United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Missouri Department of Natural Resources, Missouri Agricultural Experiment Station, and Jasper County Soil and Water Conservation District

Soil Survey of Jasper County, Missouri

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How To Use This Soil Survey

General Soil Map

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

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

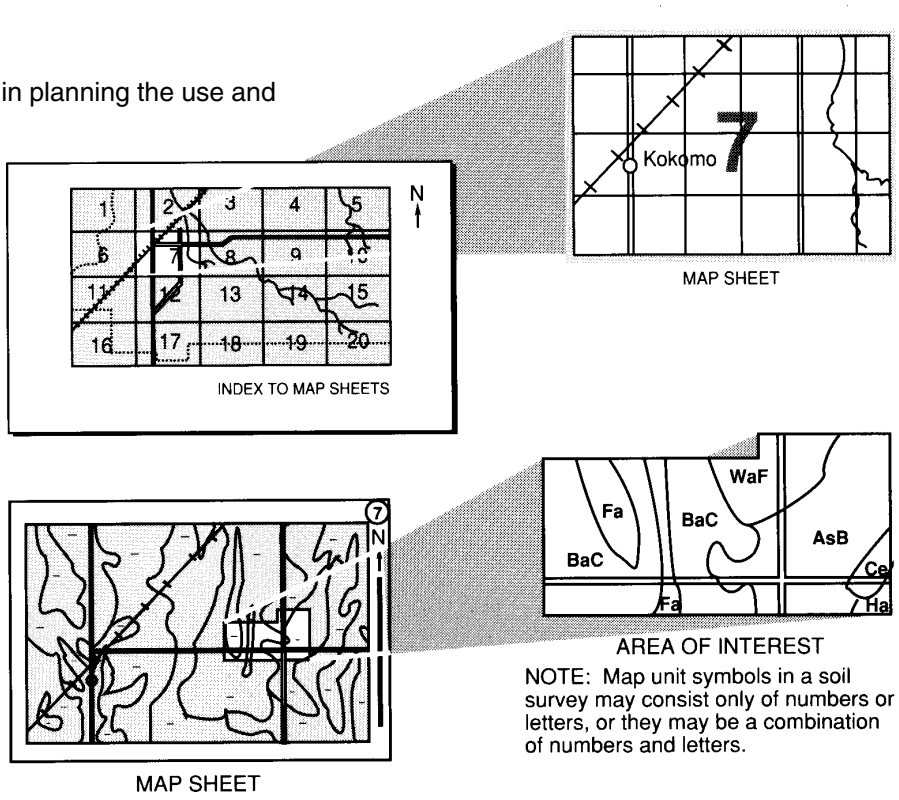
Detailed Soil Maps

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

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

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

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



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

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

Major fieldwork for this soil survey was completed in 1999. Soil names and descriptions were approved in 1999. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1999. This survey was made cooperatively by the Natural Resources Conservation Service, the Missouri Agricultural Experiment Station, and the Missouri Department of Natural Resources. The survey is part of the technical assistance furnished to the Jasper County Soil and Water Conservation District.

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Cover: An area of the Maplegrove-Newtonia-Eldorado association.

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Issued 2002

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

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State Conservationist
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Soil Survey of
Jasper County, Missouri

By Alan C. Peer

Fieldwork by Alan C. Peer, J. Scott Eversoll, and Ken Gregg, Natural Resources Conservation Service, and Kevin Hess, Camille Dobler, and Jeff Woodward, Missouri Department of Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Missouri Department of Natural Resources, the Missouri Agricultural Experiment Station, and the Jasper County Soil and Water Conservation District

JASPER COUNTY is in southwestern Missouri (fig. 1). It is bordered on the north by Barton County, on the east by Dade and Lawrence Counties, on the south by Newton County, and on the west by Cherokee and Crawford Counties, Kansas. The county has a total area of 410,393 acres, or about 641 square miles. Carthage, the county seat, is in the central part of the county. Joplin, the major city in the county, is in the southwestern part. In 1990, Carthage had a population of 10,747, Joplin had a population of 40,961, and Jasper County had 90,465 residents.

Most of Jasper County is in the Cherokee Prairie area of the Central Feed and Grains and Livestock Region of the United States (USDA, 1981). About one-third of the county is in the Ozark Border area of the East and Central Farming and Forest Region of the United States. This area lies mostly adjacent to the Spring River and Center Creek and White Oak Creek (USDA, 1981).

This survey updates the soil survey of Jasper County published in 1954 (Shrader and others, 1954). It provides additional information and has larger maps, which show the soils in greater detail.

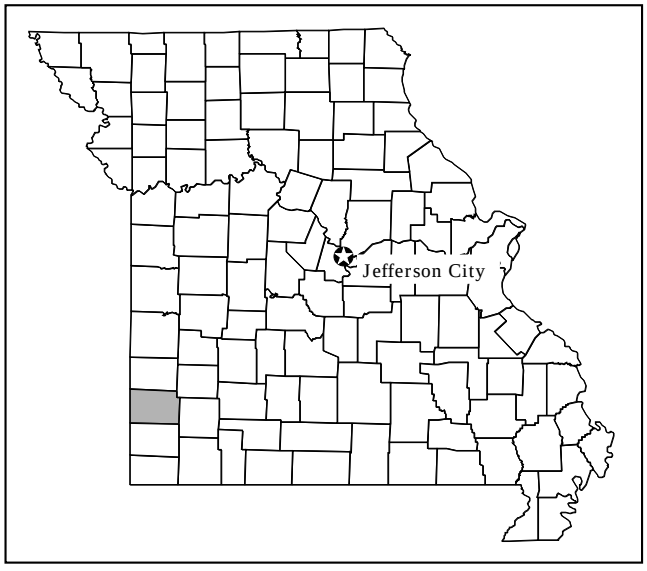

Figure 1.—Location of Jasper County in Missouri.

General Nature of the County

This section provides some general information about Jasper County. It describes relief and drainage; climate; history and development; and physiography, geology, and hydrology.

Relief and Drainage

Jasper County is on the western edge of the Ozark Plateau province. About one-third of the county lies within this province and has hilly topography. About two-thirds is in the Osage Plains province and is a gently rolling and nearly level prairie plain. In the prairie areas, some slopes are steep but short and the

relief is low. In general, the difference in elevation is about 100 feet between the crests of the divides and the flood plains of major stream valleys. Elevations range from 1,200 feet near the southeast corner of the county to 826 feet in the western part where the Spring River exits the county.

Drainage is generally to the west. Major rivers and creeks include the Spring River, Center Creek, the North Fork of the Spring River, Dry Creek, White Oak Creek, and Jenkins Creek.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Joplin in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 35.2 degrees F and the average daily minimum temperature is 25.7 degrees. The lowest temperature on record, which occurred at Joplin on December 22, 1989, was -15 degrees. In summer, the average temperature is 77.6 degrees and the average daily maximum temperature is 87.8 degrees. The highest temperature on record, which occurred at Joplin on July 14, 1954, was 115 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 43.22 inches. Of this total, about 30.23 inches, or 70 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.12 inches at Joplin on September 30, 1986. Thunderstorms occur on about 52 days each year, and most occur between May and August.

The average seasonal snowfall is 12.5 inches. The greatest snow depth at any one time during the period of record was 20 inches recorded on March 17, 1970. On an average, 13 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 20 inches recorded on March 16, 1970.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines about 66 percent of the time possible in summer and 50 percent in winter. During most of the year, the prevailing wind is from the south, but it is from the northwest during February and March. Average windspeed is highest, between 11 and 12 miles per hour, from November to April.

History and Development

The earliest known inhabitants of the survey area were the Osage Indians, but traces of other aboriginal peoples predating the Osage have been found in the county. The Osage called the region of southwestern Missouri, northeastern Oklahoma, and southeastern Kansas "The Country of the Six Bulls," referring to the principal streams in the region, which include the Spring River, Center Creek, North Fork, and Shoal Creek (Ostmeyer, 1988).

The first Europeans in the region, in about 1719, were French explorers and traders (Carthage Chamber of Commerce, 1995). One of the first settlers in the vicinity of Jasper County was Jesse Killey, who built a lodge at an Osage Indian summer village. The lodge was built about 15 miles north of the site of Carthage on the North Fork of the Spring River in what is now Barton County. Later, members of the Hornback and Walton families built a cluster of log huts on a bluff above the Spring River about a mile west-northwest of the site of Carthage. They named this site Jasper (VanGilder, 1994). In 1808, the Federal government purchased the territory of what is now Jasper County from the Osage Indians for $1,200 in cash and $1,500 in merchandise (Brief History of Jasper County, Missouri [Online], 1999). The Osage Indians moved westward to lands assigned in Kansas Territory, and the Turtle Band of the Delaware Tribe briefly claimed the region vacated by the Osage. Their main village was on the banks of Center Creek and was named for their leader, Chief Sarcoxie (VanGilder, 1994).

The first permanent settlers came to Jasper County in 1831 (Carthage Chamber of Commerce, 1995). Thacker Vivion, a native of Kentucky, built a home for his family at the Delaware village in what is now Sarcoxie (Ostmeyer, 1988). After the Osage were expelled in 1837, immigration began. John C. Cox came from Tennessee and settled southwest of Carthage. He established a trading post named Blytheville, which would later become part of the city of Joplin (VanGilder, 1994).

Jasper County, named in honor of Sergeant William Jasper, a hero of the War of Independence, was created by an act of the Missouri Legislature in December 1838. Before that time, the area was part of Barry County. Jasper County was not organized until 1840, and the boundaries were later changed slightly.

The first meeting of the county court of Jasper County was held at the home of George Hornback about 3 miles northwest of Carthage. On April 12, the court selected a plat of ground in Carthage for the courthouse. On March 28, 1842, the county court created a town and chose the name of Carthage for the county seat (VanGilder, 1994). The first courthouse, a frame structure, was erected that year. Within 10 years, a brick structure had been constructed.

Hunting, trapping, and commercial boating were the initial industries in Jasper County. The county grew steadily from its creation until the Civil War. Most of the settlers came from border states southeast of the Mississippi. Most of the newcomers were interested in agriculture. In the 1860 census, the population of Jasper County included 6,533 white people, 15 free blacks, and 335 slaves. Only 14 men and a capital of $25,750 were involved in manufacturing enterprises (Wetzel, 1895).

Before the Civil War, most of the inhabitants of Jasper County were “conditional Union men” (Southern in sympathy but not in favor of secession from the Union). When war broke out, most chose the South (Carthage Chamber of Commerce, 1995).

On July 4, 1861, 1,100 German-American Union troops from St. Louis under the command of General Franz Sigel camped at Carter Spring at Carthage. The next day, 6,000 Confederate troops under the command of Claiborne Jackson broke camp just 18 miles north of Carthage and began to march south as the Union troops marched north. The two armies met 9 miles north of Carthage. The ensuing battle lasted all day and ended in Carthage (Carthage Chamber of Commerce, 1995).

In September 1863, Colonel Jo Shelby conducted a raid from Arkansas deep into Missouri, reaching the Missouri River. Ten engagements were fought with Union troops. When Shelby’s men finally turned back south, the Union Cavalry was in pursuit. Shelby’s men reached the Kendrick farm across the Spring River just north of Carthage. Early on the morning of October 18, 1863, Brigadier General Thomas Ewing attempted to block their progress south. After an hour of fighting, Shelby and his men were able to disengage and escape toward Arkansas. This incident was known as the second battle of Carthage (Carthage Civil War Museum).

During the Civil War, a total of 13 battles or skirmishes were fought in or near Carthage (Carthage Chamber of Commerce, 1995). Many of the skirmishes were between guerrilla bands from both sides. Noncombatants were often the casualties. By the end of the war, Jasper County had fewer than 500 inhabitants (Wetzel, 1895). The county courthouse had been burned in 1863, and the town of Carthage was destroyed. County government was suspended until 1865. Whole sections of land were laid to waste. The lives of all Jasper County residents were changed forever. One of the more famous residents of Jasper County was Myra Maebelle Shirley, who was the daughter of John Shirley. John Shirley owned a hotel in Carthage and was a leading citizen in the community. He was a slave owner and was strongly pro-Southern in sentiment. His son was a Confederate guerrilla and was killed by Union troops, after which John Shirley moved his family to Texas. After the South was defeated, many former guerrillas became outlaws. Maebelle Shirley, embittered as a result of the events of the war, joined some of these men and became Belle Starr, the notorious bandit (Carthage Civil War Museum).

