, bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza (fig. 5). The major limitations are depth to bedrock and low available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is fair for shortleaf pine, loblolly pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. Depth to bedrock is a moderate limitation for streets, dwellings, and industrial sites. Depth to bedrock is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIe-2; woodland suitability group 4o1; pasture and hayland group 8A.

16—Linker fine sandy loam, 3 to 8 percent slopes. This moderately deep, well drained, gently sloping soil is on mountaintops, upper side slopes, and benches. Individual areas range from 10 to 200 acres in size.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is strong brown fine sandy loam to a depth of 8 inches; red sandy clay loam to a depth of 18 inches; red clay loam to a depth of 28 inches; and red, mottled gravelly sandy clay loam to a depth of 38 inches. Hard sandstone bedrock is at a depth of 38 inches.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils and the well drained Mountainburg soils. Also included are small areas of soils that have a silty subsoil, areas of soils that are underlain by shale, and areas of soils that have darker colors in the subsoil.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is low.

This soil has fair potential for row crops and small grain. Nearly all of the acreage is pasture. The principal pasture crop is common bermudagrass (fig. 6). Other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitations are depth to bedrock and low available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is fair for shortleaf pine, loblolly pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. Depth to bedrock is a moderate limitation for streets and dwellings. Slope and depth to bedrock are severe limitations for industrial sites. Depth to bedrock is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIe-3; woodland suitability group 4o1; pasture and hayland group 8A.

17—Linker fine sandy loam, 8 to 12 percent slopes. This moderately deep, well drained, moderately sloping soil is on mountaintops, side slopes, and benches. Individual areas range from 30 to 300 acres in size.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is strong brown fine sandy loam to a depth of 8 inches; red sandy clay loam to a depth of 18 inches; red clay loam to a depth of 28 inches; and red, mottled gravelly sandy clay loam to a depth of 38 inches. Hard sandstone bedrock is at a depth of 38 inches.

Included with this soil in mapping are a few small areas of the moderately well drained Cane soils and the well drained Mountainburg soils. Also included are small areas of soils that have a silty subsoil, areas of soils that are underlain by shale, and areas of soils that have darker colors in the subsoil.

This soil is low in natural fertility and organic-matter content. It is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is low.

This soil has poor potential for row crops and small grain. Nearly all of the acreage is pasture. The principal crops are common bermudagrass, bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitations are depth to bedrock, slope, and available water capacity. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is fair for shortleaf pine, loblolly pine, and redcedar. There are no significant limitations to woodland use or management.

This soil has fair to poor potential for most urban uses. Depth to bedrock and slope are moderate limitations for streets and dwellings. Slope is a severe limitation for industrial sites. Depth to bedrock is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IVe-3; woodland suitability group 4o1; pasture and hayland group 8A.

18—McKamie silt loam, 1 to 3 percent slopes. This deep, well drained, nearly level soil is on dissected stream terraces. Individual areas range from 40 to 80 acres in size.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is brown, mottled silt loam to a depth of 8 inches. The subsoil is red, mottled silty clay to a depth of 19 inches and red and dark red clay to a depth of 43 inches. The underlying material is dark red silty clay to a depth of 63 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Muskogee soils.

This soil is high in natural fertility and low in organic-matter content. The surface layer and upper part of the subsoil range from strongly acid to slightly acid except for the surface layer in limed areas. The lower part of the subsoil and the underlying material are neutral to moderately alkaline. Permeability is very slow, and available water capacity is high. This soil is eroded easily.

This soil has fair potential for row crops. Most of the acreage is pasture. Suitable pasture crops include bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitation is a clayey subsoil that restricts root penetration and movement of water through the soil.

Potential is good for shortleaf pine. Erosion is a slight hazard to equipment use in harvesting the trees. The tight, clayey subsoil is the main limitation to the growth of the trees.

This soil has poor potential for most urban uses. High shrink-swell potential and low strength are severe limitations for dwellings, streets, and industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIe-2; woodland suitability group 3c2; pasture and hayland group 8C.

19—McKamie silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on dissected stream terraces. Individual areas range from 40 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is brown, mottled silt loam to a depth of 8 inches. The subsoil is red, mottled silty clay to a depth of 19 inches and red and dark red clay to a depth of 43 inches. The underlying material is dark red silty clay to a depth of 63 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Muskogee soils.

This soil is high in natural fertility and low in organic-matter content. The surface layer and upper part of the subsoil range from strongly acid to slightly acid except for the surface layer in limed areas. The lower part of the subsoil and the underlying material are neutral or moderately alkaline. Permeability is very slow, and available water capacity is high. This soil is eroded easily.

This soil has poor potential for row crops. Most of the acreage is pasture. Suitable pasture crops include bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Erosion is a severe hazard (fig. 7). The tight, clayey subsoil restricts root penetration and movement of water through the soil.

Potential is good for shortleaf pine. Erosion is a slight hazard to equipment use in harvesting the trees. The tight, clayey subsoil is the main limitation to the growth of trees.

This soil has poor potential for most urban uses. High shrink-swell potential and low strength are severe limitations for dwellings, streets, and industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult or impractical to overcome. Capability unit IVe-2; woodland suitability group 3c2; pasture and hayland group 8C.

20—McKamie silt loam, 8 to 12 percent slopes. This deep, well drained, moderately sloping soil is on stream terraces. Individual areas range from 40 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is brown, mottled silt loam to a depth of 8 inches. The subsoil is red, mottled silty clay to a depth of 19 inches and red and dark red clay to a depth of 43 inches. The underlying material is dark red silty clay to a depth of 63 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Muskogee soils. Also included are areas of severely eroded soils that are marked by rills and gullies.

This soil is high in natural fertility and low in organic-matter content. The surface layer and upper part of the subsoil range from strongly acid to slightly acid except for the surface layer in limed areas. The lower part of the subsoil and the underlying material are neutral to moderately alkaline. Permeability is very slow, and available water capacity is high. This soil is eroded easily.

This soil has poor potential for row crops. Most of the acreage is pasture. Suitable pasture crops include bahiagrass, common bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitation is the clayey subsoil. Erosion is a severe hazard. The tight, clayey subsoil restricts root penetration and water movement through the soil.

Potential is good for shortleaf pine. Erosion is a slight hazard to equipment use in managing and harvesting the trees. The tight, clayey subsoil is the main limitation to the growth of trees.

This soil has poor potential for most urban uses. High shrink-swell potential and low strength are severe limitations for dwellings, streets, and industrial sites. Slope is also a severe limitation for industrial sites. Very slow permeability is a severe limitation for septic tank absorption fields. These limitations are difficult to overcome. Capability unit VIe-1; woodland suitability group 3c2; pasture and hayland group 8C.

21—Moreland silty clay. This deep, somewhat poorly drained, level soil is in backswamps of the Arkansas River. Slopes are 0 to 1 percent. Individual areas range from 40 to 300 acres in size.

Typically, the surface layer is dark reddish brown silty clay about 10 inches thick. The subsoil is reddish brown, mottled silty clay to a depth of 37 inches and reddish brown, mottled silty clay loam to a depth of 64 inches or more.

Included with this soil in mapping are a few small areas of the well drained Gallion soils, the poorly drained Roellen soils, and the very poorly drained Yorktown soils. Also included are areas of soils that have a surface layer of clay and a few small areas of soils that are flooded for short periods less often than once every 2 years.

This soil is high in natural fertility and medium in organic-matter content. Reaction ranges from slightly acid to mildly alkaline in the surface layer and from neutral to moderately alkaline in the subsoil. Permeability is very slow, and available water capacity is high. When these soils dry, they crack; when wet, they expand. The water table is within 12 inches of the surface during winter and early spring.

This soil has good potential for most crops commonly grown in the county. Most of the acreage is cultivated. The principal crops are rice and soybeans. Among the other suitable crops are cotton and grain sorghum. Farming operations are commonly delayed several days after a rain because of excess water. Surface drainage may be needed. Suitable pasture crops include common bermudagrass, Coastal bermudagrass, tall fescue, white clover, and vetch. Crops respond well to fertilization. Tilth is difficult to maintain because of high clay content in the surface layer. Clods form on the surface if the soil is plowed when wet.

Potential is good for eastern cottonwood, American sycamore, and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the trees, but this limitation is usually overcome by logging during drier seasons.

This soil has poor potential for urban uses. Wetness, low strength, and shrink-swell potential are severe limitations for dwellings, streets, and industrial sites. Very slow permeability and the seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIw-1; woodland suitability group 2w6; pasture and hayland group 1A.

22—Mountainburg gravelly fine sandy loam, 3 to 8 percent slopes. This shallow, well drained, gently sloping soil is on ridgetops. It formed in hard, massive, horizontally bedded sandstone and interbedded shales. Individual areas range from 40 to 120 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown very gravelly fine sandy loam to a depth of 9 inches. The subsoil is strong brown very gravelly sandy clay loam to a depth of 16 inches. Hard, massive, sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are a few small areas of the well drained Enders and Linker soils. Also included are small areas of shale breaks.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid throughout except for the surface layer in limed areas. Permeability is moderately rapid, and available water capacity is very low.

This soil has poor potential for row crops, and nearly all of the acreage is pasture. The principal pasture crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitations are shallow depth to bedrock and very low available water capacity. Crops respond well to fertilization, but tilth is difficult to maintain because of the coarse fragments in the soil.

Potential is poor for shortleaf pine, loblolly pine, and redcedar. The restricted root zone and very low available water capacity cause a moderate mortality rate among seedlings.

This soil has poor potential for most urban uses. Depth to bedrock is a severe limitation for dwellings, streets, industrial sites, and septic tank absorption fields. This limitation can be overcome only by costly land reclamation efforts. Capability unit IVe-4; woodland suitability group 5d2; pasture and hayland group 14A.

23—Mountainburg gravelly fine sandy loam, 8 to 12 percent slopes. This shallow, well drained, moderately sloping soil is on ridgetops and hillsides. It formed in hard, massive, horizontally bedded sandstone with interbedded shales. Individual areas range from 40 to 160 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown very gravelly fine sandy loam to a depth of 9 inches. The subsoil is strong brown very gravelly sandy clay loam to a depth of 16 inches. Hard, massive, sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are a few small areas of the well drained Enders and Linker soils. Also included are small areas of shale breaks.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderately rapid, and available water capacity is very low.

This soil has poor potential for crops. Nearly all of the acreage is wooded. The soil has poor potential for pasture because of very low available water capacity and the high content of coarse fragments. Suitable pasture plants include tall fescue, bahiagrass, common bermudagrass, sericea lespedeza, and annual lespedeza. Runoff is rapid, and the hazard of erosion is severe. Management concerns include controlled grazing, fertilization, weed and brush control, and stone removal.

Potential is poor for shortleaf pine, loblolly pine, and redcedar. The restricted root zone and very low available water capacity cause a moderate mortality rate among seedlings.

This soil has poor potential for most urban uses. Depth to bedrock is a severe limitation for dwellings, streets, industrial sites, and septic tank absorption fields. Slope is also a severe limitation for industrial sites. This limitation can be overcome only by costly land reclamation efforts. Capability unit VIe-2; woodland suitability group 5d2; pasture and hayland group 14A.

24—Mountainburg stony fine sandy loam, 12 to 40 percent slopes. This shallow, well drained, moderately steep to steep soil is on ridgetops and hillsides. It formed in hard, massive, horizontally bedded sandstone with interbedded shales. Individual areas range from 40 to 600 acres in size.

Typically, the surface layer is dark brown stony fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown very stony fine sandy loam to a depth of 9 inches. The subsoil is strong brown very gravelly sandy clay loam to a depth of 16 inches. Hard, massive, sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are a few small areas of the well drained Enders and Linker soils. Also included are small areas of shale breaks.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderately rapid, and available water capacity is very low.

This soil has poor potential for row crops. Most of the acreage is woodland. The soil has poor potential for pasture because of the very low available water capacity and the high content of coarse fragments. Suitable pasture crops include tall fescue, bahiagrass, common bermudagrass, sericea lespedeza, and annual lespedeza. Runoff is rapid, and the hazard of erosion is severe. Management concerns include controlled grazing, fertilization, weed and brush control, and stone removal.

Potential is poor for shortleaf pine, loblolly pine, and redcedar. The restricted root zone and very low available water capacity cause a moderate mortality rate among seedlings. Stones and slope are severe limitations to equipment use in managing and harvesting the trees. The erosion hazard is severe because of slope.

This soil has poor potential for most urban uses. Slope, depth to bedrock, and large stones are severe limitations for dwellings, streets, industrial sites, and septic tank absorption fields. These limitations are difficult to overcome. Capability unit VIIs-1; woodland suitability group 5x3; pasture and hayland group 14B.

25—Mountainburg-Rock outcrop complex, 3 to 20 percent slopes. This unit consists of areas of well drained, gently sloping to moderately steep soils on ridgetops and hillsides intermingled with areas of rock outcrop (fig. 8). These areas are intermingled in such an irregular pattern that separate mapping was not justified at the scale used. The soil formed in hard, massive, horizontally bedded sandstone with interbedded shales. Individual areas range from 600 to 2,000 acres in size.

Typically, Mountainburg soils have a surface layer of dark brown gravelly fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown very gravelly fine sandy loam to a depth of 9 inches. The subsoil is strong brown, very gravelly sandy clay loam to a depth of 16 inches. Hard, massive, sandstone bedrock is at a depth of 16 inches.

Mountainburg gravelly fine sandy loam makes up about 45 percent of each mapped area. Rock outcrop also makes up about 45 percent of each area; it consists of barren rock or as much as 3 inches of sandy soil material and fragments weathered from sandstone. Vegetation is sparse, and growth has been stunted in areas of weathered soil material.

Included with this unit in mapping are a few small areas of the well drained Enders and Linker soils. Also included are small areas of shale breaks.

Mountainburg soils are low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid. Permeability is moderately rapid, and available water capacity is very low.

This unit is not suitable for crops. Nearly all of the acreage is scrub woodland. The soil has very poor potential for pasture because of the low available water capacity and the rock outcrops. Runoff is rapid, and the hazard of erosion is severe.

Potential is poor for shortleaf pine and eastern redcedar. The restricted root zone and very low available water capacity cause a moderate mortality rate among seedlings. Slope and rock outcrops are moderate limitations to equipment use in managing and harvesting the trees. The erosion hazard is severe because of slope.

This soil has very poor potential for most urban uses. Slopes, rock outcrops, and depth to bedrock are severe limitations for dwellings, streets, industrial sites, and septic tank absorption fields. These limitations are difficult to overcome. Capability unit VIIs-1; woodland suitability group 5d3; pasture and hayland group 14B.

26—Muskogee silt loam, 1 to 3 percent slopes. This deep, moderately well drained, nearly level soil is on high stream terraces. Individual areas range from 30 to 200 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is yellowish brown, mottled silt loam to a depth of 13 inches. The subsoil is yellowish brown silt loam to a depth of 23 inches; strong brown, mottled silty clay loam to a depth of 34 inches; yellowish red, mottled silty clay to a depth of 59 inches; and red, mottled clay to a depth of 81 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils, the well drained McKamie and Pickwick soils, and the poorly drained Wrightsville soils.

This soil is low in natural fertility and organic-matter content. It is medium acid to very strongly acid throughout except for the surface layer in limed areas. Permeability is slow, and available water capacity is high.

This soil has fair potential for most crops commonly grown in the county. The main row crops are soybeans, cotton, and small grain. Most of the acreage is pasture. The principal pasture crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitation is the clayey subsoil. The subsoil restricts root penetration and water movement through the soil. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for loblolly pine, sweetgum, water oak, shortleaf pine, and eastern redcedar. There are no significant limitations to woodland use and management.

This soil has poor potential for most urban uses. High shrink-swell potential, wetness, and low strength are severe limitations for dwellings, streets, and industrial sites. Slow permeability and wetness are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

27—Muskogee silt loam, 3 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on high stream terraces. Individual areas range from 40 to 200 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is yellowish brown, mottled silt loam to a depth of 13 inches. The subsoil is yellowish brown silt loam to a depth of 23 inches; strong brown, mottled silty clay loam to a depth of 34 inches; yellowish red, mottled silty clay to a depth of 59 inches; and red, mottled clay to a depth of 81 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Leadvale soils, the well drained McKamie and Pickwick soils, and the poorly drained Wrightsville soils.

This soil is low in natural fertility and organic-matter content. It is medium acid to very strongly acid throughout except for the surface layer in limed areas. Permeability is slow, and available water capacity is high.

This soil has fair potential for most crops commonly grown in the county. The main row crops are soybeans, cotton, and small grain. Most of the acreage is pasture. The principal pasture crop is common bermudagrass. Among the other suitable pasture crops are bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. The major limitation is the clayey subsoil. The subsoil restricts root penetration and water movement through the soil. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for loblolly pine, sweetgum, water oak, shortleaf pine, and eastern redcedar. There are no significant limitations to woodland use and management.

This soil has poor potential for most urban uses. High shrink-swell potential, wetness, and low strength are severe limitations for dwellings, streets, and industrial sites. Slow permeability and wetness are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

28—Nella gravelly fine sandy loam, 12 to 40 percent slopes. This deep, well drained, moderately steep to steep soil is on hillsides, foot slopes, and terraces. Individual areas range from 40 to 150 acres in size.

Typically, the surface layer is dark brown gravelly fine sandy loam about 1 inch thick. The subsurface layer is brown cobbly loam to a depth of 6 inches. The subsoil is yellowish brown cobbly loam to a depth of 20 inches; yellowish red, mottled cobbly clay loam to a depth of 54 inches; and red, mottled cobbly clay loam to a depth of 80 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Cane soils and the well drained Mountainburg soils.

This soil is low in natural fertility and organic-matter content. The surface layer and subsoil are strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is medium. Runoff is medium, and the erosion hazard is severe.

This soil has very poor potential for row crops. Nearly all of the acreage is mixed hardwoods with an understory of bluestem. Suitable pasture crops are bahiagrass, sericea lespedeza, and annual lespedeza. The major limitations are slopes, erosion hazard, small stones, and medium available water capacity. Crops respond well to fertilization, but tilth is difficult to maintain.

Potential is fair for loblolly pine, shortleaf pine, and eastern redcedar. Steep slopes limit the use of equipment. The erosion hazard is moderate because of slope.

This soil has poor potential for most urban uses. Slope is a severe limitation for streets, dwellings, industrial sites, and septic tank absorption fields. This limitation is difficult to overcome. Capability unit VIe-3; woodland suitability group 3x8; pasture and hayland group 8B.