During the war, troops from Indiana, Iowa, and other northern states saw action in and around Jasper County. Some of these men returned to the area to settle after the war. Those involved in guerrilla activities, being fearful of retribution from their war activities, settled in other areas of the country (Carthage Evening Press, November 2, 1950).

After the war, the county grew rapidly. By the early part of 1866, the county had started to rebuild. The county government returned on October 10, 1865, in a session held at Cave Springs School north of Sarcoxie. County records that had been stored during the war at Fort Scott, Kansas, were returned. Several months later the county court returned to Carthage. By 1870, the county’s population had grown to 14,928 (Kennedy, 1988). The county courthouse was rebuilt in 1894-95 in Carthage at a cost of $100,000 (Carthage Chamber of Commerce, “Jasper County Courthouse”).

Thirty years after the Civil War, Jasper County had 26 towns and villages, 152 miles of railroads, and 80 miles of electric railroads, which connected the cities of Carthage, Carterville, Webb City, and Joplin. In 1895, there were 16 flouring mills in the county and 5 quarries producing polished limestone for building and ground limestone used for lime. Other manufacturing plants included canning factories, evaporators, foundries, machine shops, wagon factories, oilcloth plants, and bedspring plants along with other minor factories (Wetzel, 1895).

In 1895, the wheat crop in Jasper County amounted to 750,000 bushels and the corn crop was 1,500,000 bushels. Other crops were flax, oats, and hay. Fruit shipments from Jasper County amounted to 7,500 boxes of pears, 2,580 crates of cherries, 1,200 crates of raspberries, 32,400 crates of strawberries, and around 800,000 barrels of apples (Wetzel, 1895).

One of the major causes for growth in the later part of the 19th century and the early part of the 20th century was the discovery and subsequent mining of lead and zinc in Jasper County and the Tri-State area (the area of mining in Missouri, Kansas, and Oklahoma). During a period from about 1867 to 1912, 29 cities and towns were founded, most of which started as mining camps. In 1836, an explorer discovered a primitive smelter on the banks of Center Creek near Oronogo. The first commercial discovery of lead in Jasper County was not made until 1848 by David Campbell, a miner from eastern Missouri, on land owned by William Tingle 2 miles northwest of Joplin. At about the same time, the site found in 1836 was developed into a mine. The mining camp that grew was called Minersville and later became Oronogo. At about this same period, a slave boy named Pete was digging for fishing worms along the banks of Joplin Creek and unearthed lead chunks, which he took to his master (Kennedy, 1988). John Cox got title to the property in January 1851 (Laas and others).

Most of the early prospectors were local farmers trying to supplement their farm income. They used tools they had fashioned themselves, and most of the mines were small. These conditions tended to limit the size of the mining industry. The growth of the mining industry was also limited by problems with the transportation of the ore. Railroads had not yet come into the county. Most commonly, the ore was transported by wagons to the Spring River, loaded onto flatboats, and floated to the Grand River in Indian Territory to the Arkansas River and eventually to New Orleans (Kennedy, 1988). The production of ore was reduced drastically during the Civil War.

In 1870, Elliott Moffet and John Sargent leased a 10-acre tract of land from John Cox and began the "Discovery Shaft." In 1871, they established their own smelter (Kennedy, 1988). Within a year, 500 people lived in the valley of Turkey Creek. In 1873, the villages of Joplin and Murphysburg merged into one community, which retained the name of Joplin. By 1873, there were 17 smelters in the Joplin mining district. The railroad reached Carthage in 1872 and Joplin in 1877, thus providing a mode of transporting the lead to markets in the East (Laas and others). The Discovery Shaft itself produced 200 tons of lead a week in 1874. As word of the mining spread, new mining camps started. Mining began in Sarcoxie in 1873 and in Webb City and Carterville in 1875 (Kennedy, 1988). Electric trolleys connected the mining camps, and Joplin became the center of the mining district (Laas and others). Also, an electric streetcar line running from Carthage to the mine fields allowed the mine owners to commute from their homes to their work. Carthage thus became the home of many of the mine owners and boasted more millionaires per capita than any other city in the United States at the turn of the 20th century (Carthage Chamber of Commerce, March 1999 [Online]).

By 1880, technological advances had brought changes in the mining and milling of ores. Most of the ore deposits were of low grade. The costs of mining in the hard, flinty rock were relatively high, and the profit margins were low. Mining was thus dependent upon the price of the ore. When prices were high, everyone made a profit. When prices were low, however, only the big operators produced a profit. Most of the small-time miners went out of business. By 1900, most of the leases had been consolidated and mechanization had come to the fields. Bigger operations, financed by Eastern money, began to predominate. By 1894, only three smelters remained in the Joplin district (Laas and others).

In the early days of mining, there was not much market for zinc; thus, the zinc ore was a nuisance and the miners cast much of it aside. With the arrival of the railroads and a better demand for zinc, regular shipments of jack or zinc ore were made to St. Louis (Laas and others).

World War I brought an increased demand for both lead and zinc, and the mining activities also increased. By 1920, the mining industry in Jasper County had begun to decline. The rich veins were beginning to run out, and newer strikes to the west were luring miners out of the county. Joplin's population had fallen from 36,000 to 29,902 in 1920 (Wilson, 1988). The Great Depression brought changes again in the mining industry. Production plummeted, and only large-scale operations were profitable. At the end of the Depression, the miners found themselves working for the large companies instead of being independent miners. The miners had resisted being unionized, but after a period of turmoil and strikes, they unionized in 1935 (Laas and others).

During World War II, when the demand for lead and zinc again increased, the mining industry had a revival. After the war, however, when military needs decreased and peacetime needs were low, the industry suffered another decline. The Korean conflict brought another brief revival in the mining industry (Laas and others). By 1951, there was a shortage of zinc in the American industry and the lead supply was also low. To create a stockpile, the Federal Defense Materials Procurement Agency contracted to buy the output from area mines at a fixed price for up to 2 years. The agency also agreed to pay foreign producers 6 cents a pound more than the prevailing

United States price. Foreign ore flooded the market. The foreign competition, along with the increasing costs and diminishing profits, led to the closing of most mines by the 1960's. All Tri-State mines closed between 1965 and 1970 and were abandoned (Brothers, 1988). Water filled the mines. The cost of pumping the water and disposing of the acid water makes the resumption of mining unlikely (Laas and others).

When the mines closed, unemployment grew and many people left the area. Jasper County recorded a 1 percent drop in population from 1950 to 1960. The 1960 census figure was 78,836 (Brothers, 1988).

A national highways act was passed by the United States Congress in 1925, and a highway was built from Chicago to Los Angeles. This highway, designated as Route 66, passed through Jasper County. It was a major artery for traffic in the United States (Turner, 1999).

From 1960 to the present, Jasper County has continued to grow, expanding the manufacturing and retail businesses while maintaining the agricultural operations. Tourism has also been promoted. In 1990, the county had a population of 90,465 (Carthage Chamber of Commerce, April 1999 [Online]).

Physiography, Geology, and Hydrology

Donald L. Williams, geologist, Natural Resources Conservation Service, helped prepare this section.

Physiography

Most of Jasper County is in the Springfield Plateau section of the Ozarks Physiographic Province. The northwestern part of the county is in an area of transition to the Osage Plains Physiographic Province. The landscape in the county varies in response to the underlying bedrock formations. Many of the mounds and prairies in the northwestern part of the county are capped by resistant sandstones. The slopes below the caps typically developed on less resistant shales.

Geology

The oldest rocks exposed in the county are of Mississippian age; the youngest are of Pennsylvanian age. Bedrock in the county is essentially horizontal, although there is a gentle regional dip toward the west and northwest. The flat-lying nature of the bedrock is locally disturbed by the presence of northwest-to-southeast-trending folds and several northeast-to-southwest-trending faults. The most notable of these is the Seneca Graben, a fault complex that extends from Newton County to the northeast, crossing Interstate Highway 44 (I-44) at mile marker 21.25. Other smaller block faults are present at mile marker 27.3. Because surface rock outcrops are limited, many faults are obvious only in the soils. These faults are geologically old and inactive and are not considered a seismic risk.

Deep, long-term weathering has left behind a very uneven bedrock surface. The bedrock occurs as near-surface exposures in glades and on rocky slopes, but depth to the top of the bedrock ranges to 50 feet in areas of severe bedrock weathering.

From oldest to youngest, the geologic formations that are exposed at the surface in Jasper County are the Pierson Formation, the Reeds Spring, the Elsey Formation, Burlington-Keokuk Limestones, Hindsville Limestone, the Moorefield Formation, and some Pennsylvanian-age Cherokee Group formations (Warner and Riverton Formations). Some of these formations are described in the following paragraphs.

The ***Pierson Formation*** is identifiable in southwestern Jasper County/northwestern Newton County as a tan to greenish gray, finely or medium crystalline limestone. Gray to white calcite crystals are present in some areas. This formation may not actually be exposed in Jasper County but is identified in quarries downstream of Grand Falls in Newton County.

The ***Reeds Spring Formation*** is approximately 50 percent gray and dark gray argillaceous mudstone (fine crystalline limestone) and 50 percent interbedded dark bluish-black chert. The limestones are lighter gray than that of the underlying Pierson Formation, and there is more chert than in the overlying Elsey Formation.

The ***Elsey Formation*** consists of thin, alternating layers of gray limestone and chert. The chert generally occurs as nodules or thin, wavy layers between the thin layers of limestone and locally makes up 30 to 50 percent of the formation. Like the underlying Reeds Spring and Pierson, the Elsey Formation may not actually outcrop in the county. These formations are best exposed in the Springfield area of Greene County.

The ***Burlington-Keokuk Formation*** actually consists of two separate formations (Burlington Limestone and Keokuk Limestone). The two formations are so lithologically similar in southwestern Missouri, however, that they are commonly combined as a single unit. The Burlington-Keokuk Formation consists of gray, coarsely crystalline limestones that generally range in thickness from less than 10 feet to as much as 200 feet. The formation is thin to massive bedded limestone with discontinuous bands of chert and isolated chert nodules. Much of the rock is composed almost entirely of skeletal fragments of an animal

called a crinoid (sea lily). The crinoid is the Missouri state fossil. Weathering of the limestone produces a pitted and rough fossiliferous texture. This texture makes the weathered outcrops popular for fossil hunting. There appear to be few if any outcrops of Burlington Limestone in the county. Those that occur are likely to be in the eastern part near the Lawrence County line. There are many exposures of Keokuk Limestone along I-44.

The Burlington-Keokuk Formation is very susceptible to the formation of sinkholes. Infiltration of surface water through stony residuum and through cracks and fractures in the bedrock has slowly dissolved the calcium in the limestone and formed a network of underground openings. Sinkholes are formed when the ceiling of an underground opening begins to "stope" or enlarge in an upward direction. The soil and rock forming the ceiling of the underground opening continue to collapse until the roof becomes so weak that there is a complete collapse at the surface. There appears to be some correlation between fault zones and concentrations of sinkholes.

The top of the Keokuk Limestone is defined as the top of the Short Creek Oolite Member of the Keokuk Limestone. Rocks above the Short Creek are defined as part of the Warsaw Formation. Oolites are very small (sand-sized), calcareous spheres; the rock is almost entirely made up of these spheres. A faulted outcrop of the Short Creek can be observed at mile marker 27.3.

Outcrops of the Warsaw Formation in Jasper County show that the unit consists predominantly of a slightly cherty fossiliferous limestone. The limestones are typically light gray and are coarsely or medium crystalline; the cherts are nodular and light gray. The Warsaw is notable in that it is the primary rock that makes up the "Carthage Marble" (some of the upper Keokuk was also included in the mining operation). This is the limestone used for construction of the Missouri State Capitol in Jefferson City. It was also used extensively for foundations, steps, caps, and sills in numerous buildings in and around Carthage and Joplin. Although marble production stopped in the early 1980's, the underground mines are still used for crushed rock and lime.

The ***Pennsylvanian-age sandstone and conglomerates*** are an unassigned bedrock unit that should rest unconformably on Mississippian rocks in the northwestern parts of the county. The major components of the unit are red to brown, fine to coarse grained sandstone and cobble conglomerates with a sandstone/ironstone matrix. Some red to black shales also occur in the unit. The sandstone is typically very distinctive, containing a high concentration of chert gravels, cobbles, and boulders surrounded by a matrix of quartz sands cemented with iron, silica, and clay. The rocks are poorly cemented; in many places, gravels and sand are the only evidence of the unit's presence. The soil cover on the sandstone is generally thin, and the residual material shows the marked influence of sandstone. Actual outcrops of the unit have not been observed, but soils apparently derived from similar materials were mapped in the Joplin-Webb City area.