29—Roellen silty clay. This deep, poorly drained, level soil is on low terraces on the flood plains. Slopes are 0 to 1 percent. These soils are occasionally flooded. Individual areas range from 40 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silty clay and very dark gray, mottled silty clay to a depth of 16 inches. The subsoil is dark gray, mottled silty clay to a depth of 37 inches. The underlying material is dark gray, mottled clay to a depth of 59 inches and dark gray silty clay loam to a depth of 92 inches or more. There are thin strata of silt loam below a depth of 59 inches.

Included with this soil in mapping are a few small areas of the well drained Gallion soils and the somewhat poorly drained Moreland soils.

This soil is low in natural fertility and organic-matter content. It ranges from slightly acid to mildly alkaline throughout. Permeability is slow, and available water capacity is high.

This soil has good potential for most crops commonly grown in the county. Most of the acreage is cultivated. The principal crops are rice and soybeans. Among the other suitable crops are cotton and small grain. Farming operations are commonly delayed several days after a rain because of excess water. Surface drainage is needed. Suitable pasture crops include common bermudagrass, Coastal bermudagrass, tall fescue, white clover, and vetch. Crops respond well to fertilization. Tilth is difficult to maintain because of high clay content in the surface layer. Clods form on the surface if the soil is plowed when wet.

Potential is good for eastern cottonwood, water oak, and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the trees, but this limitation is usually overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. Wetness, flooding, and shrink-swell potential are severe limitations for dwellings, streets, and industrial sites. Slow permeability, flooding, and seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIw-1; woodland suitability group 2w6; pasture and hayland group 1A.

30—Roxana very fine sandy loam, occasionally flooded. This deep, well drained, level to nearly level soil is on flood plains of the Arkansas River. It is not protected by a levee and is flooded less often than once every 2 years. Slopes are 0 to 2 percent. Individual areas range from 50 to 250 acres in size.

Typically, the surface layer is reddish brown very fine sandy loam about 5 inches thick. The underlying material is yellowish red very fine sandy loam to a depth of 21 inches and yellowish red silt loam to a depth of 76 inches or more.

Included with this soil in mapping are a few small areas of the well drained Gallion soils and areas of soils that have texture of fine sand to a depth of 40 inches or more. Also included are small, low areas of soils that are flooded for brief periods at least once every 2 years.

This soil is high in natural fertility and low in organic-matter content. Reaction is slightly acid in the surface layer except in limed areas and ranges from neutral to moderately alkaline in the underlying material. Permeability is moderate, and available water capacity is high.

This soil has good potential for most crops commonly grown in the county. Nearly all of the acreage is cultivated. The principal crops are soybeans and cotton. Among the other suitable crops are corn and small grain. Suitable pasture crops include bahiagrass, bermudagrass, and white clover. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for eastern cottonwood and American sycamore. There are no significant limitations to woodland use or management.

This soil has poor potential for most urban uses. Flooding is a severe limitation for dwellings, streets, industrial sites, and septic tank absorption fields. This limitation can be overcome only by major flood control measures. Capability unit IIw-2; woodland suitability group 1o4; pasture and hayland group 2A.

31—Roxana silt loam. This deep, well drained, level to nearly level soil is on flood plains of the Arkansas River. Levees protect the soil from flooding. Slopes are 0 to 2 percent. Individual areas range from 50 to 500 acres in size.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The underlying material is yellowish red very fine sandy loam to a depth of 21 inches and yellowish red silt loam to a depth of 76 inches or more.

Included with this soil in mapping are a few small areas of the well drained Dardanelle and Gallion soils and areas of soils that are flooded occasionally for short periods.

This soil is high in natural fertility and low in organic-matter content. Reaction is slightly acid in the surface layer except in limed areas and ranges from neutral to moderately alkaline in the underlying material. Permeability is moderate, and available water capacity is high.

This soil has good potential for most crops commonly grown in the county. Nearly all of the acreage is cultivated. The principal crops are soybeans and cotton. Among the other suitable crops are corn, small grain, and truck crops. Suitable pasture crops include bahiagrass, bermudagrass, and white clover.

Potential is good for eastern cottonwood and American sycamore. There are no significant limitations to woodland use or management.

This soil has good potential for most urban uses. Low strength for roads and streets and wetness for homes with basements are the main limitations. These limitations can be overcome by proper design of road beds and by keeping basement floors above a depth of 4 feet. There are no limitations for industrial sites or septic tank absorption fields. Capability unit I-1; woodland suitability group 1o4; pasture and hayland group 2A.

32—Sallisaw silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on local stream terraces. Individual areas range from 40 to 150 acres in size.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is yellowish brown silt loam to a depth of 7 inches. The subsoil is strong brown, mottled silty clay loam to a depth of 15 inches; yellowish red silty clay loam to a depth of 20 inches; reddish brown, mottled silty clay loam to a depth of 35 inches; mottled red, dark red, yellowish red, and light brownish gray silty clay loam to a depth of 51 inches; red, mottled clay loam to a depth of 65 inches; and red, mottled sandy clay loam to a depth of 82 inches or more.

Included with this soil in mapping are a few small areas of the well drained McKamie soils and the moderately well drained Muskogee soils.

This soil is moderate to low in natural fertility and low in organic-matter content. Reaction is slightly acid or medium acid in the surface layer except in limed areas and medium acid or strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium to high. The erosion hazard is severe.

This soil has good potential for most crops commonly grown in the county. Suitable crops are soybeans, cotton, corn, and small grain, but most of the acreage is bermudagrass pasture (fig. 9). Among the other suitable pasture crops are bahiagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for shortleaf pine, black walnut, and loblolly pine. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. The major limitation for streets, industrial sites, and dwellings is low strength. This limitation can be overcome with proper engineering design. The soil has only slight limitations for septic tank absorption fields. Capability unit IIIe-1; woodland suitability group 3o7; pasture and hayland group 8A.

33—Spadra fine sandy loam. This deep, well drained, level to nearly level soil is on stream terraces. Flooding is rare. Slopes range from 0 to 3 percent. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark yellowish brown fine sandy loam about 2 inches thick. The subsoil is dark brown loam to a depth of 29 inches and reddish brown, mottled loam to a depth of 51 inches. The underlying material is reddish brown, mottled loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Barling soils and the poorly drained Guthrie soils. Also included are small, low areas of soils that are flooded for brief periods less often than once every 2 years.

This soil is low in natural fertility and organic-matter content. Reaction is medium acid to very strongly acid throughout except for the surface layer in limed areas. Permeability is moderate, and available water capacity is high. Runoff is slow.

This soil has good potential for most crops commonly grown in the county. Most of the acreage is cropland. The principal crop is soybeans. Other suitable crops are corn and small grain. Suitable pasture crops include common bermudagrass, tall fescue, bahiagrass, white clover, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization, and tilth is easy to maintain.

Potential is good for loblolly pine, shortleaf pine, and southern red oak. There are no major limitations to woodland use or management.

This soil has poor potential for some urban uses. Flooding is a severe limitation for dwellings and industrial sites. This limitation can be overcome by flood control measures. The soil has fair potential for roads, streets, and septic tank absorption fields. Capability unit IIe-3; woodland suitability group 2o7; pasture and hayland group 2A.

34—Taft silt loam, 0 to 2 percent slopes. This deep, somewhat poorly drained, level to nearly level soil is on stream terraces and in depressions. Individual areas range from 40 to 80 acres in size.

Typically, the surface layer is brown silt loam about 3 inches thick. The subsurface layer is pale brown, mottled silt loam to a depth of 12 inches. The subsoil is yellowish brown, mottled silt loam to a depth of 27 inches; mottled yellowish brown, gray, and pale brown, compact and brittle silty clay loam to a depth of 67 inches; and mottled gray, yellowish brown, and yellowish red silty clay loam to a depth of 85 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Barling, Guthrie, and Leadvale soils. Also included are a few low mounds.

This soil is low in natural fertility and organic-matter content. Reaction is strongly acid or very strongly acid throughout except for the surface layer in limed areas. Permeability is slow, and available water capacity is medium. The water table is within 24 inches of the surface during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. Nearly all of the acreage is woodland. The principal cultivated crop is soybeans. Other suitable crops are cotton and small grain. Suitable pasture crops are bermudagrass, tall fescue, white clover, bahiagrass, sericea lespedeza, and annual lespedeza. Crops respond well to fertilization, and tilth is easy to maintain. A fragipan, 20 to 36 inches below the surface, restricts root penetration and movement of water through the soil.

Potential is good for shortleaf pine, sweetgum, and loblolly pine. Wetness is a moderate limitation to woodland use and management. This limitation can be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. The seasonal high water table is a severe limitation for dwellings, streets, and industrial sites. The slow permeability and seasonal high water table are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIw-2; woodland suitability group 3w8; pasture and hayland group 8F.

35—Wrightsville silt loam. This deep, poorly drained, level soil is on stream terraces in the Arkansas Valley. Slopes are 0 to 1 percent. Individual areas range from about 60 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer is grayish brown and light gray, mottled silt loam to a depth of 17 inches. The next layer is gray, mottled silty clay loam to a depth of 23 inches. The subsoil is gray and light brownish gray, mottled silty clay to a depth of 49 inches; light brownish gray, mottled silty clay loam to a depth of 62 inches; and gray, mottled silty clay loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Muskogee soils and a few areas of mounds.

This soil is low in natural fertility and organic-matter content. It ranges from extremely acid to medium acid throughout, except for the surface layer in limed areas. Permeability is very slow, and available water capacity is high. The water table is within 6 inches of the surface during winter and early spring.

This soil has fair potential for most crops commonly grown in the county. Most of the acreage is mixed hardwoods. The principal cultivated crop is soybeans. Suitable pasture plants are common bermudagrass, bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Crops respond well to fertilization. If this soil is adequately drained and managed properly, row crops that leave large amounts of residue can be grown year after year.

Potential is good for loblolly pine, water oak, and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the trees, but this limitation is usually overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. Low strength, shrink-swell potential, and seasonal high water table are severe limitations for dwellings, streets, and industrial sites. Wetness and slow permeability are severe limitations for septic tank absorption fields. These limitations are difficult to overcome. Capability unit IIIw-3; woodland suitability group 3w9; pasture and hayland group 8F.

36—Yorktown silty clay. This deep, very poorly drained, level soil is in an inundated backswamp of the Arkansas River. The soil is covered by 24 to 60 inches of water at least 10 months of each year. Slopes are 0 to 1 percent. Individual areas range from 80 to 500 acres in size.

Typically, the surface layer is gray, mottled silty clay about 12 inches thick. The subsoil is dark gray, mottled clay to a depth of 38 inches; gray, mottled clay to a depth of 48 inches; and dark reddish brown, mottled clay to a depth of 63 inches or more.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Moreland soils and the poorly drained Roellen soils. Also included are a few areas of soils that are covered with water for less than 10 months each year.

This soil is moderate in natural fertility and medium in organic-matter content. The surface layer and upper part of the subsoil range from medium acid to neutral, and the lower part of the subsoil is mildly alkaline. Permeability is very slow, and available water capacity is medium to high.

This soil has very poor potential for most crops commonly grown in the county. All of the acreage is idle and in scattered forest vegetation. The soil is not suited to cultivated crops because it is covered with water for at least 10 months each year.

Potential is fair for baldcypress and water tupelo. Wetness and standing water severely limit the use of equipment in managing and harvesting the trees (fig. 10). This limitation can be overcome only by using specialized equipment during the drier seasons.

This soil has very poor potential for urban uses. Wetness, standing water, and high shrink-swell potential are severe limitations to urban development. Capability unit

VIIw-1; woodland suitability group 4w9; not in a pasture and hayland group.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops, pasture, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

W. Wilson Ferguson, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the predicted yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 141,000 acres in the survey area was used for crops and pasture in 1967 (*5*). Of this total, 53,727 acres was used for permanent pasture and 88,098 acres for row crops, mainly soybeans.

The soils in Conway County have good potential for increased production of food. About 30,000 acres of potentially good cropland is currently used as rangeland or woodland, and about 46,000 acres as pasture. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can help facilitate the application of such technology.

Acreage in crops and pasture has gradually been decreasing as more and more land is used for urban development. In 1967 there were about 12,000 acres of urban and built-up land in the survey area; this figure has been growing at the rate of about 1,500 acres per year. The use of this soil survey to help make land use decisions that will influence the future role of farming in the survey area is discussed in the section "General soil map for broad land use planning."

Soil erosion is one of the major concerns on cropland and pasture in Conway County. If slope is more than 2 percent, erosion is a hazard. Enders, Linker, Mountainburg, McKamie, and Sallisaw soils, for example, have slopes of more than 2 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Enders, McKamie, and Muskogee soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include a fragipan, as in Cane, Guthrie, Leadvale, and Taft soils, or bedrock, as in Linker and Mountainburg soils. Erosion also reduces productivity on soils that tend to be droughty, such as Mountainburg soils. Second, soil erosion on farmland results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey or hardpan spots because the original friable surface soil has been eroded away. Such spots are common in areas of moderately eroded McKamie and Muskogee soils.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land and provide nitrogen and improve tilth for the following crop.

Contour tillage or terracing is not practical on some soils. On these soils, a cropping system that provides substantial vegetative cover is required to control erosion unless minimum tillage is practiced. Minimizing tillage and leaving crop residue on the surface help increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but they are more difficult to use successfully on the eroded soils and on the soils that have a clayey surface layer, such as Moreland and Roellen soils.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained or moderately well drained soils that have regular slopes, for example, Leadvale, Muskogee, and Sallisaw soils. The other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the terrace channels, a clayey subsoil which would be exposed in terrace channels, or bedrock at a depth of less than 40 inches.

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

Soil drainage is the major management need on some of the acreage used for crops and pasture in the survey area. This acreage includes the poorly drained Guthrie and Roellen soils and the somewhat poorly drained Wrightsville, Moreland, and Taft soils.

Enders and McKamie soils have good natural drainage most of the year, but they tend to dry out slowly after rains. Small areas of wetter soils along drainageways and in swales are commonly included in areas of the moderately well drained Cane, Leadvale, and Muskogee soils, especially those that have slopes of more than 2 percent. Artificial drainage is needed in some of these wetter areas.

Information on drainage design for each kind of soil is available in local offices of the Soil Conservation Service.

Soil fertility is naturally low in most soils on uplands in the survey area. The soils on flood plains, such as Gallion and Roxana soils, range from medium acid to neutral and are naturally higher in plant nutrients than most soils on uplands.

Many soils on uplands are very strongly acid in their natural state. If they have never been limed, applications of ground limestone are required to raise the pH level sufficiently for good growth of crops or pasture. Available phosphorus and potash levels are naturally low in most of these soils. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil 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 the survey area have a surface layer of silt loam that is light in color and low in content of organic matter. Generally the structure of such soils is weak, and intense rainfall causes the formation of a crust on the surface. When dry, the crust is hard and impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can help improve soil structure and reduce crust formation.

Fall plowing is generally not a good practice on the light colored soils that have a surface layer of silt loam because of the crust that forms during winter and spring. Many of the soils are nearly as dense and hard at planting time after fall plowing as they were before they were plowed. Also, some cropland consists of sloping soils that are subject to damaging erosion if they are plowed in the fall.

The dark colored Moreland and Roellen soils are clayey, and tilth is a concern because the soils often stay wet until late in spring. If they are wet when plowed, they tend to be very cloddy when dry; seedbeds are therefore difficult to prepare. Plowing such wet soils in fall generally results in good tilth in spring.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Cotton and corn are the row crops. Cucumbers, spinach, squash, potatoes, and similar crops can be grown if economic conditions are favorable.

Wheat and oats are the common close-growing crops. Grass seed is produced from bahiagrass, fescue, rye, and clover.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the survey area is used for melons, strawberries, sweet corn, tomatoes, and other vegetables and small fruits. In addition, large areas can be adapted to other special crops such as boysenberries, grapes, and many vegetables. Apples are the most important tree fruit grown in the survey area.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. In the survey area these are the Gallion, Dardanelle, Roxana, and Spadra soils that have slopes of less than 6 percent, and they total about 26,000 acres. Also, if irrigated, about 2,600 acres of Linker soils are suited to vegetables and small fruits. Crops can generally be planted and harvested earlier on all of these soils than on the other soils in the survey area.

When adequately drained, the moderately well drained soils in the county are well suited to a wide range of vegetable crops. Cane, Leadvale, and Muskogee soils make up about 63,000 acres in the survey area.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. Soils in low positions where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Coastal bermudagrass, common bermudagrass, and Pensacola bahiagrass are the summer perennials most commonly grown in the county. Coastal bermudagrass and Pensacola bahiagrass are fairly new to the county, but both produce good quality forage. Johnsongrass is also suited to many of the soils in the county. Tall fescue is the principal winter perennial grass now grown. Annual lespedeza and white clover are the most commonly grown legumes and are usually grown in combination with grass. Alfalfa is also grown on the fertile, well drained soils on the bottom land adjacent to the Arkansas River.

Proper grazing is essential for the production of high quality forage, stand survival, and erosion control. This includes maintaining sufficient topgrowth on the plants during the growing season to provide for vigorous healthy growth. It also excludes or restricts grazing of tall fescue in summer. Brush control is essential, and weed control is often needed.

Grass pastures respond well to nitrogen fertilizer. Pastures of grass and legume mixtures may require phosphate and potash fertilizers and lime at rates based on soil tests.

The soils of Conway County have been placed in ten pasture and hayland groups. These groups have been prepared to assist land users in the selection and management of suitable forage plants. The soils included in each group support similar kinds of forage plants and require similar treatment and management. Forage production for one soil in the group is essentially the same as production for other soils in the group, provided management and treatment are the same. The pasture and hayland groups are identified in the description of each soil map unit in the section, "Soil maps for detailed planning."

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. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils 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 included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability unit is identified in the description of each soil map unit in the section "Soil maps for detailed planning." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIe-1.

Woodland management and productivity

Originally, the land area of Conway County, except for river sandbars, was forest. Within the forest on the uplands were scattered tracts of savannah where open stands of trees had an understory of tall native grasses. By 1970, only about 137,500 acres, or about 38 percent of the county, was forest (*6*). Since that time, expansion of urban areas and of pasture and hayland has reduced this acreage.

Poor to fair stands of trees grow on the ridges of the county. Good stands grow in the valleys and on the flood plains. Needle-leaved forest types dominate the uplands, and broad-leaved types dominate the flood plains.

The value of wood products is significant, though it is below its potential. Other values of these areas include grazing, wildlife, recreation, natural beauty, and conservation of soil and water. This section explains how soils affect tree growth and management in the county.

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the woodland suitability group symbol for each soil is given. All soils bearing the same woodland suitability group symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *woodland suitability group*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

The third element in the symbol, a numeral, indicates the kind of trees for which the soils in the group are best suited and also indicates the severity of the hazard or limitation. The numerals 1, 2, and 3 indicate slight, moderate, and severe limitations, respectively, and suitability for needle-leaved trees. The numerals 4, 5, and 6 indicate slight, moderate, and severe limitations, respectively, and suitability for broad-leaved trees. The numerals 7, 8, and 9 indicate slight, moderate, and severe limitations, respectively, and suitability for both needle-leaved and broad-leaved trees.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

James L. Janski, assistant state conservation engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons areas are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials.

Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for 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 for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

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

Wildlife habitat

Paul M. Brady, biologist, Soil Conservation Service, helped prepare this section.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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 soybeans, grain sorghum, wheat, and millet.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties 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, panicgrasses, paspalums, bristlegrasses, lespedezas, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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 beggarweed, bluestem, lespedeza, pokeweed, ragweed, and cheatgrass.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of hardwood trees, shrubs, and vines are oak, hickory, beech, cherry, dogwood, maple, virburnum, grape, and honeysuckle.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cypress, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, pondweed, cattail, and rice cutgrass.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat 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 kinds of wildlife attracted to these areas include cottontail rabbit, bobwhite quail, mourning dove, meadowlark, and field sparrow.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, wood thrush, woodpeckers, squirrels, raccoon, gray fox, and whitetail deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

Wildlife attracted to these areas include ducks, geese, herons, muskrat, mink, kingfisher, and beaver.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture (*4*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 13. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have 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 clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*4*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Barling series

The Barling series consists of deep, moderately well drained, moderately permeable soils that formed in alluvium derived from residuum of siltstone, shale, and sandstone. These soils are on flood plains that are occasionally flooded for brief periods during late winter and early spring. The native vegetation was mixed hardwoods. Slopes are 0 to 1 percent.

Barling soils in this survey area are geographically associated with Guthrie, Leadvale, Spadra, and Taft soils. Guthrie soils, which are on lower terraces and in depressions, have a fragipan and are poorly drained. The nearly level and gently sloping Leadvale soils, which are on terraces, have a fragipan. Spadra soils, which are on higher stream terraces, are well drained and have a fine-loamy control section. Taft soils, which are on level to depressional terraces, have a fragipan and are somewhat poorly drained.

Typical pedon of Barling silt loam, occasionally flooded, in a cultivated area in the SE1/4SE1/4SE1/4 sec. 7, T. 7 N., R. 16 W.:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; few fine pores; medium acid; clear smooth boundary.

A1—8 to 16 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; strongly acid; gradual wavy boundary.

B21—16 to 29 inches; brown (10YR 5/3) silt loam; common medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; common black concretions; strongly acid; gradual wavy boundary.

B22—29 to 42 inches; mottled yellowish brown (10YR 5/4) and gray (10YR 6/1) silt loam; weak medium subangular blocky structure; friable; common black and brown concretions; few fine pores; very strongly acid; gradual wavy boundary.

B23—42 to 61 inches; mottled gray (10YR 6/1), yellowish brown (10YR 5/8), and pale brown (10YR 6/3) silt loam; weak medium subangular blocky structure; friable; common black and brown concretions; few fine pores; very strongly acid; gradual wavy boundary.

B24—61 to 77 inches; grayish brown (10YR 5/2) silt loam; common medium distinct dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine pores; very strongly acid.

Solum thickness is more than 60 inches. Reaction ranges from strongly acid to slightly acid in the A horizon and from slightly acid to very strongly acid in the B2 horizon. Depth to gray mottles ranges from 6 to 24 inches.

The A horizon has hue of 10YR with value of 4 or 5 and chroma of 3, or with value of 4 and chroma of 2.

The B21 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is mottled in shades of brown and gray. Texture is silt loam or loam.

The B22 horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6, and it is mottled in shades of brown and gray. The B23 and B24 horizons have hue of 10YR, value of 5 or 6, and chroma of 1 or 2, or they are mottled in shades of brown. Texture is silt loam or loam.

Cane series

The Cane series consists of deep, moderately well drained soils. Permeability is moderate above the fragipan and slow in the fragipan. These soils formed in colluvium, old alluvium, or valley fill from interbedded sandstone and shale. They are on convex slopes and toe slopes. The native vegetation was mixed pine and hardwoods. Slopes are 3 to 12 percent.

Cane soils in this survey area are geographically associated with Leadvale, Linker, and Nella soils. Leadvale soils, which are on lower terraces, have a fine-silty control section and are less red than Cane soils. Linker soils, which are on mountain plateaus, side slopes and benches, are well drained and lack a fragipan. Nella soils, which are on moderately steep to steep hillsides, lack a fragipan and are well drained.

Typical pedon of Cane fine sandy loam, 3 to 8 percent slopes, in a pasture in the SW1/4NW1/4SE1/4 sec. 15, T. 8 N., R. 17 W.:

Ap—0 to 5 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; friable; many fine roots; medium acid; gradual wavy boundary.

B2t—5 to 20 inches; yellowish red (5YR 5/8) silty clay loam; few fine faint light yellowish brown mottles; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few small black concretions; strongly acid; gradual wavy boundary.

Bx1—20 to 28 inches; red (2.5YR 4/8) silty clay loam; common medium distinct strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; very friable, compact and brittle; many thin patchy clay films on faces of peds; wedges of light gray (10YR 7/1) silt loam between prisms; few small black concretions; strongly acid; gradual wavy boundary.

Bx2—28 to 46 inches; mottled red (2.5YR 4/8), strong brown (7.5YR 5/6), and light gray (10YR 7/1) silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, compact and brittle; continuous clay films on faces of most peds; wedges of light gray (10YR 7/1) silt loam between prisms; few small pebbles of quartzite; few small black concretions; strongly acid; gradual wavy boundary.

B3—46 to 78 inches; red (2.5YR 4/8) silty clay loam; common medium distinct light gray (10YR 7/2) and yellowish brown (10YR 5/6) mottles; weak medium and coarse subangular blocky structure; firm; continuous clay films on faces of most peds; few quartzite pebbles; strongly acid.

Solum thickness is more than 60 inches. Reaction ranges from medium acid to very strongly acid except for the surface layer in limed areas. Depth to the fragipan ranges from 20 to 35 inches.

The A horizon has hue of 10YR or 7.5YR with value of 4 or 5 and chroma of 4 or with value of 5 and chroma of 6, or it has hue of 10YR, value of 4 or 5, and chroma of 3. Thickness ranges from 4 to 10 inches.

The B2t horizon has hue of 5YR, value of 4 or 5, and chroma of 4, 6, or 8. Texture is silty clay loam, clay loam, or sandy clay loam. The Bx horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is mottled in shades of brown and gray. Texture is silty clay loam or clay loam.

The B3 horizon has hue of 2.5YR, value of 4 or 5, and chroma of 8. It is mottled in shades of brown and gray. Texture is silty clay loam or clay loam.

Crevasse series

The Crevasse series consists of deep, excessively drained, rapidly permeable soils that formed in sandy alluvial sediments along the Arkansas River. The native vegetation was mixed hardwoods. Slopes are 0 to 3 percent.

Crevasse soils in this survey area are geographically associated with Dardanelle, Gallion, and Roxana soils. Dardanelle soils, which are on higher flood plains, have a mollic epipedon and a fine-silty control section. Gallion soils, which are on higher flood plains, have a fine-silty control section. Roxana soils, which are on higher flood plains, are well drained and have a coarse-silty control section.

Typical pedon of Crevasse loamy fine sand, frequently flooded, in a pasture in the SW1/4SW1/4SW1/4 sec. 8, T. 6 N., R. 17 W.:

A1—0 to 7 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

C1—7 to 19 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; loose; common fine roots; slightly acid; gradual smooth boundary.

C2—19 to 43 inches; brownish yellow (10YR 6/6) sand; single grained; loose; few fine roots; neutral; gradual smooth boundary.

C3—43 to 57 inches; dark yellowish brown (10YR 4/4) loamy fine sand; single grained; loose; few fine roots; neutral; gradual smooth boundary.

C4—57 to 67 inches; yellowish brown (10YR 5/6) loamy fine sand; single grained; loose; neutral.

Solum thickness is more than 4 feet. Reaction is slightly acid or neutral.

The A horizon has hue of 10YR with value of 4 or 5 and chroma of 2, or with value of 5 and chroma of 3.

The C horizon has hue of 10YR with value of 4 or 6 and chroma of 4, or with value of 5 or 6 and chroma of 6. Texture is sand, loamy fine sand, or loamy sand.

Dardanelle series

The Dardanelle series consists of deep, well drained, moderately permeable soils that formed from reddish brown alluvium along the bottom lands of the Arkansas River. The native vegetation was mixed hardwoods. Slopes are 0 to 2 percent.

Dardanelle soils in this survey area are geographically associated with Crevasse, Gallion, Moreland, and Roxana soils. Crevasse soils, which are on lower flood plains, lack a mollic epipedon and have a coarse textured control section. Gallion soils, which are on adjacent flood plains, lack a mollic epipedon. Moreland soils, which are on the lower parts of flood plains, are somewhat poorly drained, have a fine textured control section, and lack a mollic epipedon. Roxana soils, which are on adjacent flood plains, have a coarse-silty control section and lack a mollic epipedon.

Typical pedon of Dardanelle silt loam in the NE1/4NE1/4SW1/4 sec. 9, T. 6 N., R. 17 W.:

Ap—0 to 6 inches; dark brown (7.5YR 3/2) silt loam; weak very fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

A12—6 to 12 inches; dark reddish brown (5YR 3/2) silt loam; weak fine granular structure; friable; many fine roots; slightly acid; gradual wavy boundary.

B1—12 to 25 inches; dark reddish brown (5YR 3/2) silt loam; weak medium subangular blocky structure; friable; common fine roots; slightly acid; gradual smooth boundary.

B21t—25 to 34 inches; reddish brown (5YR 4/4) silty clay loam; dark reddish brown (5YR 3/2) streaks; moderate medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; few fine roots; neutral; gradual wavy boundary.

B22t—34 to 50 inches; reddish brown (5YR 4/4) silty clay loam; dark brown (7.5YR 3/2) coatings on peds; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; neutral; gradual wavy boundary.

B3—50 to 67 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; moderately alkaline.

Solum thickness ranges from 60 to 70 inches. Reaction of the A, B1, and B2 horizons ranges from medium acid to neutral, and reaction of the B3 horizon ranges from medium acid to moderately alkaline. Thickness of the mollic epipedon ranges from 20 to 40 inches.

The A horizon has hue of 10YR, 7.5YR, or 5YR, value of 3, and chroma of 2.

The B1 horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2, or it has hue of 5YR, value of 3, and chroma of 3. Texture is silt loam, clay loam, or silty clay loam.

The B2t horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4. Texture is silty clay loam or silt loam. The B3 horizon has colors similar to those of the B2t horizon and texture of silt loam or loam.

Enders series

The Enders series consists of deep, well drained, very slowly permeable soils that formed in a thin layer of loamy material and in clayey residuum weathered from shale or interbedded shale and sandstone. These soils are on crests and sides of dissected plateaus and ridges. The native vegetation was post oak, red oak, white oak, hickory, and shortleaf pine. Slopes are 1 to 45 percent.

Enders soils in this survey area are geographically associated with Leadvale, Linker, Mountainburg, and Nella soils. Leadvale soils, which are on low terraces, have a fragipan. Linker soils, which are on benches and mountain plateaus, are shallower to bedrock and less clayey than Enders soils. Mountainburg soils, which are on ridgetops and ledges, are less than 20 inches deep to bedrock. Nella soils, which are on the sides of steep hills and terraces, have a fine-loamy control section.

Typical pedon of Enders gravelly fine sandy loam, 12 to 45 percent slopes, in the SE1/4SW1/4NE1/4 sec. 6, T. 8 N., R. 15 W.:

A11—0 to 4 inches; dark brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; friable; many fine and medium roots; about 15 percent angular sandstone fragments 0.5 inch to 2 inches in diameter; strongly acid; clear smooth boundary.

A12—4 to 8 inches; strong brown (7.5YR 5/6) gravelly loam; weak medium granular structure; friable; many fine and medium roots; about 20 percent angular sandstone fragments 0.5 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

B21t—8 to 19 inches; yellowish red (5YR 5/8) silty clay loam; common fine faint pale brown mottles; moderate medium subangular blocky structure; friable; common patchy clay films on faces of peds; few small fragments of shale and sandstone; very strongly acid; gradual wavy boundary.

B22t—19 to 28 inches; yellowish red (5YR 5/8) silty clay; common medium distinct light gray (10YR 7/1) mottles; strong fine angular blocky structure; firm, sticky and plastic; common continuous clay films on faces of peds; common fine roots; few fine pores; few fragments of shale and sandstone; very strongly acid; gradual wavy boundary.

B23t—28 to 48 inches; mottled red (2.5YR 5/6), gray (10YR 6/1), and brownish yellow (10YR 6/6) silty clay; strong fine and coarse angular blocky structure; firm, sticky and plastic; common continuous clay films on faces of peds; few fine roots; common fragments of shale and sandstone; very strongly acid; gradual wavy boundary.

B3—48 to 56 inches; variegated red (2.5YR 4/6), gray (10YR 6/1), and yellowish red (5YR 5/6) gravelly silty clay; strong fine and coarse angular blocky structure; firm, sticky and plastic; discontinuous clay films on faces of peds; about 15 percent brittle shale fragments 0.5 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

Cr—56 to 83 inches; yellowish brown (10YR 5/6) weathered weakly laminar shale grading to hard laminar shale; common medium distinct red (2.5YR 4/6) mottles; common prominent distinct gray (10YR 6/1) mottles; fragments of shale easily crushed by hand; very strongly acid.

Solum thickness ranges from 32 to 59 inches. Reaction ranges from strongly acid to extremely acid throughout except for the surface layer in limed areas.

The A1 horizon has hue of 10YR with value of 2, 3, or 4 and chroma of 2, or with value of 3 or 4 and chroma of 3. The A12 horizon, where present, has hue of 10YR or 7.5YR with value of 4 or 5 and chroma of 4, or with value of 5 and chroma of 6.

The B21t, B22t, and B23t horizons have hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Texture is silty clay loam, silty clay, or clay. Few to common fine or medium mottles of pale brown and gray are in the lower part of the B2t horizon. The B3 horizon is mottled in shades of red, brown, and gray. Texture is gravelly silty clay or silty clay.

The Cr horizon is gray or yellowish brown. It is weakly weathered laminar shale grading to hard shale bedrock.

Gallion series

The Gallion series consists of deep, well drained, moderately permeable soils that formed in loamy alluvium on natural levees and low terraces of the Arkansas River. The native vegetation was mixed hardwoods. Slopes are 0 to 1 percent.

Gallion soils in this survey area are geographically associated with Crevasse, Dardanelle, Moreland, Roellen, and Roxana soils. Crevasse soils, which are on the lower parts of flood plains, are coarse textured throughout and have a sandy control section. Dardanelle soils, which are on adjacent flood plains, have a mollic epipedon. Moreland soils, which are on backswamps and the lower parts of flood plains, have a fine textured control section and are somewhat poorly drained. Roellen soils, which are on lower positions, are fine textured throughout and are poorly drained. Roxana soils, which are on the lower parts of flood plains, have a coarse-silty control section.

Typical pedon of Gallion silt loam in the NE1/4SW1/4SW1/4 sec. 30, T. 6 N., R. 15 W.:

Ap—0 to 7 inches; dark brown (7.5YR 4/2) silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; medium acid; abrupt smooth boundary.

B21t—7 to 21 inches; reddish brown (5YR 4/4) silty clay loam; compound weak coarse prismatic and moderate medium subangular blocky structure; firm; common fine pores; dark reddish brown (5YR 3/4) discontinuous clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—21 to 32 inches; yellowish red (5YR 4/6) silt loam; weak medium and coarse subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine pores; neutral; clear smooth boundary.

B3—32 to 45 inches; yellowish red (5YR 5/6) very fine sandy loam; weak medium and coarse subangular blocky structure; friable; few thin patchy clay films on faces of peds; few fine pores; neutral; gradual wavy boundary.

C1—45 to 60 inches; reddish brown (5YR 4/4) very fine sandy loam with lenses of loam 0.5 to 1 inch thick; weak medium and coarse subangular blocky structure; friable; common fine pores; neutral; clear smooth boundary.

C2—60 to 75 inches; yellowish red (5YR 4/6) very fine sandy loam with lenses of silt loam 0.5 to 1 inch wide; weak medium subangular blocky structure; friable; few fine pores; neutral.

Solum thickness ranges from 40 to 60 inches. Reaction ranges from medium acid to neutral in the A horizon and from medium acid to moderately alkaline in the B and C horizons.

The A horizon ranges from 6 to 12 inches in thickness. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3, or it has hue of 7.5YR, value of 4 or 5, and chroma of 2.

The B2t horizon has hue of 5YR, value of 3, 4, or 5, and chroma of 3 or 4, or it has hue of 5YR, value of 4 or 5, and chroma of 6. Texture is silt loam or silty clay loam. The B3 horizon has a similar range of color as the B2t horizon. Texture is silt loam, very fine sandy loam, or silty clay loam.

The C horizon has a similar range of color as the B horizon. It is stratified in some pedons.

Guthrie series

The Guthrie series consists of deep, poorly drained, slowly permeable soils that formed in loamy sediment derived from residuum of weathered sandstone and shale. These soils are in depressions and on low terraces and upland flats. They are saturated with water in late winter and early spring. The native vegetation was mixed hardwoods and pines. Slopes are 0 to 2 percent.

Guthrie soils in this survey area are geographically associated with Barling, Leadvale, Muskogee, McKamie, and Spadra soils. Barling soils, which are on flood plains, are moderately well drained and lack a fragipan. Leadvale soils, which are on higher terraces, are better drained and not so gray. Muskogee and McKamie soils, which are on higher terraces, are redder, better drained, and lack a fragipan. Spadra soils, which are on higher terraces, do not have a fragipan.

Typical pedon of Guthrie silt loam, occasionally flooded, in the NE1/4SW1/4NE1/4 of sec. 17, T. 7 N., R. 17 W.:

Ap—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; common medium faint yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; weak fine granular structure; friable; many roots; strongly acid; clear smooth boundary.