The Pennsylvanian-age ***Riverton Formation*** is mostly dark gray, thickly laminated shale with thin lenticular bedded sandstone and two thin coal beds. The upper part is mostly gray shale and clay and includes as many as three thin coal beds. The Riverton forms the long, relatively gentle slopes of the mounds along the border with Barton County.

The Pennsylvanian-age ***Warner Formation*** is the cap rock for many of the mounds in Jasper County. The lower part of the formation is mostly interbedded, very fine grained sandstone and claystone; the upper part is largely medium to massive bedded channel-fill sandstone. A siltstone unit was identified near Cossville during soil mapping. This unit is either in the Riverton Formation or the Warner Formation.

A rock unit that deserves mention because of its unique nature is the ***Grand Falls Chert***. The Grand Falls is a massive sheet chert, typically several feet thick and free of limestone. The most notable outcrop is just south of Jasper County in Joplin, at Grand Falls of Shoal Creek. About 30 to 35 feet of chert is exposed at this location. Grand Falls cherts are not formation specific. They are found in or replacing rocks throughout the Mississippian section.

Mining History.—No discussion of the geology of Jasper County is complete without mentioning the Tri-State Mining District. This district, covering parts of southwestern Missouri, southeastern Kansas, and northeastern Oklahoma, was one of the major mining districts in the world from 1850 to 1960. For much of that period, the district produced 50 percent of the zinc and 10 percent of the lead in the United States. The first discovery in the county was reportedly near Turkey Creek, at the northwest edge of what is now the city of Joplin. Most of the early mining was for lead; the first zinc was not produced in the district until the early 1870's. By 1875, Missouri had become the leading zinc producer in the country. Signs of the old mining activities can be seen all around the Joplin area, but especially in the Duenweg-Webb City-Oronogo areas. The Tri-State Mineral Museum in Joplin features many exhibits about the mining activities.

Currently, the only mining activities in the county are the occasional production of gravel from area streams and the production of crushed limestones and lime in quarries near Carthage and in the Joplin-Webb City area.

Hydrology

All of the bedrock units below the Pennsylvanian will yield water to some degree. The Mississippian-age formations produce 1 to 10 gallons per minute in shallow wells. The quality of much of the shallow ground water has deteriorated because of contamination from the surface, contamination from mining, and poorly constructed and cased wells. The major high-yielding sources of ground water in the county are the dolomites of the lower Ordovician-Cambrian formations. Several cities obtain water from wells in these formations. Wells drilled for private water supplies are typically 150 to 400 feet deep and yield 10 to 25 gallons per minute. Wells drilled for public water supplies are generally 500 to 1,000 feet deep and yield up to 500 gallons per minute.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are

predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

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

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one association can occur in another but in a different pattern.

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

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

1. Maplegrove-Newtonia-Eldorado Association

Setting

Landform: Interfluves
Slope range: 1 to 8 percent

Composition

Extent of the association in the survey area: 46 percent
Extent of the soils in the association (fig. 2):
Maplegrove and similar soils—43 percent
Newtonia and similar soils—29 percent
Eldorado and similar soils—20 percent
Minor soils—8 percent

Minor Soils

- Gerald soils in depressions

Landscape

Maplegrove

Parent material: Loess over colluvium over residuum derived from limestone
Slope class: Very gently sloping

Newtonia

Parent material: Loess over residuum derived from limestone
Slope class: Very gently sloping

Eldorado

Parent material: Colluvium over residuum derived from limestone
Slope class: Very gently sloping to moderately sloping

2. Hoberg-Eldorado-Pomme Association

Setting

Landform: Ridges and hills
Slope range: 1 to 5 percent

Composition

Extent of the association in the survey area: 1 percent
Extent of the soils in the association:
Hoberg and similar soils—50 percent
Eldorado and similar soils—25 percent
Pomme and similar soils—25 percent

Landscape

Hoberg

Parent material: Loess over colluvium over residuum
Slope class: Very gently sloping

Eldorado

Parent material: Colluvium over residuum
Slope class: Very gently sloping

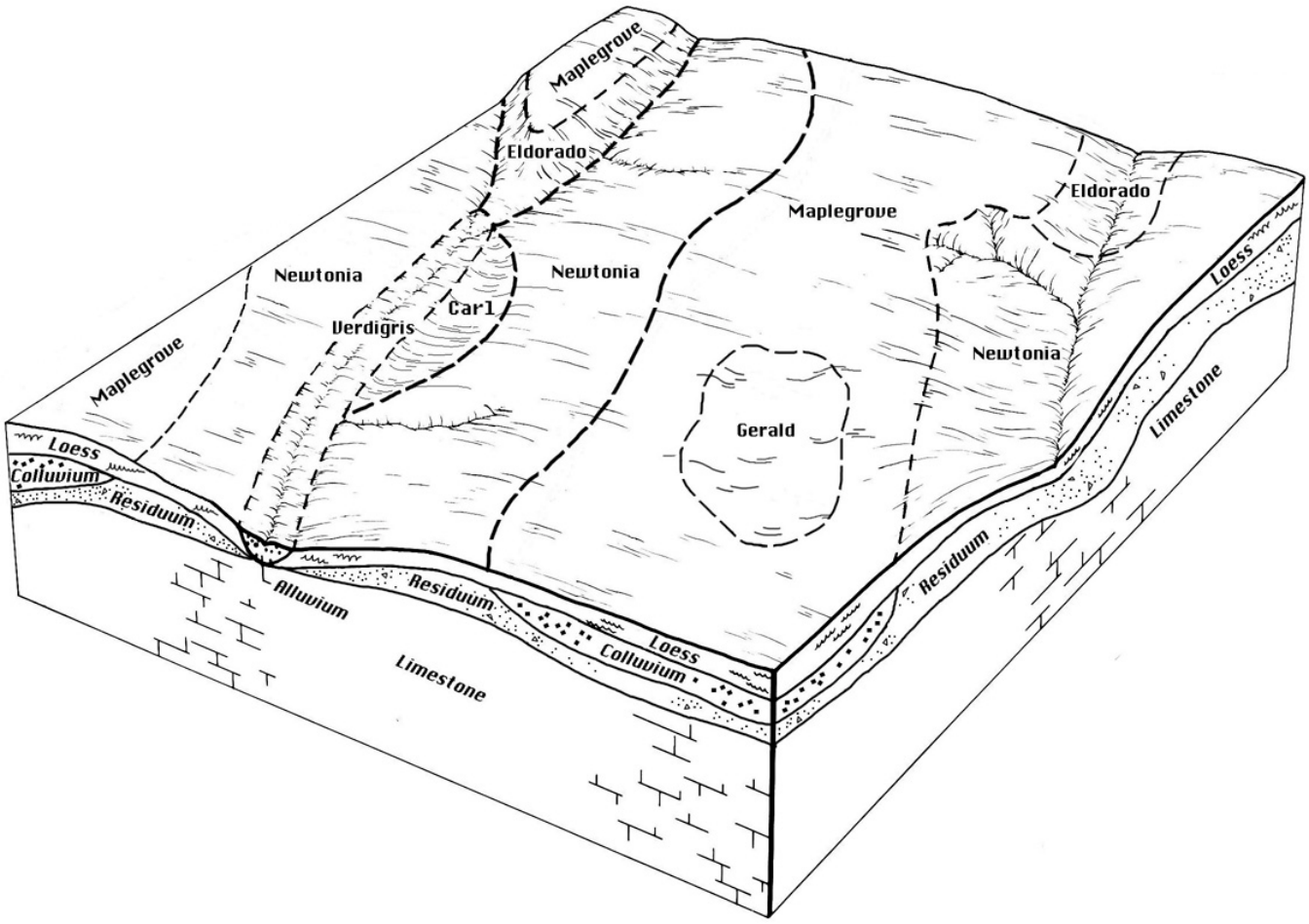

Figure 2.—Typical pattern of soils and parent material in the Maplegrove-Newtonia-Eldorado association.

Pomme

Parent material: Loess over colluvium over residuum
Slope class: Very gently sloping

3. Rueter-Pomme Association

Setting

Landform: Interfluves, sinkholes, ridges, and hills
Slope range: 1 to 35 percent

Composition

Extent of the association in the survey area: 19 percent
Extent of the soils in the association (fig. 3):
Rueter and similar soils—57 percent
Pomme and similar soils—21 percent
Minor soils—22 percent

Minor Soils

- Goss soils on side slopes
- Winnipeg soils on footslopes

Landscape

Rueter

Parent material: Colluvium over residuum derived from limestone
Slope class: Very gently sloping to strongly sloping

Pomme

Parent material: Loess over colluvium over residuum
Slope class: Very gently sloping

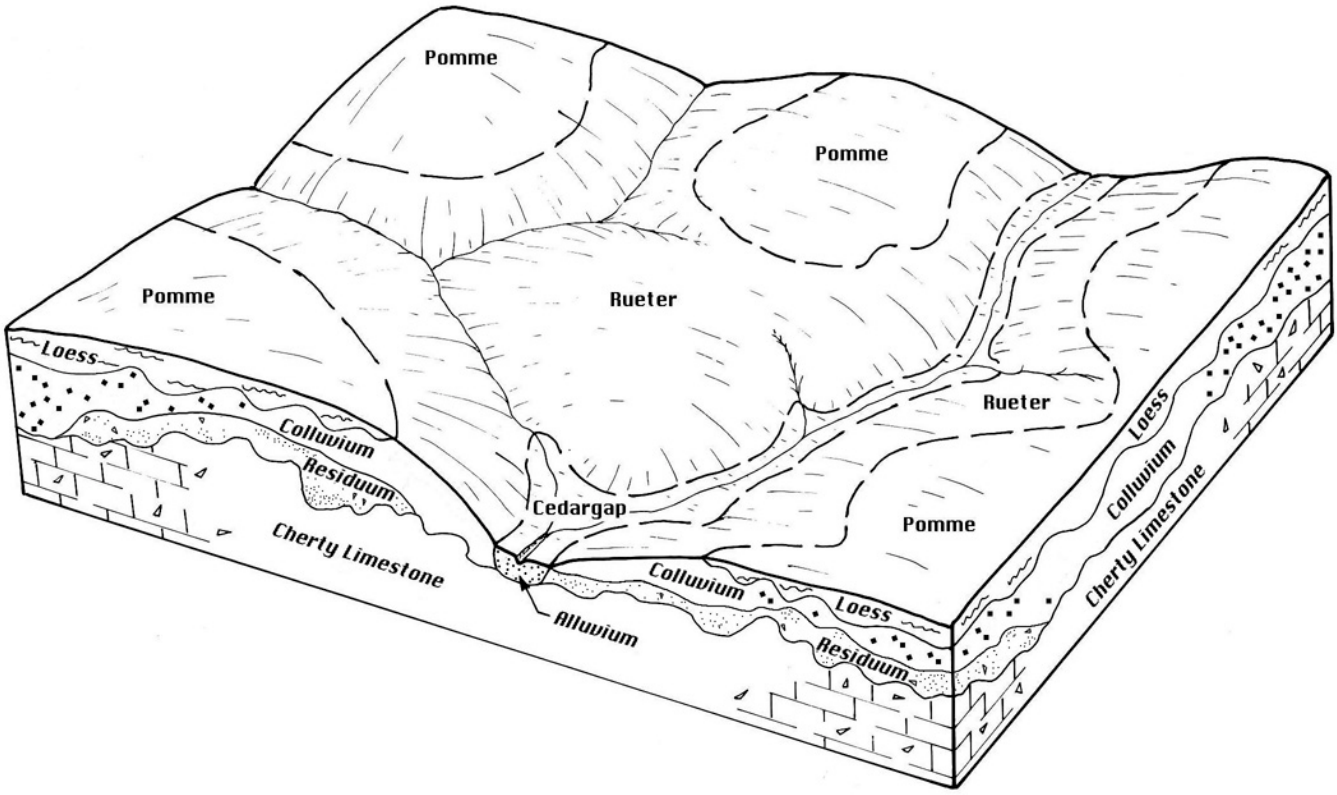

Figure 3.—Typical pattern of soils and parent material in the Rueter-Pomme association.

4. Opolis-Cherokee-Medoc Association

Setting

Landform: Interfluves and stream terraces
Slope range: 0 to 3 percent

Composition

Extent of the association in the survey area: 10 percent
Extent of the soils in the association (fig. 4):
Opolis and similar soils—45 percent
Cherokee and similar soils—25 percent
Medoc and similar soils—13 percent
Minor soils—17 percent

Minor Soils

- McCune soils on terraces

Landscape

Opolis

Parent material: Loess over residuum derived from shale and siltstone
Slope class: Level or very gently sloping

Cherokee

Parent material: Loess over alluvium
Slope class: Level

Medoc

Parent material: Loess over residuum derived from shale and siltstone
Slope class: Level

5. Barden-Sylvania-Barco Association

Setting

Landform: Ridges and hills
Slope range: 1 to 15 percent

Composition

Extent of the association in the survey area: 8 percent
Extent of the soils in the association (fig. 5):
Barden and similar soils—59 percent

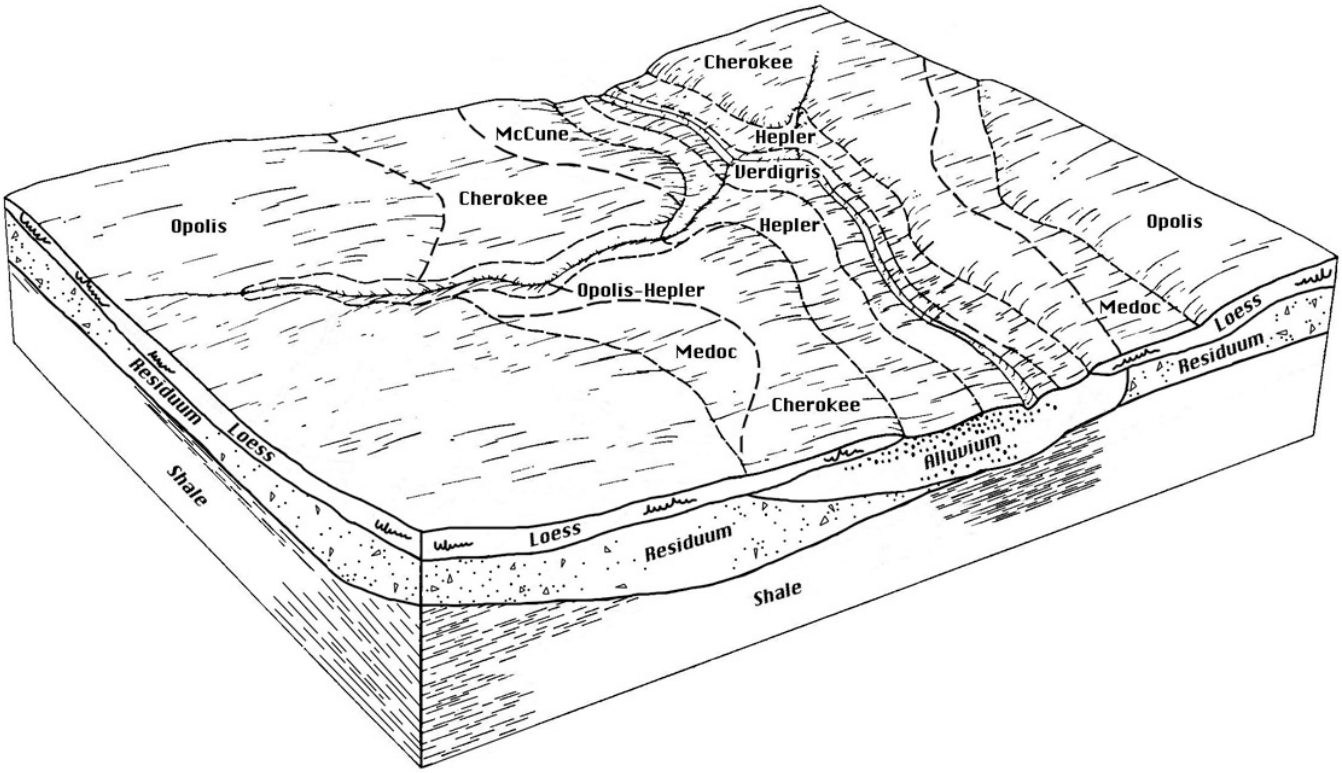

Figure 4.—Typical pattern of soils and parent material in the Opolis-Cherokee-Medoc association.

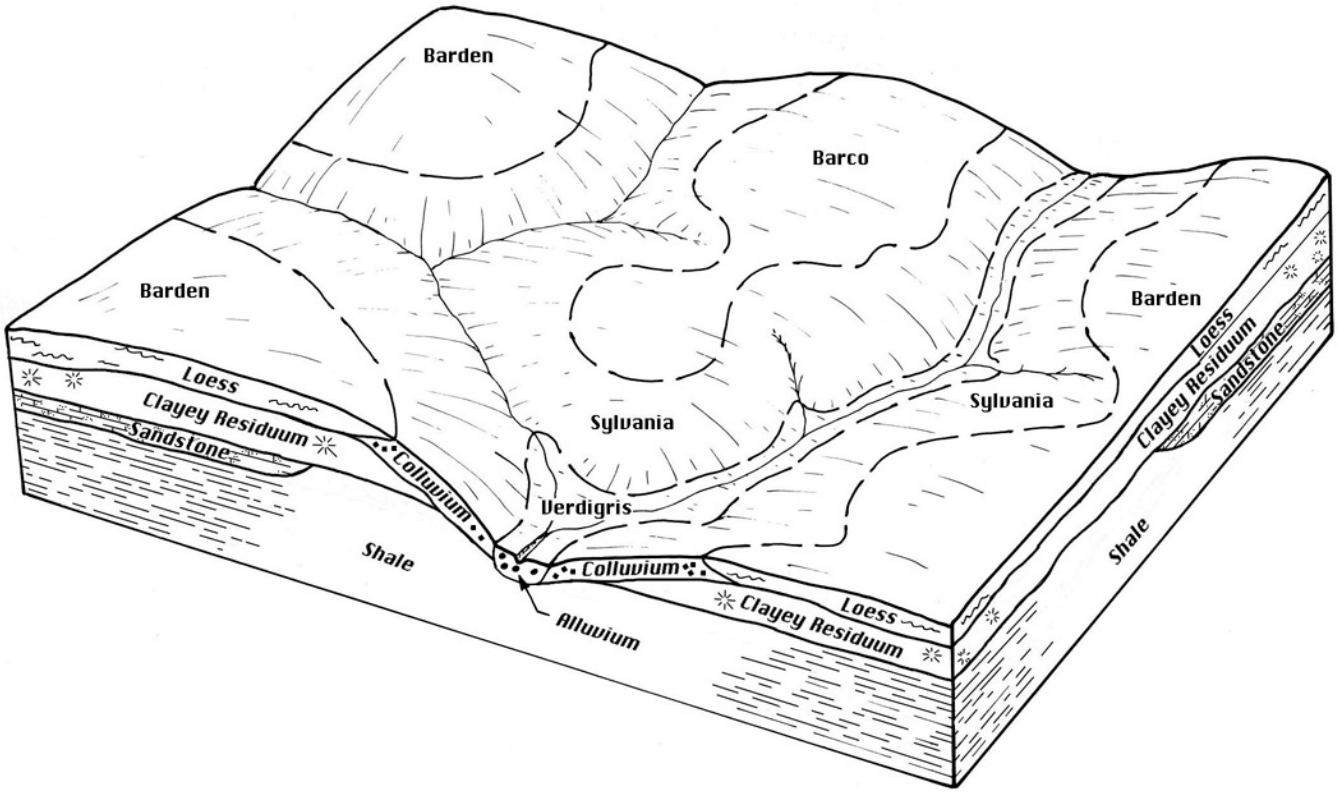

Figure 5.—Typical pattern of soils and parent material in the Barden-Sylvania-Barco association.

Sylvania and similar soils—27 percent
Barco and similar soils—7 percent
Minor soils—7 percent

Minor Soils

- Verdigris soils on flood plains

Landscape

Barden

Parent material: Loess over clayey residuum
Slope class: Very gently sloping

Sylvania

Parent material: Colluvium over residuum derived from shale and sandstone
Slope class: Very gently sloping to strongly sloping

Barco

Parent material: Colluvium over residuum derived from siltstone or sandstone
Slope class: Very gently sloping

6. Verdigris-Cedargap-Bearthicket Association

Setting

Landform: Flood plains
Slope range: 0 to 1 percent

Composition

Extent of the association in the survey area: 16 percent
Extent of the soils in the association (fig. 6):
Verdigris and similar soils—37 percent

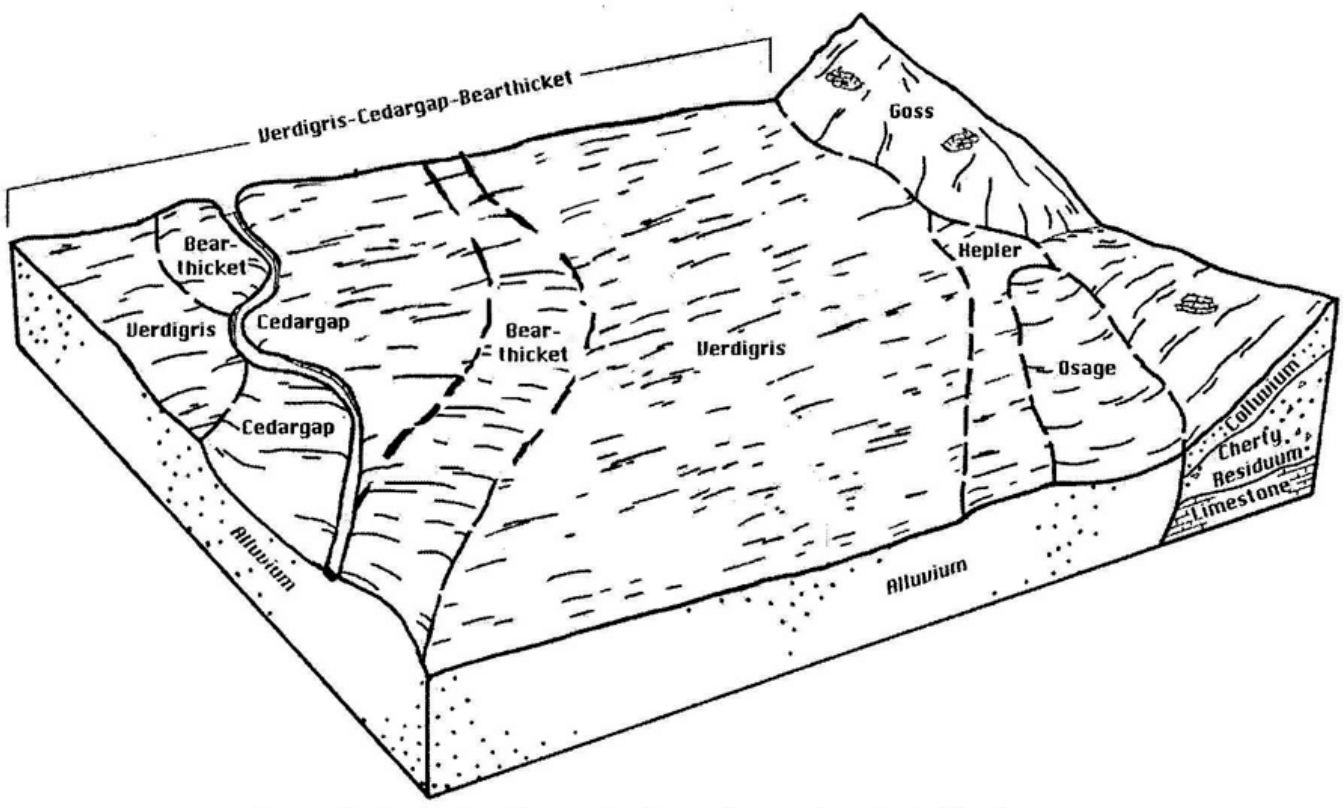

Figure 6.—Typical pattern of soils and parent material in the Verdigris-Cedargap-Bearthicket association.

Cedargap and similar soils—23 percent
Bearthicket and similar soils—16 percent
Minor soils—24 percent

Minor Soils

- Hepler and Osage soils on flood plains

Landscape

Verdigris

Parent material: Alluvium

Slope class: Level

Cedargap

Parent material: Alluvium
Slope class: Level

Bearthicket

Parent material: Alluvium
Slope class: Level

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and provides information about soil properties that may need to be considered in planning for specific uses. A detailed profile description and range in characteristics for each soil are provided under the heading “Soil Series and Their Morphology.”