A2—3 to 8 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct light gray (10YR 7/1) and yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; common fine roots; strongly acid; clear smooth boundary.

B1—8 to 17 inches; grayish brown (10YR 5/2) silt loam; few fine faint pale brown and gray mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; very strongly acid; gradual smooth boundary.

Bx1—17 to 28 inches; gray (10YR 6/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/6) mottles; moderate coarse platy structure parting to moderate medium subangular blocky; brittle; thin patchy clay films on faces of peds; common black and brown accretions; very strongly acid; gradual smooth boundary.

Bx2—28 to 47 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate coarse platy structure parting to moderate medium subangular blocky; brittle, hard; thin patchy clay films on faces of peds; black and brown accretions; few vertical veins of gray silty clay 0.25 inch to 4 inches wide extend through horizon; very strongly acid; gradual smooth boundary.

B21tg—47 to 70 inches; gray (10YR 6/1) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few vertical veins of gray silty clay 0.25 to 0.5 inch wide extending through horizon; common patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22tg—70 to 84 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common continuous clay films on faces of peds; few vertical veins of gray silty clay 0.25 to 0.5 inch wide extending through horizon; very strongly acid.

Solum thickness is more than 60 inches. Reaction is very strongly acid except for the surface layer in limed areas.

Thickness of the A horizon ranges from 8 to 14 inches. The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1, 2, 3, or 4. It is mottled throughout.

The B1 horizon has hue of 10YR, value of 5, and chroma of 1 or 2. Mottles are in shades of brown and gray. The Bx horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is silty clay loam or silt loam. The Bx horizon has common distinct mottles in shades of brown and yellow. The B2 horizon has a similar range of color and texture as the Bx horizon.

Guthrie soils as mapped in Conway County are taxadjuncts to the Guthrie series because they have a fragipan at slightly less depth than defined in the range for the series. This difference, however, does not alter use and management.

Leadvale series

The Leadvale series consists of deep, moderately well drained soils. Permeability is moderately slow above the fragipan and slow in the fragipan. These soils formed in loamy materials on uplands or in local loamy alluvium from nearby uplands underlain largely by shale and siltstone. These soils are on slightly concave toe slopes, benches, and terraces. The native vegetation was mixed hardwoods. Slopes are 1 to 8 percent.

Leadvale soils in this survey area are geographically associated with Barling, Cane, Enders, Guthrie, Linker, Muskogee, and Taft soils. Barling soils, which are on flood plains, do not have a fragipan. Cane soils, which are on higher terraces, have a fine-loamy control section and redder colors. Enders soils, which are on higher side slopes, are clayey and do not have a fragipan. Guthrie soils, which are on lower terraces and in depressional areas, are poorly drained and grayer. Linker soils, which are on higher mountain plateaus, side slopes, and benches, are moderately deep to sandstone bedrock and lack a fragipan. Muskogee soils, which occur on high stream terraces, are more clayey and lack a fragipan. Taft soils, which are on lower terraces, lack an argillic horizon above the fragipan.

Typical pedon of Leadvale silt loam, 1 to 3 percent slopes, in the SW1/4NW1/4SE1/4 of sec. 18, T. 7 N., R. 16 W.:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B1—5 to 14 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine pores; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B21t—14 to 22 inches; yellowish brown (10YR 5/8) silty clay loam; few fine faint strong brown mottles; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; common fine roots; few fine black concretions; strongly acid; gradual wavy boundary.

Bx—22 to 40 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/8, 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable, compact and brittle; few discontinuous clay films on faces of peds; few fine streaks of gray silt; few fine black concretions; strongly acid; gradual wavy boundary.

B3—40 to 70 inches; strong brown (7.5YR 5/6) silty clay loam; many prominent distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; discontinuous clay films on faces of peds; very strongly acid.

Solum thickness ranges from 50 to more than 80 inches. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Depth ranges from 16 to 38 inches.

The A horizon ranges in thickness from 4 to 8 inches. It has hue of 10YR with value of 4, 5, or 6 and chroma of 3, or with value of 4 and chroma of 2.

The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 6 or 8, or it has hue of 7.5YR, value of 5, and chroma of 6 or 8. Texture is silt loam or silty clay loam. The Bx horizon has a similar range of color and texture as the B2t horizon. The Bx horizon has mottles in shades of brown and gray. It is compact and brittle.

The B3 horizon has hue of 7.5YR, value of 5, and chroma of 6. It is mottled gray silty clay loam or silty clay.

Linker series

The Linker series consists of moderately deep, well drained, moderately permeable soils that formed in loamy residuum weathered from sandstone. These soils are on mountain plateaus, lower side slopes, and benches. The native vegetation was mixed hardwoods. Slopes are 1 to 12 percent.

Linker soils in this survey area are geographically associated with Cane, Enders, Leadvale, and Mountainburg soils. Cane soils, which are on high terraces, are moderately well drained and have a fragipan. Enders soils, which are on side slopes and crests, are deeper and have clay content of more than 35 percent in the upper 20 inches of the B horizon. Leadvale soils, which are on low terraces, are deep and have a fragipan. Mountainburg soils, which occur on similar landscapes as Linker soils, are less than 20 inches deep and have coarse fragment content of more than 35 percent in the B horizon.

Typical pedon of Linker fine sandy loam, 3 to 8 percent slopes, in the SW1/4NW1/4SE1/4 sec. 32, T. 9 N., R. 15 W.:

Ap—0 to 4 inches; brown (7.5YR 5/4) fine sandy loam; weak medium granular structure; friable; common fine roots and pores; medium acid; clear smooth boundary.

B1—4 to 8 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots and pores; clay coats and bridgings on sand grains; few worm casts; medium acid; gradual wavy boundary.

B21t—8 to 18 inches; red (2.5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; common fine pores; patchy thin clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

B22t—18 to 28 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots and pores; clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—28 to 38 inches; red (2.5YR 4/8) gravelly sandy clay loam; few fine distinct pale brown and strong brown mottles; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; about 15 percent angular sandstone fragments 0.5 to 1 inch across; very strongly acid.

R—38 inches; hard massive level bedded acid sandstone bedrock.

Solum thickness ranges from 20 to 40 inches. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas.

The A horizon has hue of 10YR with value of 4 or 5 and chroma of 3, or with value of 4 and chroma of 4; or it has hue of 7.5YR, value of 4 or 5, and chroma of 4.

The B1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6. Texture is fine sandy loam or loam.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Texture is sandy clay loam or clay loam.

The B3 horizon has a similar range of color as the B2t horizon. Texture is sandy clay loam, clay loam, or gravelly sandy clay loam.

McKamie series

The McKamie series consists of deep, well drained, very slowly permeable soils that formed in clayey alluvium. These soils are on dissected stream terraces. The native vegetation was pine forest. Slopes are 1 to 12 percent.

McKamie soils in this survey area are geographically associated with Guthrie, Moreland, Muskogee, Sallisaw, and Wrightsville soils. Guthrie soils, which are on lower terraces, are grayer than McKamie soils and have a fragipan. Moreland soils, which are in backswamps, have a mollic surface layer and are somewhat poorly drained. Muskogee soils, which are on lower terraces, are mottled in the argillic horizons and are moderately well drained. Sallisaw soils, which are on adjacent terraces, have a fine-silty control section. Wrightsville soils, which are on lower terraces, are somewhat poorly drained.

Typical pedon of McKamie silt loam, 3 to 8 percent slopes, in the NW1/4NE1/4NE1/4 sec. 32, T. 7 N., R. 17 W.:

Ap—0 to 3 inches; dark brown (10YR 4/3) silt loam; weak medium and fine granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

A2—3 to 8 inches; brown (7.5YR 5/4) silt loam; few fine faint yellowish red and light yellowish brown mottles; weak medium subangular blocky structure; friable; common fine and medium roots; strongly acid; gradual wavy boundary.

B21t—8 to 19 inches; red (2.5YR 4/6) silty clay; common medium distinct light brown (7.5YR 6/4) mottles; moderate medium subangular blocky structure; common patchy clay films on faces of peds; few fine and medium roots; strongly acid; gradual wavy boundary.

B22t—19 to 33 inches; red (2.5YR 4/6) clay; few black stains; moderate medium subangular blocky structure; very firm, plastic and sticky; common patchy clay films on faces of peds; slightly acid; gradual wavy boundary.

B3—33 to 43 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; very firm, plastic and sticky; common black stains; few medium calcium carbonate concretions; moderately alkaline; gradual wavy boundary.

C—43 to 63 inches; dark red (2.5YR 3/6) silty clay; few fine faint pale brown mottles; moderate medium subangular blocky structure; very firm, plastic and sticky; common black stains and decayed roots; few small calcium carbonate concretions; moderately alkaline.

Solum thickness ranges from 36 to 60 inches. Reaction of the A horizon and the upper part of the B horizon ranges from strongly acid to slightly acid except for the surface layer in limed areas. The lower part of the B horizon and the C horizon are neutral to moderately alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4, or it has hue of 7.5YR, value of 4 or 5, and chroma of 4.

The B horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4, 6, or 8. Texture is silty clay or clay. Calcium carbonate concretions are in the lower part of the B2t horizon.

The C horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 6 or 8. Texture is silty clay loam or silty clay.

Moreland series

The Moreland series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey alluvium in back swamps of the Arkansas River. These soils have a seasonal high water table in late winter and early spring. The native vegetation was mixed hardwoods. Slopes are 0 to 1 percent.

Moreland soils in this survey area are geographically associated with Dardanelle, Gallion, McKamie, Roellen, Roxana, Wrightsville, and Yorktown soils. Dardanelle soils, which are on higher flood plains than Moreland soils, are coarser textured, are well drained, and lack gray mottles. Gallion soils, which are on higher bottom lands, have a fine-silty control section and are well drained. McKamie soils, which are on high terraces, lack a mollic surface layer and are well drained. Roellen soils, which are on lower flood plains and terraces, are poorly drained and have gleyed colors in the B horizon. Roxana soils, which are on higher flood plains, are coarse textured and lack a mollic epipedon and vertic properties. Wrightsville soils, which are in depressional areas of terraces and flats, have gray colors and are poorly drained. Yorktown soils, which are in low, ponded back swamps, have gleyed horizons.

Typical pedon of Moreland silty clay in the SE1/4SW1/4NW1/4 sec. 6, T. 6 N., R. 16 W.:

Ap—0 to 3 inches; dark reddish brown (5YR 3/2) silty clay; moderate fine granular structure; firm; many fine roots; slightly acid; clear smooth boundary.

A1—3 to 10 inches; dark reddish brown (5YR 3/3) silty clay; few fine faint yellowish red mottles; moderate fine subangular blocky structure; firm; common fine roots; few soft black bodies; pressure faces on peds; slightly acid; gradual wavy boundary.

B1—10 to 25 inches; reddish brown (5YR 4/4) silty clay; few fine faint brown mottles; strong fine angular blocky structure; firm; distinct slickensides; common fine black concretions; neutral; gradual wavy boundary.

B2—25 to 37 inches; reddish brown (5YR 4/4) silty clay; few fine faint brown mottles; strong fine angular blocky structure; firm; distinct slickensides; common fine black concretions; mildly alkaline; gradual wavy boundary.

B3—37 to 64 inches; reddish brown (5YR 4/4) silty clay loam; few fine faint dark grayish brown mottles; weak coarse angular blocky structure; firm; few slickensides; mildly alkaline.

Depth to calcareous layers ranges from 10 to less than 40 inches. Reaction ranges from slightly acid to mildly alkaline in the A horizon and from neutral to moderately alkaline in the B horizon. Slickensides are present within 40 inches of the surface.

The A horizon has hue of 5YR, value of 3, and chroma of 2 or 3.

The B1 and B2 horizons have hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 3, or it has hue of 5YR, value of 4, and chroma of 4. Texture is silty clay or clay. The B2 horizon has few fine, faint mottles of brown and gray. The B3 horizon has hue of 5YR, value of 4, and chroma of 3 or 4. It is mottled silty clay loam or silty clay.

Mountainburg series

The Mountainburg series consists of shallow, well drained, moderately rapidly permeable soils that formed in residuum weathered from hard, massive, horizontally bedded sandstone with interbedded shales. This soil is gently sloping to steep and occupies ledges, ridgetops, and benches. The native vegetation was mixed hardwoods. Slopes are 3 to 40 percent.

Mountainburg soils in this survey area are geographically associated with Enders, Linker, and Nella soils. Enders soils, which are on adjacent side slopes, have a clayey control section and are deeper to bedrock than Mountainburg soils. Linker soils, which are on benches and plateaus, are moderately deep over bedrock and are nonskeletal. Nella soils, which are on terraces, are deep and have a fine-loamy control section.

Typical pedon of Mountainburg stony fine sandy loam, 12 to 40 percent slopes, in the NE1/4NE1/4SW1/4 sec. 9, T. 9 N., R. 17 W.:

A1—0 to 5 inches; dark brown (10YR 3/3) stony fine sandy loam; weak medium granular structure; friable; many fine and medium roots; 25 percent by volume fragments of sandstone ranging from 0.25 inch to 12 inches in diameter; strongly acid; clear smooth boundary.

A2—5 to 9 inches; yellowish brown (10YR 5/6) very stony fine sandy loam; weak medium granular structure; friable; common fine and medium roots; few fine pores; 35 percent by volume fragments of sandstone ranging from 0.25 inch to 12 inches or more in diameter; strongly acid; gradual wavy boundary.

B2t—9 to 16 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; few patchy clay films on faces of peds; 40 percent by volume fragments of sandstone ranging from 0.25 inch to 8 inches or more in diameter; very strongly acid; abrupt irregular boundary.

R—16 inches; hard level bedded sandstone bedrock.

Solum thickness ranges from 12 to 20 inches. Reaction is strongly acid or very strongly acid throughout except for the surface layer in limed areas.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Texture is gravelly fine sandy loam or stony fine sandy loam. The A2 horizon has hue of 10YR with value of 4 or 5 and chroma of 3, or with value of 5 and chroma of 6. Texture is very stony, very gravelly, gravelly, or stony fine sandy loam. Content of coarse fragments ranges from 15 to 60 percent, by volume, in the A horizon.

The B2t horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6, or it has hue of 5YR, value of 4, and chroma of 8. Texture is very gravelly sandy clay loam or very gravelly loam. Content of coarse fragments in the B horizon ranges from 35 to 50 percent. The underlying material is hard, massive, sandstone bedrock.

Muskogee series

The Muskogee series consists of deep, moderately well drained, slowly permeable soils that formed in thin, loamy material over clayey alluvium. These soils are on stream terraces. The native vegetation was mixed hardwoods. Slopes are 1 to 8 percent.

Muskogee soils in this survey area are geographically associated with Guthrie, Leadvale, McKamie, Sallisaw, and Wrightsville soils. Guthrie soils, which are on lower terraces, are gray and have a fragipan. Leadvale soils, which occur on slightly higher terraces and foot slopes, are less clayey and have a fragipan. McKamie soils, which are on slightly lower terraces, are more clayey and well drained. Sallisaw soils, which are on higher terraces, are redder and well drained. Wrightsville soils, which are on lower terraces, are grayer and poorly drained.

Typical pedon of Muskogee silt loam, 1 to 3 percent slopes, in the NW1/4SW1/4NW1/4 sec. 25, T. 6 N., R. 16 W.:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; moderate medium granular structure; friable; many fine roots; common fine pores; medium acid; clear smooth boundary.

A2—6 to 13 inches; yellowish brown (10YR 5/4) silt loam; few fine faint brownish yellowish mottles; weak fine subangular blocky structure; friable; many fine roots; common fine pores; medium acid; gradual wavy boundary.

B1—13 to 23 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine roots and pores; very strongly acid; gradual wavy boundary.

B21t—23 to 34 inches; strong brown (7.5YR 5/8) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common patchy clay films on faces of peds; few fine roots and pores; very strongly acid; gradual wavy boundary.

B22t—34 to 59 inches; yellowish red (5YR 5/6) silty clay; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; continuous clay films on faces of peds; few fine roots and pores; very strongly acid; gradual wavy boundary.

B23t—59 to 81 inches; red (2.5YR 4/6) clay; few medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; very firm, sticky, plastic; continuous clay films on faces of peds; few fine roots; few fine pores; common soft black concretions; medium acid.

Solum thickness is more than 60 inches. Reaction ranges from medium acid to very strongly acid throughout except for the surface layer in limed areas.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 2, 3, or 4.

The B1 horizon has hue of 10YR, value of 5 or 6, and chroma of 4 or 6. Texture is silt loam or silty clay loam.

The B21t horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8, or it has hue of 10YR, value of 5, and chroma of 4. Texture is silty clay loam or silt loam. The B21t horizon has fine or medium mottles having chroma of 2 or less.

The B22t and B23t horizons have hue of 5YR and 2.5YR, value of 4, and chroma of 6, or it has hue of 2.5YR, value of 5, and chroma of 6. Texture is silty clay or clay. In some pedons red colors are dominant.

Nella series

The Nella series consists of deep, well drained, moderately permeable soils that formed in loamy alluvium or colluvium underlain by sandstone or shale or by residuum from these rocks. These soils are on hillsides, foot slopes, or terraces. The native vegetation was chiefly oaks, hickories, yellow-poplar, beech, and pine. Slopes are 12 to 40 percent.

Nella soils in this survey area are geographically associated with Cane, Enders, and Mountainburg soils. Cane soils, which are on low terraces, have a fragipan and are moderately well drained. Enders soils, which are on crests and side slopes, have a clayey control section. Mountainburg soils, which are on steep ridgetops, are less than 20 inches to bedrock and have a loamy-skeletal control section.

Typical pedon of Nella gravelly fine sandy loam, 12 to 40 percent slopes, in the SW1/4NE1/4NE1/4 sec. 19, T. 8 N., R. 16 W.:

A1—0 to 1 inch; dark brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; friable; many fine and medium roots; about 15 percent angular sandstone fragments 0.25 inch to 3 inches in diameter; strongly acid; clear smooth boundary.

A2—1 to 6 inches; brown (10YR 5/3) cobbly loam; weak medium and fine granular structure; friable; many fine and medium roots; about 15 percent angular sandstone fragments as much as 4 inches in diameter; strongly acid; gradual wavy boundary.