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into ***soil phases***. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Opolis loam, 1 to 3 percent slopes, moderately eroded, is a phase of the Opolis series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A ***complex*** consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Pomme-Rueter complex, 1 to 3 percent slopes, is an example.

This survey includes ***miscellaneous areas***. Such areas have little or no soil material and support little or

no vegetation. The map unit Pits and Quarries is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

40000—Barden silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Barden

Percent of the map unit: 93 percent
Parent material: Loess over residuum derived from clayey shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 24 to 36 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 10 inches; silt loam
2Bt—10 to 47 inches; silty clay loam
3Bt—47 to 80 inches; silty clay loam

Minor Components

Barco and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Summits of hills on plains

Eldorado and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 3 to 8 percent
Landform: Backslopes of hills on plateaus

Sylvania and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 8 to 15 percent
Landform: Backslopes of hills on plains

40011—Barco loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Barco

Percent of the map unit: 90 percent
Position on the landform: Summits
Parent material: Loamy colluvium over residuum derived from sandstone and shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Moderately deep (20 to 40 inches)
Runoff rate: Medium
Depth to restrictive feature: 20 to 40 inches to bedrock (lithic)

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

A—0 to 11 inches; loam
BA—11 to 17 inches; loam
Bt—17 to 22 inches; loam
BC—22 to 30 inches; fine sandy loam
R—30 to 60 inches; weathered sandstone bedrock

Minor Components

Barden and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Summits of hills on plains

Soils that are less than 20 inches deep to bedrock

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent

40015—Eldorado silt loam, 1 to 3 percent slopes, very stony

Map Unit Setting

Landform: Hills on plateaus

Component Description

Eldorado

Percent of the map unit: 100 percent

Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Percent of surface covered by rock fragments: 0 to 3 percent (subrounded stones)
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
A—7 to 20 inches; very cobbly silt loam
Bt1—20 to 33 inches; extremely cobbly silt loam
2Bt2—33 to 80 inches; very cobbly clay

40016—Eldorado very gravelly silt loam, 3 to 8 percent slopes, very stony

Map Unit Setting

Landform: Hills on plateaus (fig. 7)

Component Description

Eldorado

Percent of the map unit: 98 percent
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Percent of surface covered by rock fragments: 0 to 3 percent (subrounded stones)
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 6 inches; very gravelly silt loam
A—6 to 15 inches; extremely cobbly silt loam
Bt1—15 to 34 inches; extremely cobbly silt loam
2Bt2—34 to 64 inches; very cobbly clay
3R—64 inches; limestone bedrock

Minor Components

Winnipeg and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 1 to 3 percent
Landform: Footslopes of hills on plateaus

Cedargap and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 3 percent
Landform: Flood plains in river valleys

Rock outcrop

Estimated percent of the map unit: 0.4 percent

40017—Maplegrove silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Interfluves on plateaus (fig. 8)

Component Description

Maplegrove

Percent of the map unit: 97 percent
Parent material: Loess over silty and clayey colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 13 to 27 inches
Drainage class: Moderately well drained

Typical Profile

A—0 to 11 inches; silt loam
2Bt—11 to 27 inches; silty clay
3Bt—27 to 46 inches; gravelly silty clay loam
4Bt—46 to 80 inches; very gravelly clay

Minor Components

Carl and similar soils

Estimated percent of the map unit: 0 to 1 percent

Figure 7.—Cattle grazing tall fescue on a black walnut plantation in an area of Eldorado very gravelly silt loam, 3 to 8 percent slopes, very stony.

Slope range: 0 to 1 percent
Landform: Terraces on plains

Eldorado and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 1 to 8 percent
Landform: Backslopes of hills on plateaus

Gerald and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 2 percent
Landform: Summits of divides on uplands

40018—Medoc silt loam, 0 to 1 percent slopes

Map Unit Setting

Landform: Interfluves on plains

Component Description

Medoc

Percent of the map unit: 100 percent
Parent material: Loess over residuum
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 12 to 18 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 9 inches; silt loam
E—9 to 13 inches; silt loam
2Btssg—13 to 32 inches; silty clay
3Btg—32 to 75 inches; silty clay loam
4Btg—75 to 80 inches; silty clay loam

Figure 8.—Tall fescue pasture in an area of Maplegrove silt loam, 1 to 3 percent slopes.

40019—Newtonia-Eldorado silt loams, 1 to 3 percent slopes

Map Unit Setting

Landform: Interfluves on plateaus

Component Description

Newtonia

Percent of the map unit: 75 percent
Parent material: Loess over fine-silty residuum over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

A—0 to 15 inches; silt loam
Bt1—15 to 29 inches; silty clay loam
Bt2—29 to 80 inches; silty clay loam

Eldorado

Percent of the map unit: 20 percent
Position on the landform: Summits
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
A—7 to 20 inches; very cobbly silt loam
Bt1—20 to 33 inches; extremely cobbly silt loam
2Bt2—33 to 80 inches; very cobbly clay

Minor Components

Soils that are 40 to 60 inches deep to bedrock

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent

40020—Newtonia-Eldorado silt loams, 1 to 3 percent slopes, moderately eroded

Map Unit Setting

Landform: Interfluves on plateaus

Component Description

Newtonia

Percent of the map unit: 75 percent
Parent material: Loess over fine-silty residuum over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

A—0 to 8 inches; silt loam
BA—8 to 24 inches; silty clay loam
Bt—24 to 80 inches; silty clay loam

Eldorado

Percent of the map unit: 20 percent
Position on the landform: Summits
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None

Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
A—7 to 20 inches; very cobbly silt loam
Bt1—20 to 33 inches; extremely cobbly silt loam
2Bt2—33 to 80 inches; very cobbly clay

Minor Components

Soils that are 40 to 60 inches deep to bedrock

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent

40021—Opolis-Hepler silt loams, 1 to 15 percent slopes

Map Unit Setting

Landform: Interfluves on plains

Component Description

Opolis

Percent of the map unit: 51 percent
Parent material: Loess over residuum
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: High
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 13 to 24 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 8 inches; silt loam
E—8 to 15 inches; silt loam
2Bt—15 to 30 inches; silty clay
3Bt—30 to 70 inches; silty clay loam
4Btg—70 to 80 inches; silty clay

Hepler

Percent of the map unit: 44 percent
Parent material: Silty alluvium
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: Occasional
Ponding: None
Current depth to water table: 12 to 36 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 8 inches; silt loam
E—8 to 18 inches; silt loam
Btg—18 to 48 inches; silt loam
2Btg—48 to 80 inches; silty clay loam

Minor Components

Saturated soils

Estimated percent of the map unit: 0 to 5 percent
Landform: Depressions on plains

40022—Opolis silt loam, 0 to 1 percent slopes

Map Unit Setting

Landform: Interfluves on plains

Component Description

Opolis

Percent of the map unit: 100 percent
Parent material: Loess over residuum
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 13 to 24 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 8 inches; silt loam
E—8 to 15 inches; silt loam
2Bt—15 to 30 inches; silty clay
3Bt—30 to 70 inches; silty clay loam
4Btg—70 to 80 inches; silty clay

40023—Opolis silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Interfluves on plains (fig. 9)

Component Description

Opolis

Percent of the map unit: 100 percent
Parent material: Loess over residuum
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: High
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 13 to 24 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 8 inches; silt loam
E—8 to 15 inches; silt loam
2Bt—15 to 30 inches; silty clay
3Bt—30 to 70 inches; silty clay loam
4Btg—70 to 80 inches; silty clay

40024—Opolis loam, 1 to 3 percent slopes, moderately eroded

Map Unit Setting

Landform: Interfluves on plains

Component Description

Opolis

Percent of the map unit: 100 percent
Parent material: Loess over residuum
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: High
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 13 to 24 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 6 inches; loam
2Bt—6 to 14 inches; silty clay
3Bt—14 to 35 inches; silty clay loam
4Btg—35 to 72 inches; clay loam

40026—Sylvania gravelly silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Sylvania

Percent of the map unit: 90 percent
Parent material: Gravelly colluvium over clayey residuum derived from sandstone and shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Runoff rate: Medium
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 21 to 48 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 6 inches; gravelly silt loam
A—6 to 20 inches; gravelly silt loam
BA—20 to 23 inches; extremely gravelly silty clay
2Bt—23 to 52 inches; silty clay
2Cr—52 to 80 inches; weathered shale bedrock

Minor Components

Sylvania soils that have a very gravelly subsoil

Estimated percent of the map unit: 0 to 30 percent
Slope range: 1 to 3 percent
Landform: Summits of hills on plains

Sylvania soils that are fine-loamy

Estimated percent of the map unit: 0 to 20 percent
Slope range: 1 to 3 percent
Landform: Summits of hills on plains

Figure 9.—Native prairie in an area of Opolis silt loam, 1 to 3 percent slopes.

40027—Sylvania very gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Sylvania

Percent of the map unit: 90 percent
Parent material: Gravelly colluvium over clayey residuum derived from sandstone and shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Runoff rate: High
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 30 to 48 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 5 inches; very gravelly silt loam
A—5 to 12 inches; extremely gravelly silt loam
Bt1—12 to 19 inches; extremely gravelly silty clay
2Bt2—19 to 57 inches; silty clay
2Cr—57 to 80 inches; weathered shale bedrock

Minor Components

Sylvania soils that have a very gravelly subsoil

Estimated percent of the map unit: 0 to 30 percent
Slope range: 3 to 8 percent
Landform: Backslopes of hills on plains

Sylvania soils that are fine-loamy

Estimated percent of the map unit: 0 to 20 percent
Slope range: 3 to 8 percent
Landform: Backslopes of hills on plains

40028—Sylvania loam, 3 to 8 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Sylvania

Percent of the map unit: 80 percent
Position on the landform: Shoulders
Parent material: Colluvium over clayey residuum derived from sandstone and shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Runoff rate: Medium
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 30 to 48 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 7 inches; loam
BA—7 to 12 inches; clay loam
2Bt—12 to 44 inches; silty clay
2Cr—44 to 60 inches; weathered shale bedrock

Minor Components

Sylvania fine sandy loam and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 3 to 8 percent
Landform: Shoulders of hills on plains

Soils that have a stony surface

Estimated percent of the map unit: 0 to 10 percent
Slope range: 3 to 8 percent
Landform: Shoulders of hills on plains

Sylvania soils that have a very gravelly subsoil

Estimated percent of the map unit: 0 to 5 percent
Slope range: 3 to 8 percent
Landform: Shoulders of hills on plains

Sylvania soils that are fine-loamy

Estimated percent of the map unit: 0 to 10 percent
Slope range: 3 to 8 percent
Landform: Shoulders of hills on plains

40029—Sylvania loam, 8 to 15 percent slopes

Map Unit Setting

Landform: Hills on plains

Component Description

Sylvania

Percent of the map unit: 74 percent
Parent material: Colluvium over clayey residuum derived from sandstone and shale
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Runoff rate: High
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 21 to 48 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 8 inches; loam
2Bt—8 to 30 inches; silty clay
2CB—30 to 56 inches; silty clay
2Cr—56 to 80 inches; weathered shale bedrock

Minor Components

Soils that have a stony surface

Estimated percent of the map unit: 0 to 20 percent
Slope range: 8 to 15 percent
Landform: Shoulders of hills on plains

Sylvania fine sandy loam and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 8 to 15 percent
Landform: Backslopes of hills on plains

Sylvania soils that have a very gravelly subsoil

Estimated percent of the map unit: 0 to 5 percent

Slope range: 8 to 15 percent
Landform: Backslopes of hills on plains

Sylvania soils that are fine-loamy

Estimated percent of the map unit: 0 to 10 percent
Slope range: 8 to 15 percent
Landform: Backslopes of hills on plains

McCune and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 1 percent
Landform: Terraces on plains

44000—Cherokee silt loam, 0 to 1 percent slopes

Map Unit Setting

Landform: Terraces on plains

Component Description

Cherokee

Percent of the map unit: 99 percent
Parent material: Loess over alluvium
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 12 to 18 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 11 inches; silt loam
E—11 to 16 inches; silt loam
2Btg—16 to 35 inches; silty clay
3Btg—35 to 60 inches; silty clay loam
4Btg—60 to 99 inches; silty clay loam

Minor Components

McCune and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 1 percent
Landform: Terraces on plains

44002—Carl silty clay loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

Landform: Stream terraces on plains

Component Description

Carl

Percent of the map unit: 100 percent
Parent material: Clayey alluvium
Slope shape: Concave

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: Rare
Ponding: None
Current depth to water table: 0 to 18 inches
Drainage class: Poorly drained

Typical Profile

A—0 to 13 inches; silty clay loam
2Bt—13 to 27 inches; silty clay
2Bssg—27 to 68 inches; silty clay
3Btg—68 to 80 inches; very gravelly clay

44004—McCune silt loam, 0 to 1 percent slopes

Map Unit Setting

Landform: Terraces on plains

Component Description

McCune

Percent of the map unit: 100 percent
Parent material: Silty alluvium
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None

Current depth to water table: 12 to 36 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 11 inches; silt loam
E—11 to 22 inches; silt loam
2Btg—22 to 80 inches; silty clay loam

46001—Verdigris silt loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Landform: Flood plains in river valleys

Component Description

Verdigris

Percent of the map unit: 86 percent
Parent material: Silty alluvium
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: Frequent
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

A—0 to 3 inches; silt loam
AB—3 to 39 inches; silty clay loam
Bt—39 to 80 inches; silt loam

Minor Components

Verdigris silty clay loam and similar soils

Estimated percent of the map unit: 0 to 15 percent
Slope range: 0 to 1 percent
Landform: Flood plains in river valleys

Areas incised by stream channels

Estimated percent of the map unit: 0 to 30 percent
Landform: Flood plains in river valleys

Osage and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 1 percent
Landform: Flood plains in river valleys

46002—Hepler silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Landform: Flood plains in river valleys (fig. 10)

Component Description

Hepler

Percent of the map unit: 94 percent
Parent material: Silty alluvium
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding frequency: Occasional
Ponding: None
Current depth to water table: 12 to 36 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 8 inches; silt loam
E—8 to 18 inches; silt loam
Btg—18 to 48 inches; silt loam
2Btg—48 to 80 inches; silty clay loam

Minor Components

Saturated soils

Estimated percent of the map unit: 0 to 5 percent
Landform: Depressions on flood plains in river valleys

Winnipeg and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 1 to 3 percent
Landform: Footslopes of hills on plateaus

46004—Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Landform: Flood plains in river valleys

Component Description

Osage

Percent of the map unit: 100 percent
Parent material: Clayey alluvium
Slope shape: Concave

Figure 10.—Grain sorghum in an area of Hepler silt loam, 0 to 1 percent slopes, occasionally flooded.

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding frequency: Occasional
Ponding: None
Current depth to water table: 0 to 18 inches
Drainage class: Poorly drained

Typical Profile

Ap—0 to 7 inches; silty clay loam
A—7 to 10 inches; silty clay
Bss—10 to 43 inches; silty clay
Btg—43 to 80 inches; silty clay loam

46005—Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Landform: Flood plains in river valleys

Component Description

Verdigris

Percent of the map unit: 94 percent
Parent material: Silty alluvium
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding frequency: Occasional (fig. 11)
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

A—0 to 7 inches; silt loam
AB—7 to 29 inches; silty clay loam
Bt—29 to 80 inches; silt loam

Minor Components

Verdigris silty clay loam and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 0 to 1 percent
Landform: Flood plains in river valleys

Cedargap and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 3 percent
Landform: Flood plains in river valleys

70006—Creldon silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Divides on uplands

Component Description

Creldon

Percent of the map unit: 90 percent
Parent material: Loess over gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: 18 to 35 inches to a fragipan

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 18 to 36 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 8 inches; silt loam
Bt—8 to 27 inches; silty clay
2Btx—27 to 37 inches; very gravelly silt loam
3Bt—37 to 60 inches; very gravelly clay

Minor Components

Barden and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Summits of divides on uplands

70012—Hoberg silt loam, 2 to 5 percent slopes

Map Unit Setting

Landform: Ridges on uplands

Component Description

Hoberg

Percent of the map unit: 90 percent
Position on the landform: Summits
Parent material: Fine-loamy colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: 20 to 36 inches to a fragipan

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 12 to 36 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 12 inches; silt loam

Figure 11.—Flooding in an area of Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded.

Bt—12 to 26 inches; silt loam
2Btx—26 to 42 inches; extremely cobbly silty clay loam
3Bt—42 to 62 inches; extremely cobbly clay

Minor Components

Wanda soils (mapped in Dade County)

Estimated percent of the map unit: 0 to 5 percent
Slope range: 2 to 5 percent
Landform: Footslopes on paleoterraces in river valleys

70045—Keeno gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landform: Ridges on uplands

Component Description

Keeno

Percent of the map unit: 90 percent
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: High
Depth to restrictive feature: 18 to 36 inches to a fragipan

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 18 to 30 inches
Drainage class: Moderately well drained

Typical Profile

A—0 to 6 inches; gravelly silt loam
Bt—6 to 19 inches; very gravelly silty clay loam
Btx—19 to 29 inches; extremely gravelly silt loam
2Bt—29 to 60 inches; extremely gravelly clay

Minor Components

Hoberg and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 2 to 5 percent
Landform: Summits of ridges on uplands

70056—Crackerneck extremely gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

Landform: Ridges on plateaus

Component Description

Crackerneck

Percent of the map unit: 100 percent
Position on the landform: Backslopes
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: High
Percent of surface covered by rock fragments: 0 to 0.01 percent (subangular stones)
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 16 to 36 inches
Drainage class: Moderately well drained

Typical Profile

A—0 to 9 inches; extremely gravelly silt loam
Bt—9 to 23 inches; extremely gravelly silt loam
2Bt—23 to 42 inches; extremely gravelly clay
3Bt—42 to 68 inches; extremely gravelly clay

70057—Crackerneck extremely gravelly silt loam, 15 to 35 percent slopes

Map Unit Setting

Landform: Ridges on plateaus

Component Description

Crackerneck

Percent of the map unit: 100 percent
Position on the landform: Backslopes
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Very high

Percent of surface covered by rock fragments: 0 to 0.01 percent (subangular stones)
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 16 to 36 inches
Drainage class: Moderately well drained

Typical Profile

A—0 to 9 inches; extremely gravelly silt loam
Bt—9 to 23 inches; extremely gravelly silt loam
2Bt—23 to 42 inches; extremely gravelly clay
3Bt—42 to 68 inches; extremely gravelly clay

70058—Crackerneck very gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landform: Ridges on plateaus

Component Description

Crackerneck

Percent of the map unit: 100 percent
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Percent of surface covered by rock fragments: 0 to 0.01 percent (subangular stones)
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 16 to 36 inches
Drainage class: Moderately well drained

Typical Profile

A—0 to 4 inches; very gravelly silt loam
AB—4 to 7 inches; very gravelly silt loam
Bt—7 to 29 inches; extremely gravelly silt loam
2Bt—29 to 42 inches; extremely gravelly clay
3Bt—42 to 65 inches; extremely gravelly clay
4R—65 inches; chert bedrock

70059—Goss extremely gravelly silt loam, 15 to 35 percent slopes, rocky

Map Unit Setting

Landform: Hills on plateaus

Component Description

Goss

Percent of the map unit: 93 percent
Position on the landform: Backslopes
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Percent of surface covered by rock fragments: 0 to 10 percent subangular cobbles; 0 to 20 percent subangular stones
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; extremely gravelly silt loam
E—7 to 16 inches; very gravelly silt loam
Bt—16 to 24 inches; very gravelly silt loam
2Bt—24 to 41 inches; extremely gravelly silty clay
3Bt—41 to 80 inches; extremely gravelly clay

Minor Components

Rueter and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 15 to 35 percent
Landform: Backslopes of hills on plateaus

Rock outcrop

Estimated percent of the map unit: 1 percent

Winnipeg and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 1 to 3 percent
Landform: Footslopes of hills on plateaus

70060—Hoberg-Eldorado-Pomme silt loams, 1 to 3 percent slopes

Map Unit Setting

Landform: Interfluves on plateaus

Component Description

Hoberg

Percent of the map unit: 50 percent
Parent material: Fine-loamy colluvium over gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 12 to 36 inches
Drainage class: Moderately well drained

Typical Profile

Ap—0 to 7 inches; silt loam
Bt—7 to 22 inches; silty clay loam
2Btx—22 to 47 inches; extremely gravelly silty clay loam
3Bt—47 to 72 inches; very gravelly clay

Eldorado

Percent of the map unit: 25 percent
Parent material: Gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
A—7 to 20 inches; very cobbly silt loam
Bt1—20 to 33 inches; extremely cobbly silt loam
2Bt2—33 to 80 inches; very cobbly clay

Pomme

Percent of the map unit: 20 percent
Parent material: Loess over loamy colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
Bt1—7 to 19 inches; gravelly silt loam
2Bt2—19 to 57 inches; very gravelly silty clay loam
3Bt3—57 to 86 inches; very gravelly clay

Minor Components

Pomme soils that are moderately well drained

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Depressions on interfluves on plateaus

70061—Pomme silt loam, karst, 1 to 3 percent slopes

Map Unit Setting

Landform: Sinkholes on plateaus (fig. 12)

Component Description

Pomme

Percent of the map unit: 85 percent
Parent material: Loess over loamy colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Figure 12.—Alfalfa in an area of Pomme silt loam, karst, 1 to 3 percent slopes. Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony, is on the side slopes surrounding areas of the Pomme soil.

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
Bt1—7 to 19 inches; gravelly silt loam
2Bt2—19 to 57 inches; very gravelly silty clay loam
3Bt3—57 to 86 inches; very gravelly clay

Minor Components

Rueter and similar soils

Estimated percent of the map unit: 0 to 25 percent
Slope range: 1 to 3 percent
Landform: Summits of hills on plateaus

Pomme soils that are moderately well drained

Estimated percent of the map unit: 0 to 10 percent
Slope range: 1 to 3 percent
Landform: Depressions on interfluves on plateaus

Cedargap and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 0 to 1 percent
Landform: Flood plains in river valleys

70062—Pomme-Rueter complex, 1 to 3 percent slopes

Map Unit Setting

Landform: Interfluves on plateaus

Component Description

Pomme

Percent of the map unit: 80 percent
Parent material: Loess over loamy colluvium over clayey residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 7 inches; silt loam
Bt1—7 to 19 inches; gravelly silt loam
2Bt2—19 to 57 inches; very gravelly silty clay loam
3Bt3—57 to 86 inches; very gravelly clay

Rueter

Percent of the map unit: 15 percent
Position on the landform: Summits
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Very low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Somewhat excessively drained

Typical Profile

A—0 to 13 inches; very gravelly silt loam
Bt1—13 to 42 inches; extremely gravelly silt loam
2Bt2—42 to 80 inches; very gravelly clay

Minor Components

Pomme soils that are moderately well drained

Estimated percent of the map unit: 0 to 10 percent
Slope range: 1 to 3 percent
Landform: Depressions on interfluves on plateaus

70063—Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Landform: Hills on plateaus

Component Description

Rueter

Percent of the map unit: 90 percent
Position on the landform: Backslopes
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Somewhat excessively drained

Typical Profile

A—0 to 14 inches; extremely gravelly silt loam
Bt1—14 to 40 inches; extremely gravelly silt loam
2Bt2—40 to 80 inches; very gravelly clay

Minor Components

Goss and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 8 to 15 percent
Landform: Backslopes of hills on plateaus

Rueter soils that are moderately steep or steep

Estimated percent of the map unit: 0 to 10 percent
Slope range: 15 to 35 percent
Landform: Backslopes of hills on plateaus

70064—Rueter very gravelly silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Hills on plateaus

Component Description

Rueter

Percent of the map unit: 90 percent
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Very low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Somewhat excessively drained

Typical Profile

A—0 to 13 inches; very gravelly silt loam
Bt1—13 to 42 inches; extremely gravelly silt loam
2Bt2—42 to 80 inches; very gravelly clay

Minor Components

Goss and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 1 to 3 percent
Landform: Backslopes of hills on plateaus

Crackerneck and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 1 to 3 percent
Landform: Shoulders of ridges on plateaus

70065—Rueter very gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landform: Hills on plateaus

Component Description

Rueter

Percent of the map unit: 90 percent
Position on the landform: Shoulders
Parent material: Gravelly colluvium over residuum derived from cherty limestone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Somewhat excessively drained

Typical Profile

A—0 to 13 inches; very gravelly silt loam
Bt1—13 to 42 inches; extremely gravelly silt loam
2Bt2—42 to 80 inches; very gravelly clay

Minor Components

Goss and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 3 to 8 percent
Landform: Backslopes of hills on plateaus