B1—6 to 20 inches; yellowish brown (10YR 5/6) cobbly loam; weak medium and fine subangular blocky structure; common fine and medium roots; about 20 percent angular sandstone fragments and cobbles as much as 4 inches in diameter; few thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B21t—20 to 38 inches; yellowish red (5YR 5/8) cobbly clay loam; few fine faint pale brown mottles; moderate medium subangular blocky structure; few fine and medium roots; thin patchy clay films on faces of peds; about 20 percent angular sandstone fragments and cobbles as much as 5 inches in diameter; very strongly acid; gradual wavy boundary.

B22t—38 to 54 inches; yellowish red (5YR 5/6) cobbly clay loam; few fine faint dark red and pale brown mottles; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few fine and medium roots; about 20 percent angular sandstone fragments as much as 4 inches in diameter; very strongly acid; gradual wavy boundary.

B23t—54 to 80 inches; red (2.5YR 4/6) cobbly clay loam; common medium distinct light gray and yellowish brown mottles; weak medium subangular blocky structure; friable; common discontinuous clay films on faces of peds; few fine and medium roots; about 20 percent angular sandstone fragments as much as 5 inches in diameter and brittle weathered sandstone; very strongly acid.

Solum thickness ranges from 60 to 80 inches. Reaction is strongly acid to very strongly acid throughout except for the surface layer in limed areas.

The A horizon has hue of 10YR with value of 4, 5, or 6 and chroma of 3, or with value of 5 and chroma of 6 or 8. Texture of the A2 horizon is cobbly loam or cobbly fine sandy loam.

The B1 horizon has hue of 10YR, value of 5, and chroma of 4, 6, or 8. Texture is clay loam, sandy clay loam, or cobbly loam.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Texture is sandy clay loam or cobbly clay loam. There are mottles in shades of brown, red, and gray in the lower part of the B2t horizon.

Roellen series

The Roellen series consists of deep, poorly drained, slowly permeable soils that formed in clayey alluvium on flood plains and low terraces. The native vegetation was mixed hardwoods. Slopes are 0 to 1 percent.

Roellen soils in this survey area are geographically associated with Gallion, Moreland, and Yorktown soils. The well drained Gallion soils, which are on natural levees, have a fine-silty control section. The somewhat poorly drained Moreland soils, which are on slightly higher flood plains and terraces, lack gleyed colors in the B horizon and are somewhat poorly drained. The very poorly drained Yorktown soils, which are on lower bottoms, are covered with water at least 10 months of each year.

Typical pedon of Roellen silty clay in the SE1/4NW1/4SE1/4 sec. 3, T. 6 N., R. 17 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay; moderate medium granular structure; friable; slightly acid; clear smooth boundary.

A12—8 to 16 inches; very dark gray (10YR 3/1) silty clay; common medium faint dark brown (7.5YR 4/2) mottles; reddish brown coating in root holes; moderate medium subangular blocky structure; firm; few slickensides; slightly acid; clear smooth boundary.

Bg—16 to 37 inches; dark gray (10YR 4/1) silty clay; common medium distinct dark reddish brown (5YR 3/2) mottles; moderate medium subangular blocky structure; firm, plastic, sticky; few slickensides; neutral; gradual wavy boundary.

Cg—37 to 59 inches; dark gray (10YR 4/1) clay; common medium distinct dark reddish gray (5YR 4/2) and reddish brown (5YR 4/4) mottles; massive; plastic; neutral; gradual smooth boundary.

IIC—59 to 92 inches; dark gray (10YR 4/1) silty clay loam; thin stratum of yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; friable silt strata; neutral.

Solum thickness is more than 60 inches. Reaction ranges from slightly acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 3, and chroma of 1 or 2. The A12 horizon has similar color as the Ap horizon.

The Bg and Cg horizons have hue of 10YR, value of 4, 5, or 6, and chroma of 1 or 2. Texture is silty clay or clay. There are few to many mottles of higher chroma.

The IIC horizon has similar color as the Bg and Cg horizons. Texture is silty clay loam or clay loam.

Roxana series

The Roxana series consists of deep, well drained, moderately permeable soils that formed in stratified, loamy alluvium on level to nearly level flood plains of the Arkansas River. The native vegetation was pecan, cottonwood, and willow. Slopes are 0 to 2 percent.

Roxana soils in this survey area are geographically associated with Crevasse, Dardanelle, Gallion, Moreland, and Yorktown soils. Crevasse soils, which are on lower flood plains than Roxana soils, are excessively drained and are coarser textured throughout. Dardanelle soils, which are on adjacent flood plains, have a fine-silty control section and a mollic epipedon. Gallion soils, which are on slightly higher flood plains, have a fine-silty control section. Moreland soils, which are in backswamp areas, have a mollic epipedon, are clayey, and have vertic properties. Yorktown soils, which are in backswamps and old river cutoffs, are inundated at least 10 months of the year.

Typical profile of Roxana silt loam in the SW1/4SW1/4NE1/4 sec. 32, T. 6 N., R. 15 W.:

A1—0 to 5 inches; reddish brown (5YR 4/4) silt loam; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

C1—5 to 21 inches; yellowish red (5YR 4/6) very fine sandy loam; massive; distinct remnants of bedding planes throughout; very friable; few fine roots; mildly alkaline; clear smooth boundary.

C2—21 to 46 inches; yellowish red (5YR 4/6) silt loam; massive; very friable; few fine roots; few thin bedding planes; mildly alkaline; clear smooth boundary.

C3—46 to 61 inches; yellowish red (5YR 5/6) silt loam; massive; very friable; few fine roots; few thin bedding planes; moderately alkaline; clear smooth boundary.

C4—61 to 76 inches; yellowish red (5YR 4/6) silt loam; massive; very friable; few remnants of bedding planes; moderately alkaline; calcareous.

Bedding planes are evident in the 10- to 40-inch control section. Reaction is slightly acid in the A horizon and ranges from neutral to moderately alkaline in the C horizon.

The A horizon ranges from 3 to 6 inches in thickness. It has hue of 5YR, value of 3 or 4, and chroma of 4. Texture is silt loam or very fine sandy loam.

The C horizon is stratified and has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. Textures are very fine sandy loam, silt loam, or loamy very fine sand. Some pedons have a buried A horizon at a depth of 30 inches or more.

Sallisaw series

The Sallisaw series consists of deep, well drained, moderately permeable soils that formed in loamy sediments and in gravel on gently sloping stream terraces. The native vegetation was mixed hardwoods. Slopes are 3 to 8 percent.

Sallisaw soils in this survey area are geographically associated with McKamie and Muskogee soils. McKamie soils, which are adjacent to Sallisaw soils, have a fine control section. Muskogee soils, which are on lower terraces, have mottles with chroma of 2 or less and are moderately well drained.

Typical pedon of Sallisaw silt loam, 3 to 8 percent slopes, in the NE1/4SE1/4NE1/4 sec. 31, T. 7 N., R. 17 W.:

Ap—0 to 3 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium granular structure; friable; many fine roots; few worm casts; common fine pores; slightly acid; clear smooth boundary.

B21t—7 to 15 inches; strong brown (7.5YR 5/6) silty clay loam; few fine faint yellowish brown mottles; moderate fine subangular blocky structure; friable; common fine roots and pores; thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—15 to 20 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common fine roots and pores; strongly acid; gradual wavy boundary.

B23t—20 to 35 inches; reddish brown (5YR 4/4) silty clay loam; few medium distinct red (2.5YR 4/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; some dusky red and reddish brown coatings on peds; few fine roots and pores; about 5 percent by volume gravel; few fine black concretions; strongly acid; gradual wavy boundary.

B24t—35 to 51 inches; mottled red (2.5YR 4/6), dark red (2.5YR 3/6), yellowish red (5YR 4/6), and light brownish gray (10YR 6/2) silty clay loam; strong fine subangular blocky structure; firm; thin patchy clay films on faces of peds; few fine roots and pores; about 5 percent by volume gravel; strongly acid; gradual wavy boundary.

B25t—51 to 65 inches; red (2.5YR 4/6) clay loam; common medium distinct strong brown (7.5YR 5/6) and few fine faint light gray mottles; few lenses of brown; strong fine subangular blocky structure; firm; thin patchy clay films on faces of peds; few fine pores; strongly acid; gradual wavy boundary.

B3—65 to 82 inches; red (2.5YR 4/6) sandy clay loam; common medium distinct light gray (10YR 7/1), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable; few fine pores; strongly acid.

Solum thickness is more than 5 feet. Reaction is slightly acid or medium acid in the A horizon except in limed areas, and medium acid or strongly acid in the B horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4, or it has hue of 7.5YR, value of 4 or 5, and chroma of 2, 3, or 4.

The B2t horizon has hue of 7.5YR, value of 5, and chroma of 4 or 6, or it has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. Texture is silty clay loam or clay loam.

The B3 horizon has the same color range as the B2t horizon. Texture is sandy clay loam, clay loam, or silty clay loam.

Spadra series

The Spadra series consists of deep, well drained, moderately permeable soils that formed in loamy alluvial material weathered from sandstone, siltstone, and shale.

These nearly level soils are on stream terraces. Brief flooding may occur after heavy rains. The native vegetation was mixed hardwoods and shortleaf pine. Slopes are 0 to 3 percent.

Spadra soils in this survey area are geographically associated with Barling and Guthrie soils. Barling soils, which are on flood plains, are moderately well drained and have a coarse-silty control section. Guthrie soils, which are in depressions in terraces, have a fragipan.

Typical pedon of Spadra fine sandy loam in the NW1/4SE1/4SE1/4 sec 9, T. 8 N., R. 17 W.:

Ap—0 to 2 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B1—2 to 12 inches; dark brown (7.5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; many fine roots; medium acid; gradual wavy boundary.

B21t—12 to 29 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots and pores; medium acid; gradual wavy boundary.

B22t—29 to 51 inches; reddish brown (5YR 4/4) loam; few fine faint yellowish brown mottles; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

C—51 to 72 inches; reddish brown (5YR 4/4) loam; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; very friable; very strongly acid.

Solum thickness ranges from 40 to 60 inches. Reaction is medium acid to very strongly acid throughout except for the surface layer in limed areas.

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

The B1 horizon has hue of 7.5YR, value of 4, and chroma of 4. Texture is loam or fine sandy loam. The B2t horizon has hue of 7.5YR or 5YR, value of 4, and chroma of 4. Texture is loam or sandy clay loam.

The B3 and C horizons have hue of 7.5YR or 5YR, value of 4, and chroma of 4. Texture is loam, sandy loam, or fine sandy loam.

Taft series

The Taft series consists of deep, somewhat poorly drained, slowly permeable soils that formed in loamy material derived from soils weathered from shale and siltstone. These soils are on stream terraces and in depressions. They have a seasonal perched water table during late winter and early spring. The native vegetation was mixed hardwoods. Slopes are 0 to 2 percent.

Taft soils in this survey area are geographically associated with Barling and Leadvale soils. Barling soils, which are on flood plains, are moderately well drained and lack a fragipan. Leadvale soils, which are on higher terraces, have an argillic horizon above the fragipan.

Typical pedon of Taft silt loam, 0 to 2 percent slopes, in the NE1/4SE1/4NE1/4 sec. 25, T. 7 N., R. 15 W.:

A1—0 to 3 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

A2—3 to 12 inches; pale brown (10YR 6/3) silt loam; spots of dark yellowish brown (10YR 4/4) and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; many fine and medium roots; strongly acid; gradual wavy boundary.

B21—12 to 27 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct yellowish brown (10YR 5/8) and light gray (10YR 7/1) mottles; weak medium and subangular blocky structure; friable; common fine and medium roots; strongly acid; gradual wavy boundary.

A'2&B'x1—27 to 40 inches; mottled yellowish brown (10YR 5/4) and gray (10YR 6/1) silty clay loam; weak coarse platy structure parting to moderate medium subangular blocky; compact and brittle, firm; few thin patchy clay films on faces of peds; few fine and medium roots; few fine pores; very strongly acid; gradual wavy boundary.

B'x2—40 to 67 inches; mottled yellowish brown (10YR 5/4), gray (10YR 6/1), and pale brown (10YR 6/3) silty clay loam; weak coarse platy structure parting to moderate medium subangular blocky; firm, compact and brittle; common patchy clay films on faces of peds; vertical veins of gray silty clay 0.5 inch across; few fine medium roots; very strongly acid; gradual wavy boundary.

B'2t—67 to 85 inches; coarsely mottled gray (10YR 6/1), yellowish brown (10YR 5/4), and yellowish red (10YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; many vertical gray clay veins; continuous clay films on faces of peds; very strongly acid.

Solum thickness is 50 inches or more. Depth to the fragipan ranges from 20 to 36 inches. Reaction is strongly acid or very strongly acid throughout except for the surface layer in limed areas.

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

The B2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is silt loam or silty clay loam. Mottles having chroma of 1 or 2 occur within 10 inches of the top of the B horizon. The B'x horizon has dominant color with hue of 10YR, value of 5, and chroma of 4, or is evenly mottled in shades of brown or gray.

Texture is silt loam or silty clay loam. The B'2t horizon is mottled in shades of gray, red, or brown. Texture is silty clay loam or loam.

Wrightsville series

The Wrightsville series consists of deep, poorly drained, very slowly permeable soils that formed in old clayey alluvium that has a loamy mantle. These soils are in level or depressional areas of stream terraces. They are saturated with water in late winter and early spring. Slopes are 0 to 1 percent.

Wrightsville soils in this survey area are geographically associated with McKamie, Moreland, and Muskogee soils. McKamie soils, which are on higher terraces than Wrightsville soils, are well drained. Moreland soils, which are in adjacent backswamps in the bottom lands, are not so gray as Wrightsville soils and are somewhat poorly drained. Muskogee soils, which are on higher terraces, have less gray in the B horizon and are moderately well drained.

Typical pedon of Wrightsville silt loam, in the SW1/4NE1/4SW1/4 sec. 6, T. 5 N., R. 17 W.:

O1—1 inch to 0; black (10YR 2/1) partially decomposed leaves, twigs, and roots.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many medium roots; very strongly acid; abrupt smooth boundary.

A21g—1 to 10 inches; grayish brown (10YR 5/2) silt loam; few fine faint grayish brown mottles; weak medium granular structure; friable; many medium roots; very strongly acid; abrupt smooth boundary.

A22g—10 to 17 inches; light gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many medium and fine roots; common fine pores; very strongly acid; clear wavy boundary.

Bg&Ag—17 to 23 inches; gray (10YR 5/1) silty clay loam (Bg) and 20 percent tongues 0.5 inch to 2 inches wide of light gray (10YR 7/1) silt loam (Ag); common medium distinct yellowish brown (10YR 5/6) mottles; Bg has weak medium prismatic structure parting to weak medium subangular blocky; firm; Ag is massive; friable; common fine roots; few fine pores; continuous clay films on faces of peds in Bg; prisms have light gray silt coatings; very strongly acid; gradual wavy boundary.

B21tg—23 to 39 inches; gray (10YR 5/1) silty clay; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to strong medium subangular blocky; firm; few fine roots; few fine pores; continuous clay films on faces of peds; 10 percent tongues 0.5 to 1 inch wide with interfingering and small pockets of light gray silt loam; silt coatings on prisms; very strongly acid; gradual smooth boundary.

B22tg—39 to 49 inches; light brownish gray (2.5Y 6/2) silty clay; many medium distinct strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to strong medium subangular blocky; firm; few fine roots; patchy clay films on faces of peds; small pockets of light gray silt loam; silt coatings on prisms; very strongly acid; gradual smooth boundary.

B23tg—49 to 62 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; patchy clay films on faces of peds; few small dark brown concretions; silt coatings on prisms and in small pockets; very strongly acid; clear smooth boundary.

B24tg—62 to 72 inches; gray (10YR 5/1) silty clay loam; medium coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; patchy clay films on faces of peds; light gray silt in small pockets; very strongly acid.

Solum thickness ranges from 40 to 70 inches. Reaction ranges from extremely acid through medium acid throughout except for the surface layer in limed areas.

Thickness of the A horizon ranges from 10 to 23 inches. The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 2. The A2 horizon has hue of 10YR with value of 5, 6, or 7 and chroma of 1, or with value of 6 or 7 and chroma of 2.

The B2t horizon has hue of 10YR, value of 5, 6, or 7, and chroma of 1 or 2, or it has hue of 2.5Y, value of 5, 6, or 7, and chroma of 2. The B2t horizon has silt tongues 0.5 inch to 2 inches wide. Texture is silty clay loam, silty clay, or clay. The B2t horizon has common to many mottles in shades of brown.

The Cg horizon, where present, has hue of 10YR, value of 5, 6, or 7, and chroma of 1.

Yorktown series

The Yorktown series consists of deep, very poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are inundated with water at least 10 months of each year. The native vegetation was baldcypress, water tupelo, and buttonbush. Slopes are 0 to 1 percent.

Yorktown soils in this survey area are geographically associated with Moreland, Roellen, and Roxana soils. Moreland soils, which are on higher bottom lands than Yorktown soils, are reddish brown throughout. Roellen soils, which are on higher bottom lands, are not inundated for long periods. Roxana soils, which are on higher bottom lands, have coarser texture within the control section.

Typical pedon of Yorktown silty clay in the SW1/4NE1/4SW1/4 sec. 19, T. 6 N., R. 15 W.:

A1—0 to 12 inches; gray (5Y 5/1) silty clay; few medium prominent dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; medium acid; abrupt smooth boundary.

B21g—12 to 26 inches; dark gray (5Y 4/1) clay; few medium prominent dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; medium acid; gradual wavy boundary.

B22g—26 to 38 inches; dark gray (5Y 4/1) clay; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; very firm; common fine roots; neutral; gradual smooth boundary.

B23g—38 to 48 inches; gray (5Y 5/1) clay; few medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; very firm; few medium roots; few fine pressure faces; neutral; gradual wavy boundary.

B3—48 to 63 inches; dark reddish brown (5YR 3/4) clay; few medium prominent gray (5Y 5/1) mottles; strong fine and medium subangular blocky structure; very firm; few smooth slickensides as much as 1 inch in diameter; common fine pressure faces; common fine accretions; few fine roots; mildly alkaline.

Solum thickness ranges from 50 to 80 inches. Depth to the B3 horizon ranges from 40 to 55 inches. Reaction ranges from neutral to medium acid in the A and B2g horizons and is mildly alkaline in the B3 horizon.

The A horizon has hue of 5Y, value of 4 or 5, and chroma of 1.

The B2g horizon has hue of 5Y, value of 4 or 5, and chroma of 1 or less. It has few to common mottles in shades of brown. The B3 horizon has hue of 5YR, value of 4 or 5, and chroma of 3 or 4. It has few to common mottles of gray.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*7*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 16, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Fluvaquents (*Fluv*, meaning river deposit, plus *aquent*, the suborder of Entisols that has an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 is thought to typify the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation of the soils

In this section the factors of soil formation are discussed and related to the soils in the survey area. In addition, the processes of soil formation are described.