Crackerneck and similar soils

Estimated percent of the map unit: 0 to 10 percent
Slope range: 3 to 8 percent
Landform: Shoulders of ridges on plateaus

70066—Winnipeg silt loam, 1 to 3 percent slopes

Map Unit Setting

Landform: Hills on plateaus

Component Description

Winnipeg

Percent of the map unit: 100 percent
Parent material: Loess over silty colluvium
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None

Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 9 inches; silt loam
Bt1—9 to 45 inches; silty clay loam
2Bt2—45 to 64 inches; silty clay loam
3Bt3—64 to 80 inches; very gravelly loam

71751—Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

Landform: Flood plains in river valleys

Component Description

Bearthicket

Percent of the map unit: 99 percent
Parent material: Silty alluvium over gravelly alluvium
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Very low
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding frequency: Occasional
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 11 inches; silt loam
Bt—11 to 64 inches; silt loam
2Bt—64 to 80 inches; very gravelly silty clay loam

Minor Components

Osage and similar soils

Estimated percent of the map unit: 0 to 1 percent
Slope range: 0 to 1 percent
Landform: Flood plains in river valleys

73031—Gerald silt loam, 0 to 2 percent slopes

Map Unit Setting

Landform: Divides on uplands

Component Description

Gerald

Percent of the map unit: 90 percent
Position on the landform: Summits
Parent material: Loess over gravelly colluvium over clayey residuum derived from cherty limestone
Slope shape: Concave

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Negligible
Depth to restrictive feature: 20 to 40 inches to a fragipan

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: 12 to 24 inches
Drainage class: Somewhat poorly drained

Typical Profile

Ap—0 to 11 inches; silt loam
E—11 to 16 inches; silt loam
Bt—16 to 33 inches; silty clay
2Btx—33 to 49 inches; gravelly silty clay loam
3Bt—49 to 77 inches; cobbly clay

Minor Components

Barden and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Summits of divides on uplands

Creldon and similar soils

Estimated percent of the map unit: 0 to 5 percent
Slope range: 1 to 3 percent
Landform: Summits of divides on uplands

75376—Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

Landform: Flood plains in river valleys

Component Description

Cedargap

Percent of the map unit: 100 percent
Parent material: Gravelly alluvium
Slope shape: Linear

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Negligible
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding frequency: Frequent
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 11 inches; gravelly silt loam
A—11 to 37 inches; very gravelly clay loam
C—37 to 80 inches; very gravelly sandy clay loam

99000—Pits and Quarries

Component Description

• This map unit consists of open pits from which limestone has been removed. It also includes processed/stockpiled stone.

99001—Water

Component Description

• This map unit consists of naturally occurring basins of surface water, such as perennial rivers and creeks. It also includes manmade lakes and ponds that are larger than 5 acres.

99002—Borrow areas

Component Description

• This map unit consists of excavated areas from which soil material has been removed for a variety of uses.

99003—Miscellaneous water

Component Description

• This map unit consists of small manmade areas that are used primarily for water treatment applications.

99005—Landfill

Component Description

• This map unit consists of areas used as sanitary landfills. The landfills are either completed or in process, and the soils are either reclaimed or in the process of being reclaimed.

99010—Dumps and Pits complex

Component Description

• This map unit consists of unreclaimed areas of discarded mine spoil and earthfill derived primarily from the mining of lead and zinc.

99011—Kanima very channery loam, 3 to 50 percent slopes

Map Unit Setting

Landform: Plains

Component Description

Kanima

Percent of the map unit: 100 percent
Parent material: Mine spoil or earthy fill derived from shale and siltstone
Slope shape: Convex

Component Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Runoff rate: Medium
Depth to restrictive feature: More than 80 inches

Component Hydrologic Properties

Flooding: None
Ponding: None
Current depth to water table: More than 6 feet
Drainage class: Well drained

Typical Profile

Ap—0 to 6 inches; very channery loam
C—6 to 85 inches; very channery loam

Use and Management of the Soils

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

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

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various land uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited or not limited by all of the soil features that affect a specified use. Terms for the limitation classes are ***not limited, slightly limited, moderately limited, limited,*** and ***very limited.*** In certain tables the soils are rated as ***improbable, possible,*** or ***probable*** sources of specific materials used for construction purposes.

Numerical Ratings

Numerical ratings in the tables indicate the severity of individual limitations. They also indicate the overall degree to which a soil is limited or not limited for a specific use. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

In tables that use limitation class terms, such as ***very limited*** or ***limited,*** the limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each map unit component. The overall limitation rating for the component is based on the most severe limitation.

Crops and Pasture

Kim Ehlers, resource conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. Prime farmland is described, the estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

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

In 1999, approximately 322,000 acres in Jasper County was used for crops, hay, and pasture. Of this total, about 138,000 acres was used for permanent pasture, hay, and fescue seed production and 115,000 acres was used for cultivated crops, mainly soybeans, corn, grain sorghum, and wheat (fig. 13). Rye, barley, oats, cotton, sunflowers, cucumbers, and various types of melons also are grown each year. The county has 10,000 acres of irrigated cropland, and the main crops grown are corn, soybeans, and cucumbers (fig. 14).

The potential of the soils in Jasper County for sustained production of food is good. About 63 percent of the county is prime farmland. An additional 3 percent can be considered prime farmland if it is drained or protected against flooding. The cropland is mainly in upland areas that are farmed in a manner that can cause excessive soil erosion. Some of the

Figure 13.—Wheat ready for harvest in an area of Opolis silt loam, 1 to 3 percent slopes.

Figure 14.—Soybeans in an area of Barden silt loam, 1 to 3 percent slopes. Sylvania loam, 8 to 15 percent slopes, is on the hill in the background.

marginal cropland used for row crops should be converted to pasture or hayland or should be used in rotation with grasses and/or legumes.

Water erosion is the major problem on nearly all of the sloping cropland and overgrazed pasture in Jasper County. All soils that have slopes of more than 2 percent are susceptible to erosion. Other soils, such as Opolis soils, which have long slopes, may be subject to severe erosion during intense spring rains if tillage is excessive and crop residue is removed.

Loss of the surface layer through soil erosion is damaging for two main 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 Barden and Sylvania soils. Second, erosion of farmland soils can result in the sedimentation of streams, lakes, and ponds. Controlling erosion minimizes the pollution of these areas by sediment and improves the quality of water for municipal and recreational uses and for fish and wildlife. Erosion-control practices also prolong the use of lakes and ponds by preventing them from filling with sediment and can reduce the cost of cleaning road ditches.

The benefits of erosion-control practices are significant. Practices that provide the most benefits are conservation tillage, which involves crop residue management, and cropping sequences that include small grain and meadow crops. These practices reduce the runoff rate, increase the rate of water infiltration, and improve soil tilth and soil productivity. A cropping system that keeps a cover of crop residue or vegetation on the surface can hold soil losses to a level that will not reduce the long-term productivity of the soil. Growing grasses and legumes for pasture and hay is very effective in controlling soil erosion. Using legumes, such as clover and alfalfa, for pasture and hay in a crop rotation is also effective. The legumes also provide nitrogen for the following crop.

The cropland soils generally are well suited to the construction of gradient broadbased terraces. These terraces reduce the length of the slopes, which is the most limiting factor for erosion control on the

Cherokee Prairie. Reducing the slope length also reduces overland flow velocity and quantity during peak runoff periods. Conventional terraces are most practical in uneroded upland areas that have slopes of less than 8 percent. On some soils, however, such as Opolis and Barden soils, special management techniques may be needed if terracing exposes the clayey subsoil.

Grassed waterways installed in areas of concentrated flow stabilize ephemeral and gully erosion and also serve as outlets for broadbased terraces and diversions.

Contour stripcropping and some form of conservation tillage are alternatives to terraces. Contour stripcropping effectively reduces the length of slopes. This practice involves alternating strips of row crops with strips of small grain or hay. The water is slowed down and filtered through the grass buffer. The strips of grass or of grass and legumes are typically used for hay. The areas between the strips are cultivated and planted to row crops, which are grown on the contour.

Conservation tillage uses crop residue management as a method of controlling erosion on sloping land. This practice is becoming more common in the county and is practical on many of the soils. No-till systems are also being used in the county. A no-till system minimizes the disturbance of the surface and reduces the hazard of erosion (fig. 15).

Soil tilth is affected by the texture and organic matter content of the surface layer. Most of the uneroded upland soils used for crops in the survey area have a surface layer of silt loam and a low or medium content of organic matter. Generally, the structure of the silt loam soils becomes weaker as a result of tillage, which causes compaction. In addition, intense rainfall causes the formation of a crust on the surface. This crust is hard when dry and reduces the rate of water infiltration, hinders seed germination, and increases the runoff rate. Crop residue management and no-till farming are effective in improving tilth and soil structure and increasing the content of organic matter.

Soil fertility is naturally lower in most of the soils that are eroded or have a light-colored surface layer. On all soils, however, additional plant nutrients are needed before maximum production can be achieved. Most of the soils in the county are naturally acid in the upper part of the root zone. As a result, applications of ground limestone or ground dolomite are needed to raise the pH, calcium, and magnesium levels sufficiently for optimum growth of legumes. Additions of lime and fertilizer should be based on the results of current soil tests, on the needs of the crop, and on the desired level of yields. The Cooperative Extension Service and some private farm service firms can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil drainage and flood control are management concerns on about 15 percent of the acreage used for crops and pasture in the county. Osage soils are naturally so wet that crop production is reduced during some part of the year. Flooding can prevent crop production on Bearthicket, Cedargap, Hepler, Osage, and Verdigris soils. The flooding on these soils commonly occurs during the period from March through July.

Pasture and hayland forage crops suited to the soils and climate in Jasper County include legumes, cool-season grasses, and warm-season grasses. Alfalfa and red clover are the most common legumes grown for hay. Deep, well drained soils that have a high available water capacity and a high content of calcium, magnesium, and potassium, such as Newtonia and Eldorado soils, are well suited to alfalfa for long-term hay or silage. Most alfalfa stand losses are caused by failure to maintain adequate levels of calcium and potassium in the soils. Yields of alfalfa in areas of claypan soils, such as Maplegrove, Barden, and Opolis soils, are comparable to those in areas of Newtonia soils; however, the claypan restricts the rooting depth and can negatively affect stand vigor and shorten the overall life of the alfalfa stand. Soils that have a fragipan, such as Keeno and Hoberg soils, or soils that are characterized by seasonal wetness, such as Gerald, Cherokee, and Medoc soils, are better suited to clover than to alfalfa for hay or pasture (fig. 16).

If proper lime and fertility levels are maintained, most of the soils in the county support lespedeza, red clover, and white clover. Most of the soils are suited to tall fescue, orchardgrass, and other cool-season grasses. These grasses grow best in the spring, early summer, and fall. Where additional midsummer pasture or hay is needed, warm-season grasses and legumes can be grown.

Warm-season grasses, such as big bluestem, indiangrass, switchgrass, Caucasian bluestem, bermudagrass, and eastern gamagrass, are suited to a wide range of soil conditions. Caucasian bluestem is best suited to areas of well drained soils, such as Newtonia soils. Eastern gamagrass is best suited to areas of somewhat poorly drained soils, such as Cherokee, Hepler, and McCune soils. These grasses

Figure 15.—No-till soybeans in an area of Barden silt loam, 1 to 3 percent slopes.

Figure 16.—Hay bales in an area of Medoc silt loam, 0 to 1 percent slopes.

grow best from late spring to early fall and thus fill the "summer slump" period left by the cool-season grasses with green, actively growing forage. Both cool-season and warm-season grasses require proper management in order to produce at their highest potential.

Hayland management varies with each forage type, but some general rules apply to all grasses and legumes. Fertility levels should be maintained based on forage type, production, and soil testing. Cutting heights, cutting intervals, and stage of growth at the time of cutting vary by forage type. As forage crops become more mature, they increase in quantity but decrease in quality. Hayland management decisions should be made based on these considerations.

Proper pasture management eliminates overgrazing and maintains a healthy stand of forage crops. By dividing pastures into smaller units and rotating livestock, the plants are allowed to rest and recover from grazing pressure. Smaller pastures and proper livestock rotation minimize selective or "spot" grazing, better distribute manure, and increase both forage production and stocking numbers. The addition of legumes to existing grass stands by no-till or broadcast methods in early March can increase the quality and quantity of the forage in pastures. The Natural Resources Conservation Service and the Cooperative Extension Service can provide information on hayland and pasture management based on forage type.