Factors of soil formation

Soil is a natural, three-dimensional body on the earth's surface that supports plants and has properties resulting from the integrated effects of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

The interaction of five main factors results in differences among soils. These factors are physical and chemical composition of the parent material; climate during and after the accumulation of the parent material; the kind of plants and organisms living in the soil; the relief of the land and its effects on runoff; and the effect of time on all the other factors (*3*).

The effect of one factor can differ from place to place, but the interaction of all the factors determines the kind of soil that forms. In the following paragraphs, the factors of soil formation are discussed as they relate to the soils in the survey area.

Parent material

The soils of Conway County formed in alluvium and residuum from materials weathered from shale and sandstone bedrock.

The alluvium was deposited by the Arkansas River and its tributaries. It consists of a mixture of minerals transported from several states and weathered from several types of rocks. Many of the minerals in the Arkansas River alluvium are only partially weathered. As a result, the soils that formed are high in natural fertility, for example, Dardanelle, Gallion, and Roxana soils.

Crevasse soils formed in sandy sediments deposited along or near the river on natural levees (*9*). Moreland and Roellen soils formed in predominantly clayey sediments deposited by slack water on flats and in flood bays farther from the river. Most of the minerals in the alluvium from tributary streams are highly weathered. As a result, the soils that formed are low to moderate in natural fertility, for example, Barling and Spadra soils.

Because the weathering bedrock is protected from erosion, the residuum can accumulate. The soils that formed in residuum have properties directly related to the characteristics of the parent bedrock. Sandstone bedrock weathers into loamy materials that contain coarse fragments of resistant minerals. Linker and Mountainburg soils, for example, formed in residuum from sandstone. Shale bedrock weathers into clayey materials that contain a few fragments of resistant minerals. Enders soils, for example, formed in material weathered from shale.

Climate

The climate of Conway County is characterized by mild winters, warm or hot summers, and generally adequate rainfall. The generally warm temperatures and high precipitation are probably similar to the climate under which the soils in the county formed. The average daily maximum temperature at Conway in July is about 94 degrees F, and the average maximum in January is about 52 degrees. The total annual rainfall, about 46 inches, is well distributed throughout the year. For additional information about the climate, refer to the section "General nature of the county."

The warm, moist climate promotes rapid soil formation, and the warm temperature encourages rapid chemical reactions. The large amount of water that moves through the soil is instrumental in removing dissolved or suspended materials. Because remains of plants decompose rapidly, the organic acids thus formed hasten the formation of clay minerals and removal of carbonates. Because the soil is frozen only to shallow depths for short periods, soil formation continues almost the year around. The climate throughout the county is uniform, though its effect is modified locally by runoff. Climate alone does not account for differences in the soils of Conway County.

Living organisms

The higher plants and animals, as well as insects, bacteria, and fungi, are important in the formation of soils. Among the changes they cause are gains and losses in organic matter, nitrogen, and plant nutrients and changes in structure and porosity.

Before Conway County was settled, the native vegetation probably had more influence on soil formation than did animal activity. Hardwood and pine forests, broken by swamps, covered the county. Differences in native vegetation seem to have been related mainly to variations in drainage and, to a lesser degree, parent material. Because the type of vegetation was relatively uniform over the county, differences among the soils cannot be directly related to vegetation.

Man is important to the future rate and direction of soil formation. He clears the forest, cultivates the soils, and introduces new kinds of plants. He adds fertilizer and lime, and chemicals for insect, disease, and weed control. Improving drainage and grading the soil surface also affect the future development of soils. Results of these changes may not be evident for centuries. Nevertheless, man has drastically changed the complex of living organisms affecting soil formation in Conway County.

Relief

The other soil-forming factors are affected by relief through its effect on drainage, runoff, erosion, and percolation of water through the soil. Some of the greatest differences among the soils are due mainly to differences in relief.

In the bottom land area of Conway County, relief ranges from level backswamps to undulating ridges and swales. Local differences in relief are usually less than 1 foot in the backswamps and 3 to 4 feet on the ridges and swales.

The uplands range from broad, gently sloping valleys to steep ridges. Overall relief of the uplands is a series of nearly parallel, generally east-west trending, gently sloping valleys and strongly sloping to steep, nearly parallel ridges.

Time

The length of time required for formation of a soil depends largely upon other factors of soil formation. Less time generally is required if the climate is warm and humid and the vegetation is luxuriant. If other factors are equal, less time also is required where the parent material is sandy or loamy than where it is clayey.

In terms of geologic time, the soils of Conway County are both young and old. The soils of the Arkansas River bottom lands, such as Gallion and Roxana, are young. They are estimated to be between 10,000 and 20,000 years old. The soils of the uplands, such as Enders and Linker, are old soils. They are estimated to be more than 100,000 years old. The degree of soil development is a good indication of the age of a soil. Roxana soils have been in place so short a time that the soils show little evidence of development and horizonation. Enders soils formed in residuum; they are strongly developed and have distinct horizons.

Processes of soil formation

Evidence of soil forming factors is recorded in the soil profile as the succession of layers, or horizons, from the surface to the parent material. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, and reaction.

Most soil profiles contain three major horizons, called A, B, and C. Very young soils do not have a B horizon.

The A horizon can be the horizon of maximum accumulation of organic matter, the A1 horizon or the surface layer, or it can be the horizon of maximum leaching of dissolved or suspended materials, the A2 horizon or the subsurface layer.

The B horizon is immediately beneath the A horizon and is sometimes called the subsoil. It is a horizon of maximum accumulation of dissolved or suspended materials such as iron and clay. Commonly, the B horizon has blocky structure (*8*) and is firmer than the horizons immediately above and below it.

Beneath the B horizon is the C horizon, which has been affected little by the soil forming processes. The C horizon, however, can be materially modified by weathering. In some young soils, the C horizon immediately underlies the A horizon and has been slightly modified by living organisms as well as by weathering.

Several processes have been active in the formation of horizons in the soils of Conway County. Among these processes are: the accumulation of organic matter, leaching of calcium carbonates and bases, reduction and transfer of iron, and formation and translocation of silicate clay minerals. In most of the soils of Conway County, more than one of these processes have been active in soil formation.

Accumulation of organic matter in the upper part of the profile to form an A1 horizon has been an important process of soil formation. The soils of Conway County range from high to low in content of organic matter.

Leaching of carbonates and bases has occurred to some degree in nearly all the soils of Conway County. Soil scientists generally agree that bases are leached downward in soils before silicate clay minerals begin to move. Some of the soils in Conway County are only slightly leached, but most are highly leached.

Reduction and transfer of iron have occurred to a significant degree in the somewhat poorly drained and poorly drained soils. In naturally wet soils, this process is called gleying. Gray colors in the layers below the surface layer indicate the reduction and loss of iron. Some horizons contain reddish or yellowish mottles and concretions derived from segregated iron. Gleying is pronounced in several of the soils. Among the gleyed soils are Guthrie, Roellen, and Wrightsville soils.

In several soils in Conway County, the translocation of clay minerals has contributed to the formation of horizons. In some places, the eluviated A2 horizon has been destroyed by cultivation. Where an A2 horizon occurs, its structure is granular to platy, its clay content is less than in the lower horizons, and its color is lighter. Generally, clay films have accumulated in pores and on surfaces of peds in the B horizon. The soils were probably leached of carbonates and soluble salts to a great extent before translocation of silicate clay occurred.

Leaching of bases and translocation of silicate clay are among the most important processes in horizon differentiation in the soils of Conway County.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Accretions. Soft local concentrations of certain chemical compounds that form uninundated bodies of various sizes, shapes, and colors. The composition of most accretions is unlike that of the surrounding soil. Calcium carbonate and iron and manganese oxides are common compounds in accretions.

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.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

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

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

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

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

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

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

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.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). 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 40 or 80 inches (1 or 2 meters).

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.

Depth to rock. Bedrock at a depth that adversely affects 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 for 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, as for example in "hillpeats" and "climatic moors."

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 running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

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 (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

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.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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 from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

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

Light textured soil. Sand and loamy sand.

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. Inadequate strength for supporting 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 greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy 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).

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

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

Piping. Moving water forms subsurface tunnels or pipelike cavities in 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 a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to 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 a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The 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

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

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

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

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

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. 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.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

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 runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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

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

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

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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.

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil 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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

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

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

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 content of organic matter than the overlying surface layer.

Surface soil. 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 or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

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

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

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

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded.

ILLUSTRATIONS

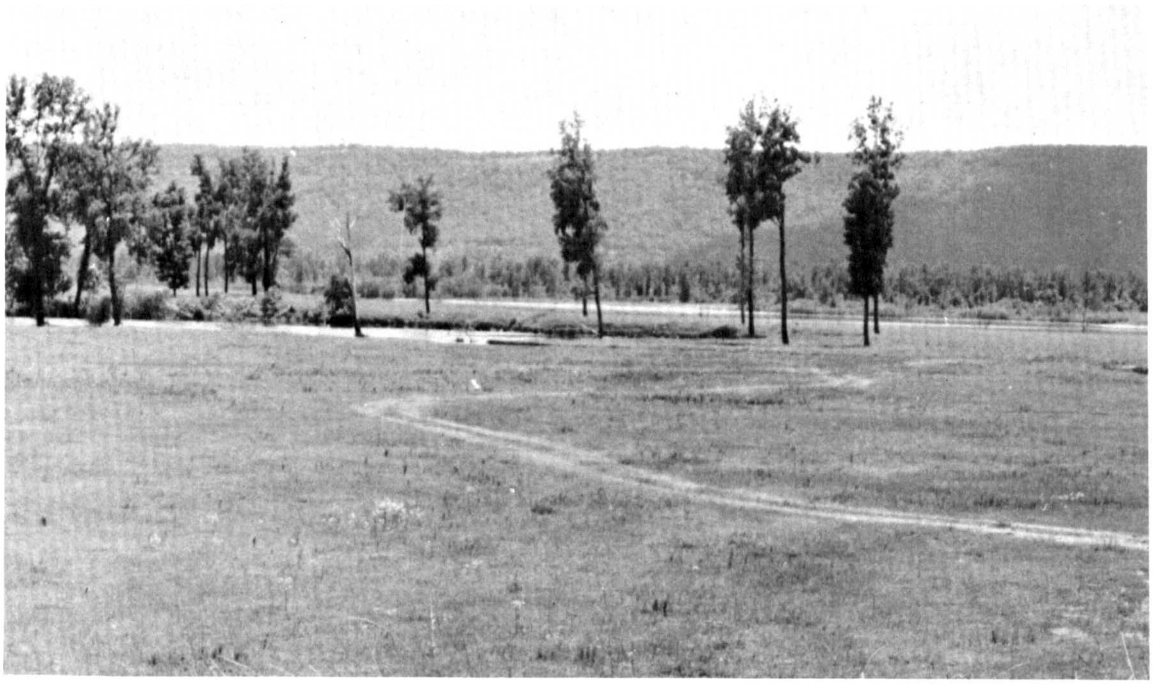

Figure 1.—Common bermudagrass pasture in an area of Crevasse loamy fine sand, frequently flooded.

Figure 2.—Native grass and mixed hardwoods in an area of Enders gravelly fine sandy loam, 12 to 45 percent slopes.

Figure 3.—Mixed hardwoods in an area of Guthrie silt loam, occasionally flooded.

Figure 4.—Typical topography of Leadvale silt loam, 3 to 8 percent slopes.

Figure 5.—Bermudagrass pasture in an area of Linker fine sandy loam, 1 to 3 percent slopes.

Figure 6.—Bermudagrass pasture and mixed woods in an area of Linker fine sandy loam, 3 to 8 percent slopes.

Figure 7.—Bermudagrass pasture properly managed, such as this area of McKamie silt loam, 3 to 8 percent slopes, will control erosion.

Figure 8.—Intermingling of Rock outcrop and Mountainburg soils in an area of Mountainburg-Rock outcrop complex, 3 to 20 percent slopes.

Figure 9.—A well established pasture of common bermudagrass on an area of Sallisaw silt loam, 3 to 8 percent slopes.

Figure 10.—Baldcypress trees in an inundated area of Yorktown silty clay.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Data were recorded in the period 1951-75 at Morrilton, Arkansas. Summaries are based on incomplete record]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	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----	51.9	30.7	41.3	76	8	16	3.29	1.39	4.83	5	1.8
February---	56.2	33.7	45.0	77	12	34	3.26	1.82	4.43	6	.8
March------	63.9	40.7	52.4	87	19	190	4.86	2.45	6.82	8	.6
April------	74.9	51.0	63.0	89	30	390	4.76	2.47	6.61	8	.0
May--------	82.5	59.1	70.8	93	41	645	5.25	2.50	7.48	6	.0
June-------	89.7	66.3	78.1	101	51	843	3.95	1.42	5.98	6	.0
July-------	93.7	70.0	81.8	105	57	986	3.22	1.87	4.32	5	.0
August-----	93.0	68.1	80.5	104	56	946	2.70	1.38	3.76	5	.0
September--	86.5	61.6	74.1	100	43	723	3.89	1.76	5.61	5	.0
October----	77.3	50.3	64.1	93	30	437	2.83	.76	4.49	4	.0
November---	63.7	40.1	51.9	83	18	122	4.22	1.96	6.05	5	.2
December---	53.8	33.3	43.6	76	11	31	3.93	2.10	5.41	6	.6
Yearly:											
Average--	73.9	50.4	62.2	---	---	---	---	---	---	---	---
Extreme--	---	---	---	106	5	---	---	---	---	---	---
Total----	---	---	---	---	---	5,363	46.16	37.77	54.11	69	4.0

[1] 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 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-75 at Morrilton, Arkansas. Summaries are based on incomplete record]

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 20	March 29	April 12
2 years in 10 later than--	March 13	March 23	April 7
5 years in 10 later than--	February 27	March 12	March 28
First freezing temperature in fall:			
1 year in 10 earlier than--	November 3	October 29	October 20
2 years in 10 earlier than--	November 11	November 3	October 25
5 years in 10 earlier than--	November 26	November 11	November 2

TABLE 3.--GROWING SEASON LENGTH

[Data were recorded in the period 1951-75 at Morrilton, Arkansas. Summaries are based on incomplete record]

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	242	221	199
8 years in 10	252	228	206
5 years in 10	271	243	218
2 years in 10	290	258	306
1 year in 10	300	266	237

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

Map symbol	Soil name	Acres	Percent
1	Barling silt loam, occasionally flooded	6,930	1.9
2	Cane fine sandy loam, 3 to 8 percent slopes	7,910	2.2
3	Cane fine sandy loam, 8 to 12 percent slopes	2,440	0.7
4	Crevasse loamy fine sand	860	0.2
5	Crevasse loamy fine sand, frequently flooded	2,660	0.7
6	Dardanelle silt loam	3,410	0.9
7	Enders gravelly fine sandy loam, 1 to 3 percent slopes	1,000	0.3
8	Enders gravelly fine sandy loam, 3 to 8 percent slopes	8,870	2.5
9	Enders gravelly fine sandy loam, 8 to 12 percent slopes	6,710	1.9
10	Enders gravelly fine sandy loam, 12 to 45 percent slopes	9,440	2.6
11	Gallion silt loam	3,550	1.0
12	Guthrie silt loam, occasionally flooded	9,800	2.7
13	Leadvale silt loam, 1 to 3 percent slopes	28,280	7.9
14	Leadvale silt loam, 3 to 8 percent slopes	9,120	2.5
15	Linker fine sandy loam, 1 to 3 percent slopes	5,780	1.6
16	Linker fine sandy loam, 3 to 8 percent slopes	59,400	16.6
17	Linker fine sandy loam, 8 to 12 percent slopes	29,360	8.2
18	McKamie silt loam, 1 to 3 percent slopes	680	0.2
19	McKamie silt loam, 3 to 8 percent slopes	1,970	0.5
20	McKamie silt loam, 8 to 12 percent slopes	650	0.2
21	Moreland silty clay	11,130	3.1
22	Mountainburg gravelly fine sandy loam, 3 to 8 percent slopes	10,120	2.8
23	Mountainburg gravelly fine sandy loam, 8 to 12 percent slopes	15,150	4.2
24	Mountainburg stony fine sandy loam, 12 to 40 percent slopes	58,940	16.5
25	Mountainburg-Rock outcrop complex, 3 to 20 percent slopes	3,050	0.9
26	Muskogee silt loam, 1 to 3 percent slopes	10,050	2.8
27	Muskogee silt loam, 3 to 8 percent slopes	4,990	1.4
28	Nella gravelly fine sandy loam, 12 to 40 percent slopes	950	0.3
29	Roellen silty clay	5,060	1.4
30	Roxana very fine sandy loam, occasionally flooded	3,120	0.9
31	Roxana silt loam	11,200	3.1
32	Sallisaw silt loam, 3 to 8 percent slopes	1,292	0.4
33	Spadra fine sandy loam	5,310	1.5
34	Taft silt loam, 0 to 2 percent slopes	10,180	2.8
35	Wrightsville silt loam	5,200	1.4
36	Yorktown silty clay	2,980	0.8
	Water	1,370	0.4
	Total	358,912	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Bahiagrass	Common bermuda-grass	Tall fescue
	Lb	Bu	Bu	Bu	AUM*	AUM*	AUM*
1----------------------- Barling	---	35	---	40	---	8.0	9.0
2----------------------- Cane	630	30	---	30	8.0	7.0	7.0
3----------------------- Cane	650	25	---	30	8.0	7.0	7.0
4**--------------------- Crevasse	---	---	---	---	---	---	---
5----------------------- Crevasse	---	---	---	---	---	---	---
6----------------------- Dardanelle	850	40	---	---	---	8.0	7.5
7----------------------- Enders	---	---	---	25	---	5.0	4.0
8----------------------- Enders	---	---	---	25	---	4.0	4.0
9----------------------- Enders	---	---	---	---	---	5.0	4.0
10---------------------- Enders	---	---	---	---	---	---	---
11---------------------- Gallion	875	40	---	---	8.0	7.0	8.0
12---------------------- Guthrie	---	30	---	25	5.0	5.0	5.0
13---------------------- Leadvale	550	30	---	40	7.5	7.0	7.0
14---------------------- Leadvale	500	25	---	35	7.0	6.5	6.5
15---------------------- Linker	550	25	---	30	6.5	6.0	5.5
16---------------------- Linker	500	20	---	25	6.0	5.5	5.0
17---------------------- Linker	450	---	---	25	5.5	5.0	4.0
18---------------------- McKamie	---	25	---	---	5.5	5.0	5.0
19, 20------------------ McKamie	---	---	---	---	5.0	4.5	4.0
21---------------------- Moreland	625	35	130	---	---	6.0	8.5
22---------------------- Mountainburg	---	---	---	15	5.0	4.0	4.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Soybeans	Rice	Wheat	Bahiagrass	Common bermudagrass	Tall fescue
	Lb	Bu	Bu	Bu	AUM*	AUM*	AUM*
23 Mountainburg	---	---	---	---	4.5	4.0	---
24 Mountainburg	---	---	---	---	4.0	3.0	---
25*** Mountainburg	---	---	---	---	---	---	---
26 Muskogee	---	30	---	35	7.5	7.0	6.5
27 Muskogee	---	25	---	30	7.5	7.0	6.0
28 Nella	---	---	---	---	---	---	---
29 Roellen	450	30	120	25	---	6.0	7.0
30 Roxana	800	35	---	---	---	8.5	---
31 Roxana	850	35	---	---	---	8.5	7.5
32 Sallisaw	---	25	---	25	6.0	6.0	6.0
33 Spadra	---	30	---	40	---	7.0	9.0
34 Taft	500	25	---	25	6.0	6.0	5.0
35 Wrightsville	450	25	---	---	7.5	7.0	5.0
36 Yorktown	---	---	---	---	---	---	---

* 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 a period of 30 days.
** Yields are for areas protected from flooding.
*** See map unit description for the composition and behavior of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species]

Soil name and map symbol	Woodland suitability group	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
1 Barling	2o7	Slight	Slight	Slight	Southern red oak Sweetgum Eastern cottonwood Shortleaf pine	80 90 95 80	Eastern cottonwood, American sycamore, shortleaf pine, loblolly pine, sweetgum, green ash, Shumard oak, cherrybark oak.
2, 3 Cane	3o7	Slight	Slight	Slight	Sweetgum Loblolly pine	80 77	Loblolly pine, shortleaf pine.
4, 5 Crevasse	2s6	Slight	Moderate	Severe	Sugarberry Sweetgum White oak Eastern cottonwood	-- 90 90 100	Eastern cottonwood, American sycamore.
6 Dardanelle	1o4	Slight	Slight	Slight	Green ash Eastern cottonwood Cherrybark oak Sweetgum American sycamore	75 105 100 100 ---	Eastern cottonwood, sweetgum, American sycamore, black walnut.
7, 8, 9 Enders	4o1	Slight	Slight	Slight	Southern red oak White oak Shortleaf pine Northern red oak	60 55 60 60	Loblolly pine, shortleaf pine, eastern redcedar.
10 Enders	4r3	Slight	Severe	Moderate	Eastern redcedar Shortleaf pine	40 60	Eastern redcedar, shortleaf pine, loblolly pine.
11 Gallion	2o4	Slight	Slight	Slight	Green ash Cherrybark oak Sweetgum Water oak Pecan American sycamore Eastern cottonwood	80 95 90 --- --- --- 100	Eastern cottonwood, American sycamore, cherrybark oak, sweetgum.
12 Guthrie	2w9	Slight	Severe	Severe	Southern red oak Loblolly pine Willow oak Sweetgum	75 80 85 90	Loblolly pine, sweetgum.
13, 14 Leadvale	3o7	Slight	Slight	Slight	Eastern redcedar White oak Shortleaf pine	45 70 70	Loblolly pine, shortleaf pine, eastern redcedar.
15, 16, 17 Linker	4o1	Slight	Slight	Slight	Shortleaf pine Southern red oak White oak Eastern redcedar Loblolly pine	60 50 50 40 ---	Shortleaf pine, loblolly pine, eastern redcedar.
18, 19, 20 McKamie	3c2	Slight	Moderate	Moderate	Shortleaf pine	70	Shortleaf pine.
21 Moreland	2w6	Slight	Severe	Moderate	Green ash Eastern cottonwood Sweetgum American sycamore Water oak	70 100 90 --- 90	Eastern cottonwood, American sycamore, sweetgum, green ash.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Woodland suitability group	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
22, 23------------- Mountainburg	5d2	Slight	Slight	Moderate	Shortleaf pine------ Eastern redcedar----	50 30	Shortleaf pine, eastern redcedar, loblolly pine.
24----------------- Mountainburg	5x3	Severe	Severe	Moderate	Shortleaf pine------ Eastern redcedar----	50 30	Shortleaf pine, eastern redcedar, loblolly pine.
25*---------------- Mountainburg	5d3	Severe	Moderate	Moderate	Shortleaf pine------ Eastern redcedar----	50 30	Shortleaf pine, eastern redcedar, loblolly pine.
26, 27------------- Muskogee	3o7	Slight	Slight	Slight	Shortleaf pine------ Sweetgum------------ Loblolly pine------- Water oak----------- Southern red oak----	70 80 --- --- ---	Loblolly pine, shortleaf pine, eastern redcedar, Shumard oak, sweetgum.
28----------------- Nella	3x8	Moderate	Moderate	Slight	Shortleaf pine------ Southern red oak---- Eastern redcedar---- Black oak----------- Black walnut--------	71 60 61 70 ---	Shortleaf pine, loblolly pine, black walnut.
29----------------- Roellen	2w6	Slight	Severe	Moderate	Eastern cottonwood-- Sweetgum------------ Water oak----------- Cherrybark oak------	100 90 90 90	Eastern cottonwood, sweetgum, Nuttall oak.
30, 31------------- Roxana	1o4	Slight	Slight	Slight	Eastern cottonwood-- Sweetgum------------ Pecan--------------- American sycamore--- Water oak----------- Cherrybark oak------	115 100 --- --- --- ---	Eastern cottonwood, American sycamore, cherrybark oak.
32----------------- Sallisaw	3o7	Slight	Slight	Slight	Shortleaf pine------ Southern red oak---- White oak-----------	65 --- 60	Shortleaf pine, loblolly pine, black walnut, cherrybark oak.
33----------------- Spadra	2o7	Slight	Slight	Slight	Shortleaf pine------ Southern red oak---- Eastern redcedar---- Sweetgum------------	80 80 60 90	Loblolly pine, shortleaf pine, black walnut, black locust, southern red oak, eastern redcedar.
34----------------- Taft	3w8	Slight	Moderate	Moderate	Loblolly pine------- Sweetgum------------ Shortleaf pine------	85 80 70	Loblolly pine, sweetgum, shortleaf pine, southern red oak.
35----------------- Wrightsville	3w9	Slight	Severe	Moderate	Loblolly pine------- Sweetgum------------ Water oak-----------	80 80 80	Loblolly pine, sweetgum, water oak, willow oak.
36----------------- Yorktown	4w9	Slight	Severe	Severe	Baldcypress--------- Water tupelo-------- Water hickory------- Green ash-----------	--- --- --- ---	Baldcypress, water tupelo.

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

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1 Barling	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
2 Cane	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: low strength.
3 Cane	Moderate: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: low strength, slope.
4 Crevasse	Severe: cutbanks cave, wetness.	Slight	Moderate: wetness.	Slight	Slight.
5 Crevasse	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
6 Dardanelle	Slight	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength.
7, 8 Enders	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
9 Enders	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
10 Enders	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
11 Gallion	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
12 Guthrie	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
13 Leadvale	Severe: too clayey.	Moderate: wetness, low strength.	Moderate: wetness.	Moderate: low strength, wetness.	Severe: low strength.
14 Leadvale	Severe: too clayey.	Moderate: wetness, low strength.	Moderate: slope, wetness.	Moderate: slope, wetness, low strength.	Severe: low strength.
15 Linker	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
16 Linker	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
17 Linker	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
18, 19 McKamie	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
20 McKamie	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
21 Moreland	Severe: wetness, too clayey.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: shrink-swell, low strength.
22 Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
23 Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
24 Mountainburg	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.
25* Mountainburg	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
26, 27 Muskogee	Severe: too clayey, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell.
28 Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
29 Roellen	Severe: wetness, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: shrink-swell, floods, wetness.	Severe: shrink-swell, floods, wetness.	Severe: shrink-swell, wetness.
30 Roxana	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
31 Roxana	Slight	Slight	Moderate: wetness.	Slight	Moderate: low strength.
32 Sallisaw	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.
33 Spadra	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.
34 Taft	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
35 Wrightsville	Severe: wetness, too clayey.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.	Severe: wetness, low strength, shrink-swell.
36 Yorktown	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.

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

TABLE 8.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Barling	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
2 Cane	Severe: percs slowly.	Moderate: slope, wetness.	Slight	Slight	Good.
3 Cane	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope, wetness.
4 Crevasse	Moderate: wetness.	Severe: seepage.	Severe: too sandy, seepage.	Severe: seepage.	Poor: seepage, too sandy.
5 Crevasse	Severe: floods.	Severe: floods.	Severe: floods, too sandy, seepage.	Severe: floods, seepage.	Poor: seepage, too sandy.
6 Dardanelle	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Good.
7, 8 Enders	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
9 Enders	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
10 Enders	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey.
11 Gallion	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
12 Guthrie	Severe: percs slowly, wetness, floods.	Slight	Severe: wetness, floods.	Severe: wetness.	Poor: wetness.
13 Leadvale	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: wetness.	Fair: too clayey.
14 Leadvale	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: wetness, slope.	Fair: slope, too clayey.
15, 16 Linker	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
17 Linker	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
18, 19 McKamie	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
20 McKamie	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21: Moreland	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
22: Mountainburg	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer.
23: Mountainburg	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer.
24: Mountainburg	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, seepage.	Poor: slope, thin layer, large stones.
25*: Mountainburg	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
26, 27: Muskogee	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Severe: wetness.	Fair: thin layer, too clayey.
28: Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
29: Roellen	Severe: percs slowly, floods, wetness.	Severe: wetness, floods.	Severe: wetness, too clayey, floods.	Severe: wetness, floods.	Poor: wetness, too clayey.
30: Roxana	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
31: Roxana	Slight	Moderate: seepage.	Slight	Slight	Good.
32: Sallisaw	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
33: Spadra	Moderate: floods.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
34: Taft	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
35: Wrightsville	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
36: Yorktown	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.

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

TABLE 9.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1----------------------- Barling	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
2, 3------------------- Cane	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer.
4, 5------------------- Crevasse	Good-----------------	Good-----------------	Unsuited: excess fines.	Poor: too sandy.
6---------------------- Dardanelle	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
7, 8, 9, 10----------- Enders	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, small stones.
11--------------------- Gallion	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
12--------------------- Guthrie	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
13--------------------- Leadvale	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
14--------------------- Leadvale	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
15, 16----------------- Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
17--------------------- Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
18, 19, 20------------ McKamie	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
21--------------------- Moreland	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
22, 23----------------- Mountainburg	Poor: thin layer.	Poor: excess fines.	Poor: thin layer.	Poor: small stones.
24--------------------- Mountainburg	Poor: slope, thin layer, large stones.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, large stones, thin layer.
25*-------------------- Mountainburg	Poor: slope, thin layer.	Poor: excess fines.	Poor: thin layer.	Poor: slope, small stones.
26, 27----------------- Muskogee	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
28--------------------- Nella	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
29--------------------- Roellen	Poor: shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
30, 31----------------- Roxana	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
32--------------------- Sallisaw	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
33--------------------- Spadra	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
34--------------------- Taft	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
35--------------------- Wrightsville	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
36--------------------- Yorktown	Poor: wetness, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.

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

TABLE 10.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1----------------- Barling	Moderate: seepage.	Moderate: wetness, piping.	Floods---------	Floods: wetness.	Not needed-----	Wetness, erodes easily.
2, 3------------- Cane	Slight---------	Slight---------	Not needed-----	Slope, wetness, percs slowly, rooting depth.	Complex slope, rooting depth.	Rooting depth.
4----------------- Crevasse	Severe: seepage.	Severe: seepage, piping.	Not needed-----	Fast intake, percs rapidly.	Piping---------	Erodes easily, droughty.
5----------------- Crevasse	Severe: seepage.	Severe: seepage, piping.	Floods---------	Fast intake, percs rapidly.	Piping---------	Erodes easily, droughty.
6----------------- Dardanelle	Moderate: seepage.	Moderate: seepage.	Not needed-----	Favorable------	Not needed-----	Favorable.
7, 8, 9, 10------- Enders	Moderate: depth to rock.	Severe: low strength, compressible.	Not needed-----	Slope, erodes easily, slow intake.	Slope, depth to rock, erodes easily.	Erodes easily, percs slowly, slope.
11---------------- Gallion	Moderate: seepage.	Slight---------	Not needed-----	Favorable------	Not needed-----	Favorable.
12---------------- Guthrie	Slight---------	Moderate: piping.	Percs slowly, poor outlets.	Wetness--------	Not needed-----	Not needed.
13---------------- Leadvale	Moderate: seepage.	Moderate: thin layer, wetness.	Percs slowly, slope.	Wetness, slow intake, percs slowly.	Wetness, erodes easily.	Erodes easily, rooting depth.
14---------------- Leadvale	Moderate: seepage.	Moderate: thin layer, wetness.	Percs slowly, slope.	Wetness, slow intake, percs slowly.	Slope, wetness, erodes easily.	Erodes easily, rooting depth.
15, 16------------ Linker	Severe: depth to rock.	Moderate: thin layer, compressible.	Not needed-----	Favorable------	Slope, depth to rock, large stones.	Large stones, slope, depth to rock.
17---------------- Linker	Severe: depth to rock.	Moderate: thin layer, compressible.	Not needed-----	Slope----------	Slope, depth to rock, large stones.	Large stones, slope, depth to rock.
18---------------- McKamie	Slight---------	Moderate: shrink-swell, low strength, compressible.	Not needed-----	Slope, erodes easily, slow intake.	Erodes easily, percs slowly.	Favorable.
19, 20------------ McKamie	Slight---------	Moderate: shrink-swell, low strength, compressible.	Not needed-----	Slope, erodes easily, slow intake.	Slope, erodes easily, percs slowly.	Slope.
21---------------- Moreland	Slight---------	Moderate: compressible, low strength, shrink-swell.	Complex slope, percs slowly.	Complex slope, slow intake, wetness.	Not needed-----	Favorable.
22, 23------------ Mountainburg	Severe: depth to rock, seepage.	Severe: thin layer.	Not needed-----	Slope, fast intake, rooting depth.	Slope, depth to rock, rooting depth.	Rooting depth, slope.
24---------------- Mountainburg	Severe: seepage, depth to rock.	Severe: thin layer, large stones.	Not needed-----	Slope, droughty, large stones.	Large stones, depth to rock.	Large stones, depth to rock, rooting depth.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
25*: Mountainburg	Severe: depth to rock, seepage.	Severe: thin layer.	Not needed	Slope, fast intake, rooting depth.	Slope, depth to rock, rooting depth.	Rooting depth, slope.
26: Muskogee	Slight	Moderate: compressible, wetness.	Percs slowly, slope.	Erodes easily, slope, slow intake.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
27: Muskogee	Slight	Moderate: compressible, wetness.	Percs slowly, slope.	Erodes easily, slope, slow intake.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly, slope.
28: Nella	Moderate: seepage.	Slight	Not needed	Slope	Slope	Slope.
29: Roellen	Slight	Moderate: compressible.	Percs slowly	Slow intake, wetness.	Not needed	Not needed.
30: Roxana	Moderate: seepage.	Moderate erodes easily, seepage, piping.	Not needed	Floods	Not needed	Erodes easily.
31: Roxana	Moderate: seepage.	Moderate: erodes easily, seepage, piping.	Not needed	Favorable	Not needed	Erodes easily.
32: Sallisaw	Moderate: depth to rock.	Moderate: thin layer, low strength.	Not needed	Favorable	Favorable	Favorable.
33: Spadra	Moderate: seepage.	Moderate: seepage.	Not needed	Erodes easily, floods.	Favorable	Erodes easily.
34: Taft	Slight	Moderate: compressible, piping.	Percs slowly, poor outlets.	Wetness	Not needed	Not needed.
35: Wrightsville	Slight	Severe: unstable fill, compressible.	Percs slowly	Wetness: slow intake.	Not needed	Not needed.
36: Yorktown	Slight	Moderate: shrink-swell, low strength.	Floods	Floods, slow intake, wetness.	Not needed	Not needed.

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

TABLE 11.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Barling	Severe: floods, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
2 Cane	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight.
3 Cane	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight.
4 Crevasse	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
5 Crevasse	Severe: floods.	Moderate: too sandy, floods.	Severe: floods.	Moderate: floods, too sandy.
6 Dardanelle	Slight	Slight	Slight	Slight.
7, 8 Enders	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
9 Enders	Severe: percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight.
10 Enders	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope.
11 Gallion	Slight	Slight	Slight	Slight.
12 Guthrie	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
13 Leadvale	Moderate: wetness.	Moderate: wetness.	Moderate: slope, percs slowly, wetness.	Slight.
14 Leadvale	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight.
15, 16 Linker	Slight	Slight	Moderate: slope.	Slight.
17 Linker	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
18, 19 McKamie	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
20 McKamie	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
21 Moreland	Severe: too clayey, percs slowly, wetness.	Severe: too clayey, wetness.	Severe: too clayey, percs slowly, wetness.	Severe: too clayey, wetness.
22 Mountainburg	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
23 Mountainburg	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
24 Mountainburg	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.
25* Mountainburg	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
26, 27 Muskogee	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight.
28 Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
29 Roellen	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
30 Roxana	Severe: floods.	Slight	Moderate: floods.	Slight.
31 Roxana	Slight	Slight	Slight	Slight.
32 Sallisaw	Slight	Slight	Moderate: slope.	Slight.
33 Spadra	Severe: floods.	Slight	Slight	Slight.
34 Taft	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
35 Wrightsville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
36 Yorktown	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.

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

TABLE 12.--WILDLIFE HABITAT POTENTIALS

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1 Barling	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
2, 3 Cane	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4, 5 Crevasse	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
6 Dardanelle	Good	Good	Good	Good	---	Poor	Fair	Good	Good	Poor.
7 Enders	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
8, 9 Enders	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10 Enders	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
11 Gallion	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
12 Guthrie	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
13 Leadvale	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
14 Leadvale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15, 16 Linker	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
17 Linker	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
18 McKamie	Fair	Good	Good	---	Good	Poor	Poor	Good	Good	Poor.
19, 20 McKamie	Fair	Good	Good	---	Good	Very poor.	Very poor.	Good	Good	Very poor.
21 Moreland	Fair	Fair	Fair	Good	---	Good	Good	Fair	Good	Good.
22 Mountainburg	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
23 Mountainburg	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
24 Mountainburg	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
25* Mountainburg	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
26 Muskogee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
27------------------ Muskogee	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28------------------ Nella	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
29------------------ Roellen	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
30------------------ Roxana	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
31------------------ Roxana	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
32------------------ Sallisaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
33------------------ Spadra	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
34------------------ Taft	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
35------------------ Wrightsville	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
36------------------ Yorktown	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Good	Very poor.	Very poor.	Fair.

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

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	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	
1------------------ Barling	0-16	Silt loam-------	ML	A-4	0	100	100	90-100	70-90	<20	NP-3
	16-77	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	<30	NP-12
2, 3--------------- Cane	0-5	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0-2	80-100	75-100	65-95	40-75	<30	NP-7
	5-20	Silt loam, silty clay loam, clay loam.	ML, CL-ML, CL	A-4	0-2	90-100	80-95	75-95	60-70	17-32	3-10
	20-78	Silt loam, silty clay loam, clay loam.	ML, CL-ML, CL	A-4	0-2	90-100	80-95	75-95	55-70	18-30	3-10
4, 5--------------- Crevasse	0-7	Loamy fine sand	SM	A-2	0	100	95-100	60-100	15-30	---	NP
	7-67	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	95-100	50-100	5-20	---	NP
6------------------ Dardanelle	0-12	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	100	85-100	16-30	3-11
	12-50	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	23-38	6-15
	50-67	Silt loam, very fine sandy loam, loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	100	80-100	16-38	3-15
7, 8, 9, 10-------- Enders	0-8	Gravelly fine sandy loam.	ML, SM, SM-SC, CL-ML	A-2, A-4	0-15	50-95	35-75	30-70	30-60	20-35	2-10
	8-19	Clay loam, silty clay loam, loam.	CL	A-6	0	80-100	80-100	80-100	75-95	30-40	11-17
	19-48	Silty clay, clay	CH	A-7	0	95-100	85-100	85-100	70-95	65-80	35-45
	48-56	Silty clay, gravelly silty clay.	CH	A-7	0-15	95-100	90-100	85-100	70-95	65-80	35-45
	56-83	Weathered bedrock, unweathered bedrock.	---	---	---	---	---	---	---	---	---
11----------------- Gallion	0-7	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	100	100	100	90-100	<28	NP-11
	7-32	Silt loam, silty clay loam, clay loam.	CL	A-6	0	100	100	100	90-100	28-40	11-17
	32-75	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	23-34	4-12
12----------------- Guthrie	0-8	Silt loam-------	ML, CL-ML	A-4	0	100	100	90-100	85-95	18-28	2-7
	8-17	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	85-95	23-39	5-15
	17-47	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	100	95-100	85-100	85-95	20-42	5-20
	47-84	Silty clay loam, silt loam.	CL, ML, CL-ML	A-6, A-7, A-4	0-5	90-100	85-100	80-100	70-95	20-50	4-25

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	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	
13, 14-------------- Leadvale	0-5	Silt loam-------	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	5-22	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	95-100	90-98	75-90	22-36	3-14
	22-40	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	95-100	80-98	70-90	23-42	3-18
	40-70	Silty clay loam, silty clay, clay.	CL, MH, ML, CH	A-6, A-7	0-5	90-100	90-100	85-95	70-90	32-58	12-26
15, 16, 17---------- Linker	0-4	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	0-5	90-100	80-100	70-100	25-70	<30	NP-7
	4-28	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM, ML	A-4, A-6	0-10	90-100	80-100	70-100	40-80	<40	NP-18
	28-38	Gravelly sandy clay loam, clay loam, sandy clay loam.	CL, SC, GC, ML	A-4, A-6	0-10	65-100	60-100	55-100	40-80	<40	NP-18
18, 19, 20---------- McKamie	0-8	Silt loam-------	SM, ML, CL-ML, SM-SC	A-4	0	100	100	90-100	40-60	25	NP-5
	8-43	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	85-100	45-70	22-40
	43-63	Silty clay loam, silt loam, silty clay.	CL, CL-ML	A-4, A-6, A-7	0	100	100	95-100	50-95	25-45	5-22
21------------------ Moreland	0-10	Silty clay------	CH	A-7	0	100	95-100	90-100	90-100	51-74	25-45
	10-37	Clay, silty clay	CH	A-7	0	100	95-100	90-100	90-100	51-74	25-45
	37-64	Clay, silty clay loam, silty clay.	CH, CL	A-7, A-6	0	100	100	100	90-100	35-74	15-45
22, 23-------------- Mountainburg	0-5	Gravelly fine sandy loam.	GM, SM	A-1, A-2	0-15	60-80	50-70	20-40	15-30	---	NP
	5-16	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GP-GM, GM-GC	A-1, A-2	15-30	40-60	30-50	25-50	10-25	<30	NP-10
24------------------ Mountainburg	0-5	Stony fine sandy loam.	GM	A-1, A-2	30-60	40-50	30-50	20-40	15-25	<20	NP
	5-16	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GM-GC	A-1, A-2	30-65	40-60	30-50	25-50	20-30	<30	NP-10
25*----------------- Mountainburg	0-5	Gravelly fine sandy loam.	GM, SM	A-1, A-2	0-15	60-80	50-70	20-40	15-30	---	NP
	5-16	Very gravelly sandy clay loam, very gravelly sandy loam, very gravelly fine sandy loam.	GM, GC, GP-GM, GM-GC	A-1, A-2	15-30	40-60	30-50	25-50	10-25	<30	NP-10

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
26, 27------------- Muskogee	0-13	Silt loam-------	ML, CL, CL-ML	A-4	0	100	100	95-100	85-100	18-30	1-10
	13-34	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	90-100	35-55	15-30
	34-81	Silty clay, clay	CH	A-7	0	100	100	95-100	90-100	55-70	30-40
28----------------- Nella	0-20	Gravelly fine sandy loam, cobbly loam.	ML, CL, GM, SM	A-4, A-2	0-25	65-100	60-90	55-75	30-55	<30	NP-8
	20-80	Cobbly clay loam, clay loam, sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
29----------------- Roellen	0-16	Silty clay------	CL, CH	A-7	0	100	100	95-100	90-100	45-65	20-40
	16-59	Clay, silty clay	CH	A-7	0	100	100	95-100	90-100	55-80	30-50
	59-92	Clay loam, silty clay, silty clay loam.	CH, CL, CL-ML	A-7, A-6, A-4	0	100	95-100	80-100	60-95	20-80	6-50
30----------------- Roxana	0-5	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-75	<27	NP-7
	5-76	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML	A-4	0	100	100	85-100	50-85	<27	NP-7
31----------------- Roxana	0-5	Silt loam-------	ML, CL-ML	A-4	0	100	100	85-100	50-75	<27	NP-7
	5-76	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML	A-4	0	100	100	85-100	50-85	<27	NP-7
32----------------- Sallisaw	0-7	Silt loam-------	CL, ML, SM, SC	A-2, A-4	0-15	55-100	51-100	45-90	25-75	<31	NP-10
	7-82	Clay loam, silty clay loam, sandy clay loam	GC, SC, CL	A-2, A-4, A-6	0	55-100	51-100	45-90	25-85	25-40	7-18
33----------------- Spadra	0-12	Fine sandy loam, loam.	ML, SM	A-2, A-4	0	85-100	80-100	65-80	30-75	<20	NP-3
	12-72	Loam, sandy clay loam, fine sandy loam.	CL, ML	A-4, A-6	0	90-100	90-100	80-95	55-75	25-40	8-15
34----------------- Taft	0-12	Silt loam-------	CL-ML, ML	A-4	0	100	95-100	90-100	75-95	18-30	2-7
	12-27	Silt loam, silty clay.	CL-ML, CL	A-4, A-6	0	100	95-100	95-100	85-95	23-38	5-16
	27-67	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	80-95	23-42	5-20
	67-85	Silty clay loam, loam.	MH, ML, GC, CL	A-6, A-7	0-20	65-100	55-100	45-90	36-85	35-65	12-30
35----------------- Wrightsville	0-17	Silt loam-------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	75-100	<31	NP-10
	17-72	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	41-65	22-40
36----------------- Yorktown	0-12	Silty clay------	MH, CH	A-7	0	100	100	100	95-100	55-75	22-45
	12-48	Clay------------	CH	A-7	0	100	100	100	95-100	60-80	32-50
	48-63	Clay------------	CH	A-7	0	100	100	95-100	90-100	60-80	32-50

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

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
1	0-16	0.6-2.0	0.13-0.24	5.1-6.5	Low	0.37	5
Barling	16-77	0.6-2.0	0.13-0.24	4.5-6.5	Low	0.37	
2, 3	0-5	0.6-2.0	0.10-0.18	5.6-6.5	Low	0.32	3
Cane	5-20	0.6-2.0	0.14-0.19	4.5-6.0	Low	0.37	
	20-78	0.06-0.2	0.05-0.08	4.5-6.0	Low	0.37	
4, 5	0-7	6.0-20.0	0.08-0.08	5.6-8.4	Low	0.15	5
Crevasse	7-67	6.0-20.0	0.02-0.06	5.6-8.4	Low	0.15	
6	0-12	0.6-2.0	0.13-0.24	5.6-7.3	Low	0.37	5
Dardanelle	12-50	0.6-2.0	0.15-0.24	5.1-7.3	Moderate	0.32	
	50-67	0.6-2.0	0.13-0.24	5.6-8.4	Low	0.32	
7, 8, 9, 10	0-8	0.6-2.0	0.07-0.15	3.6-5.5	Low	0.32	3
Enders	8-19	0.2-0.6	0.15-0.22	3.6-5.5	Low	0.43	
	19-48	<0.06	0.12-0.18	3.6-5.5	High	0.37	
	48-56	<0.06	0.08-0.10	3.6-5.5	Moderate	0.37	
	56-83	---	---	---	---------------	---	
11	0-7	0.6-2.0	0.21-0.23	5.6-7.3	Low	0.37	5
Gallion	7-32	0.6-2.0	0.20-0.22	5.6-7.8	Moderate	0.32	
	32-75	0.6-2.0	0.20-0.23	6.1-8.4	Low	0.37	
12	0-8	0.6-2.0	0.20-0.22	3.6-5.0	Low	0.43	5
Guthrie	8-17	0.6-2.0	0.18-0.20	3.6-5.0	Low	0.43	
	17-47	0.06-0.2	0.03-0.05	3.6-5.0	Low	0.43	
	47-84	0.06-0.2	0.03-0.05	3.6-5.0	Low	0.43	
13, 14	0-5	0.6-2.0	0.17-0.22	4.5-5.5	Low	0.43	3
Leadvale	5-22	0.6-2.0	0.17-0.20	4.5-5.5	Low	0.43	
	22-40	0.06-0.6	0.06-0.11	4.5-5.5	Low	0.43	
	40-70	0.06-0.6	0.06-0.11	4.5-5.5	Low	0.24	
15, 16, 17	0-4	0.6-2.0	0.11-0.17	3.6-5.5	Low	0.28	3
Linker	4-28	0.6-2.0	0.11-0.20	3.6-5.5	Low	---	
	28-38	0.6-2.0	0.08-0.20	3.6-5.5	Low	---	
18, 19, 20	0-8	0.6-2.0	0.14-0.22	5.1-6.5	Low	0.43	3
McKamie	8-43	<0.06	0.18-0.20	4.5-8.4	High	0.32	
	43-63	0.2-2.0	0.14-0.22	4.5-8.4	Moderate	0.37	
21	0-10	<0.06	0.18-0.20	6.1-7.8	Very high	0.32	5
Moreland	10-37	<0.06	0.18-0.20	6.6-8.4	High	0.32	
	37-64	<0.2	0.18-0.21	7.4-8.4	Very high	0.32	
22, 23	0-5	2.0-6.0	0.05-0.10	5.1-6.0	Low	0.20	1
Mountainburg	5-16	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.17	
24	0-5	2.0-6.0	0.05-0.10	5.1-6.0	Low	0.17	1
Mountainburg	5-16	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.24	
25*	0-5	2.0-6.0	0.05-0.10	5.1-6.0	Low	0.20	1
Mountainburg	5-16	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.17	
26, 27	0-13	0.6-2.0	0.16-0.24	4.5-6.0	Low	0.43	5
Muskogee	13-34	0.2-0.6	0.16-0.24	4.5-6.0	Moderate	0.37	
	34-81	0.06-0.2	0.14-0.18	5.1-7.8	High	0.32	
28	0-20	0.6-2.0	0.08-0.15	4.5-5.5	Low	0.20	5
Nella	20-80	0.6-2.0	0.07-0.14	4.5-5.5	Low	0.17	

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
29----------------	0-16	0.06-0.2	0.15-0.19	5.6-7.8	High-----------	0.32	5
Roellen	16-59	0.06-0.2	0.14-0.17	5.6-7.8	High-----------	0.37	
	59-92	0.06-2.0	0.14-0.20	5.6-7.8	High-----------	0.37	
30, 31-----------	0-5	0.6-2.0	0.10-0.21	6.1-8.4	Low------------	0.37	5
Roxana	5-76	0.6-2.0	0.10-0.19	6.6-8.4	Low------------	0.37	
32----------------	0-7	0.6-2.0	0.10-0.18	5.6-6.5	Low------------	0.32	4
Sallisaw	7-82	0.6-2.0	0.11-0.18	5.1-6.0	Low------------	0.32	
33----------------	0-12	0.6-2.0	0.11-0.24	4.5-6.0	Low------------	0.37	5
Spadra	12-72	0.6-2.0	0.12-0.20	4.5-6.0	Low------------	0.37	
34----------------	0-12	0.6-2.0	0.20-0.22	4.5-5.5	Low------------	0.43	3
Taft	12-27	0.6-2.0	0.18-0.20	4.5-5.5	Low------------	0.43	
	27-67	0.06-0.2	0.03-0.07	4.5-5.5	Low------------	0.43	
	67-85	0.2-0.6	0.01-0.03	4.5-5.5	Low------------	0.37	
35----------------	0-17	0.2-0.6	0.16-0.24	3.6-6.0	Low------------	0.49	5
Wrightsville	17-72	<0.06	0.14-0.22	3.6-6.0	High-----------	0.37	
36----------------	0-12	<0.06	0.12-0.18	5.6-7.3	High-----------	0.32	5
Yorktown	12-48	<0.06	0.12-0.18	5.6-7.3	Very high------	0.32	
	48-63	<0.06	0.12-0.18	7.4-8.4	Very high------	0.32	

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

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1 Barling	C	Occasional	Very brief to brief.	Dec-Apr	1.0-4.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
2, 3 Cane	C	None	---	---	2.0-3.0	Perched	Nov-Mar	>60	---	Moderate	High.
4 Crevasse	A	None	---	---	3.5-6.0	Apparent	Nov-Mar	>60	---	Low	Moderate.
5 Crevasse	A	Frequent	Brief	Oct-Mar	3.5-6.0	Apparent	Nov-Mar	>60	---	Low	Moderate.
6 Dardanelle	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
7, 8, 9, 10 Enders	C	None	---	---	>6.0	---	---	40-60	Rippable	High	High.
11 Gallion	B	None	---	---	>6.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
12 Guthrie	D	Occasional	Brief	Jan-Apr	0.5-1.0	Perched	Jan-Apr	>60	---	High	High.
13, 14 Leadvale	C	None	---	---	2.0-3.0	Perched	Jan-Apr	>48	Rippable	Moderate	Moderate.
15, 16, 17 Linker	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
18, 19, 20 McKamie	D	None	---	---	>6.0	---	---	>60	---	High	Moderate.
21 Moreland	D	None	---	---	0-1.5	Perched	Dec-Apr	>60	---	High	Low.
22, 23, 24, 25* Mountainburg	D	None	---	---	>6.0	---	---	12-20	Hard	Low	Moderate.
26, 27 Muskogee	C	None	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High	Moderate.
28 Nella	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
29 Roellen	D	Occasional	Brief	Jan-May	0-1.0	Apparent	Jan-May	>60	---	High	Low.
30 Roxana	B	Occasional	Brief to long.	Dec-Jun	4.0-6.0	Apparent	Dec-Apr	>60	---	Low	Low.
31 Roxana	B	None	---	---	4.0-6.0	Apparent	Dec-Apr	>60	---	Low	Low.
32 Sallisaw	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
33 Spadra	B	Rare	Very brief to brief.	Dec-Apr	>6.0	---	---	>60	---	Low	High.
34 Taft	C	None	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High	High.
35 Wrightsville	D	None	---	---	0.6-1.5	Perched	Dec-Apr	>60	---	High	High.
36 Yorktown	D	Common	Very long	Oct-Aug	+5-0.5	Apparent	Oct-Aug	>60	---	High	Moderate.

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

TABLE 16--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Barling	Coarse-silty, mixed, thermic Fluvaquentic Dystrochrepts
Cane	Fine-loamy, siliceous, thermic Typic Fragiudults
Crevasse	Mixed, thermic Typic Udipsamments
Dardanelle	Fine-silty, mixed, thermic Typic Argiudolls
Enders	Clayey, mixed, thermic Typic Hapludults
Gallion	Fine-silty, mixed, thermic Typic Hapludalfs
*Guthrie	Fine-silty, siliceous, thermic Typic Fragiaquults
Leadvale	Fine-silty, siliceous, thermic Typic Fragiudults
Linker	Fine-loamy, siliceous, thermic Typic Hapludults
McKamie	Fine, mixed, thermic Vertic Hapludalfs
Moreland	Fine, mixed, thermic Vertic Hapludolls
Mountainburg	Loamy-skeletal, siliceous, thermic Lithic Hapludults
Muskogee	Fine-silty, mixed, thermic Aquic Paleudalfs
Nella	Fine-loamy, siliceous, thermic Typic Paleudults
Roellen	Fine, montmorillonitic, thermic Vertic Haplaquolls
Roxana	Coarse-silty, mixed, nonacid, thermic Typic Udifluvents
Sallisaw	Fine-loamy, siliceous, thermic Typic Paleudalfs
Spadra	Fine-loamy, siliceous, thermic Typic Hapludults
Taft	Fine-silty, siliceous, thermic Glossaquic Fragiudults
Wrightsville	Fine, mixed, thermic Typic Glossaqualfs
Yorktown	Very-fine, montmorillonitic, nonacid, thermic Typic Fluvaquents

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