Yields shown in the pasture yields table (table 7) are for hay. They account for approximately 70 percent of the total above-ground production, since about 30 percent of the total forage production is lost or left in the field as stubble during hay harvesting. For purposes of comparison with other soils in the county, yields are shown for soils that have slopes of more than 12 percent and also for soils that have surface stones; however, normal harvesting practices may be impractical on these soils.

Specialty crops commercially grown in the county are cucumbers, popcorn, sunflowers, apples, peaches, blueberries, sweet corn, strawberries, and pumpkins (fig. 17). Special equipment, management, and propagation techniques are needed where these crops are grown. Most of the soils that are used for specialty crops require supplemental irrigation at some time during the growing season. Onsite investigations and feasibility information are needed for most specialty crops.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper

Figure 17.—Pumpkins in an area of Opolis silt loam, 1 to 3 percent slopes.

management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 271,715 acres in the survey area, or about 66 percent of the total acreage, meets the soil requirements for prime farmland.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Yields per Acre

The average yields per acre that can be expected of the principal crops and pasture plants under a high level of management are shown in tables 6 and 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the tables.

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

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

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

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

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

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, 2e. The letter ***e*** shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; ***w*** shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); ***s*** shows that the soil is limited mainly because it is shallow, droughty, or stony; and ***c,*** used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by ***w, s,*** or ***c*** because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the yields tables.

Pasture and Hayland Suitability Groups

The soils in Jasper County are assigned to a pasture and hayland group according to their suitability for pasture management.

Many different pasture and hayland suitability groups are in the survey area. Over time, the combination of plants best suited to a particular soil and climate has or will become dominant. Plant communities are not static but vary slightly from year to year and from place to place.

The relationship between soils and vegetation was ascertained during this survey. Thus, pasture and hayland suitability groups generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of each plant species. Soil reaction, salt content, and a seasonal high water table also are important. The “Field Office Technical Guide,” which is available at local offices of the Natural Resources Conservation Service, can provide specific information about pasture and hayland suitability groups.

Table 8 shows the pasture and hayland suitability groups assigned to the soils in the survey area. Specific concerns and recommendations for pasture and hayland management for each group are described in the following paragraphs.

Group WCB—Wet Clayey Bottom. Wetness and flooding are the main management concerns. The soils in this group are poorly suited to hay. The hazard of flooding should be considered when a grazing system is designed. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

Group WLO—Wet Loamy Overflow. Wetness and flooding are the main management concerns. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

Group LyO—Loamy Overflow. Flooding is the main management concern. The hazard of flooding should be considered when a grazing system is designed.

Group LyU—Loamy Upland. No serious concerns affect pasture and hayland management. Erosion is a hazard in newly seeded areas. Timely seedbed

preparation is needed to ensure a good ground cover.

Group CyU—Clayey Upland. Pasture and hay crops are effective in controlling erosion. Erosion during seedbed preparation is the main concern. Timely tillage and a quickly established ground cover reduce the hazard of erosion. The forage species that are tolerant of wetness grow best. The production of deep-rooted legumes is limited because of wetness and a restricted rooting depth.

Group GrU—Gravelly Upland. The soils in this group generally are not suited to cultivated crops. Droughtiness and erosion are the main management concerns. Seedbeds should be prepared on the contour. Timely seedbed preparation helps to ensure rapid plant growth and a protective ground cover.

Group MDU—Moderately Deep Upland. Shallow-rooted species that are tolerant of droughtiness should be selected for planting. Erosion is a serious hazard in newly seeded areas. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group WtP—Wet Pan. The species that are tolerant of wetness grow best. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is the main concern. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group LyP—Loamy Pan. A few small areas of this group are used for cultivated crops, and some areas are wooded. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is a hazard. Seedbeds should be prepared on the contour. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group GrO—Gravelly Overflow. Most areas of this group have been cleared of trees and are used for pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during periods of flooding help to keep the pasture in good condition.

Group GrP—Gravelly Pan. If the soils in this group are used for improved pasture, chert on the surface hinders tillage. Because of seasonal droughtiness, timely planting is needed to ensure an adequate stand. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a protective ground cover.

Forestland Productivity and Management

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

Approximately 60,631 acres in Jasper County, or about 15 percent of the survey area, is forested, according to 1986 woodland survey estimates by the Missouri Department of Conservation. Woodland tracts in the county are primarily small or medium-sized private holdings of less than 300 acres and are essentially unmanaged, poletimber sized and smaller stands (Geissman and others, 1986). In areas on the flood plains, forests are restricted to long narrow bands bordering streams and rivers.

Tree species and growth rates in the county vary, depending on site conditions, soil types, and past management.

The soil serves as a reservoir for moisture, provides an anchor for roots, and supplies essential plant nutrients. Soil properties that affect the growth of trees include reaction (pH), fertility, drainage, texture, structure, and soil depth. Soils that do not have extremes of these properties and have an effective rooting depth of more than 40 inches allow for the best growth for wood production.

Site characteristics that affect tree growth include aspect and topographic position. These site characteristics influence the amount of available sunlight, air drainage, soil temperature, soil moisture, and relative humidity. Typically, north and east aspects and the lower slope positions, which are cooler and have better moisture conditions than other sites, are the best upland sites for tree growth.

Management activities can influence woodland productivity and should be aimed at eliminating factors causing tree stress. Generally, these activities include thinning overstocked young stands; harvesting old, mature trees; eliminating destructive fire; and preventing grazing. Fire and grazing have very negative impacts on forest growth and quality. Although frequent forest fires are no longer a problem in the county, about 60 percent of the woodland is still subject to grazing. Grazing destroys the leaf layer on the surface, compacts the soil, and destroys or damages tree seedlings. Woodland sites that are protected from livestock and fire have the highest potential for optimum timber production and tree growth.

Rueter, Crackerneck, Pomme, and Goss soils are

the major forested upland soils in Jasper County. Post oak, blackjack oak, and black oak forest types are typical on these soils (fig. 18). Other significant forest types include white oak and eastern redcedar-mixed hardwood (Ostrom, 1991).

Along the major watercourses, Bearthicket, Cedargap, Verdigris, and Hepler soils support bottomland hardwoods adapted to flooded soil conditions. Many of these sites have been cleared for pasture and crop production. The uncleared wooded areas typically support silver maple, hackberry, American elm, sycamore, cottonwood, and Shumard oak. Bur oak, green ash, and walnut are common on the bottom land along the smaller streams and on the higher terraces of the major streams. These sites have a high potential for excellent forest growth.

Soils in the uplands, such as Cherokee, Opolis, Barden, and Creldon soils, formed under mixed prairie grasses or in transitional areas of open forest vegetation combined with prairie understory. The successful establishment of trees on these soils may require extra care and maintenance. Special-use tree plantings (Christmas trees, nut trees, and fuelwood trees) can be very successful if adapted species are used. Christmas tree plantings can be established on any soil that is not poorly drained or very poorly drained. Suitable tree species in Jasper County include Scotch pine, Virginia pine, red pine, and white pine. Nut trees, such as black walnut and pecan, are best suited to deep, medium textured, moderately well drained and well drained soils, such as Bearthicket and Verdigris soils. Other soils are also suited but may be less productive. Planting trees for fuelwood is also feasible in Jasper County if fast-growing trees are used. The species that are most suitable for this purpose include green ash, black locust, sycamore, and silver maple.

The tables described in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forestland Productivity

In table 9, the ***potential productivity*** of merchantable or ***common trees*** on a soil is expressed as a site index and as a volume number. The ***site index*** is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or through the Agency's Website.

The ***volume of wood fiber***, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forestland Management

In tables 10 and 11, interpretive ratings are given for various aspects of forest management. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified aspect of forest management. ***Not limited*** indicates that the soil has features that are very favorable for the specified aspect of management. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified aspect of management. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified aspect of management. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified aspect of management. The limitations can be overcome, but overcoming them generally requires special design, special planning, soil reclamation, specialized equipment, or other procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified aspect of management. The limitations generally cannot be overcome without

Figure 18.—Typical hardwood trees in an area of Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony.

major soil reclamation, special design, specialized equipment, or other expensive procedures. Poor performance, unsafe conditions, or high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation class for the component is based on the most severe limitation.

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management factors. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or through the Agency's Website.

In table 10, ratings in the column ***hand planting*** are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. Ratings indicate the expected difficulty of hand planting, which includes the proper placement of root systems of tree seedlings to a depth of up to 12 inches, using standard hand planting tools. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column ***mechanical planting*** are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. Ratings indicate the expected difficulty in using a mechanical planter, which includes proper placement of root systems of tree seedlings to a depth of up to 12 inches. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column ***use of harvesting equipment*** are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, depth to a water table, and ponding. Ratings indicate the suitability for operating harvesting equipment for off-road transport or harvest of logs and/or wood products by ground-based wheeled or tracked equipment.

Ratings in the column ***mechanical site preparation (surface)*** are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The part of the soil from the surface to a depth of about 12 inches is considered in the ratings. Ratings indicate the suitability of using surface-altering soil tillage equipment to prepare the site for planting or seeding.

Ratings in the column ***roads (natural surface)*** are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads on which trucks transport logs and other wood products from the site.

In table 11, ratings in the column ***erosion on roads and trails*** are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails.

Ratings in the column ***off-road or off-trail erosion*** are based on slope and on the soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

Ratings in the column ***soil rutting*** are based on depth to a water table, rock fragments on or below the surface, surface texture, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. Ratings indicate limitations affecting the hazard or risk of ruts in the uppermost layers of the soil. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with the formation of ruts.

Ratings in the column ***log landings*** are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, depth to a water table, ponding, flooding, and the hazard of soil slippage. Ratings indicate the suitability of the soil at the forest site to serve as a log landing and to allow the efficient and effective use of equipment for the temporary storage and handling of logs.

Ratings in the column ***seedling survival*** are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. Ratings indicate the impact of soil, physiographic, and climatic conditions on the survivability of newly established tree seedlings.

Windbreaks and Environmental Plantings

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

Living plants play an important role in supporting our life and improving its condition. If properly used and maintained, plants can help provide positive solutions to many problems in our contemporary environment. In Jasper County, windbreaks and environmental plantings can be utilized throughout the landscape to meet a variety of engineering, climatological, and esthetic needs.

Several specific aspects of management should be considered when farmstead and field windbreaks are planned. These include design and layout; species selection; site preparation; seedling handling; weed management; supplemental watering; and protection from diseases, insects, and livestock.

Farmstead windbreaks make the farmstead area a more comfortable place, reduce energy costs, increase garden and fruit tree yields, enhance wildlife populations, buffer noises, and raise property values (Scholten, 1988). Feedlot windbreaks can be used to protect livestock from wind and snow. Windbreaks significantly reduce calf losses, make feeding operations easier, and enable livestock to maintain better weight with less feed.

Farmstead and feedlot windbreaks are generally three or more rows wide, and at least two of the rows consist of a conifer species. The windbreaks should be established on the windward side of the area to be protected and as perpendicular as possible to the prevailing winds. Well designed farmstead and feedlot windbreaks are needed throughout Jasper County, especially in the open, former prairie areas of the Barden-Sylvania-Barco, Maplegrove-Newtonia-Eldorado, and Opolis-Cherokee-Medoc associations. These associations are described under the heading "General Soil Map Units."

Field windbreaks or shelterbelts are designed to protect field crops and bare soil from the effects of strong winds. Field windbreaks minimize soil losses, increase crop yields, retard the spread of weeds between fields, and enhance wildlife habitat (Brandle and others, 1988). They should be carefully planned. Field boundaries, irrigation systems, associated crops, power lines, and roads should be considered when the location of field windbreaks is determined. Windbreaks should be oriented at a right angle to the prevailing winds. The typical field windbreak system consists of a series of single rows of trees or shrubs. Field windbreaks are adaptable to many locations throughout the county but would be most beneficial in areas of the Barden-Sylvania-Barco, Maplegrove-Newtonia-Eldorado, and Opolis-Cherokee-Medoc associations.

Environmental plantings can be used for beautification, visual screens, and control of acoustical, pollution, and climatological problems around buildings and other living spaces. Care should be given to selecting plants that exhibit proper height, shape, form, color, and texture and that are compatible with the surrounding area, structures, and desired use (Robinette, 1972). Establishing trees and shrubs is relatively easy in most areas of Jasper County, but adequate site preparation prior to planting, control of competition from weeds after planting, and sufficient water during the growing season are necessary.

Table 12 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreational Development

The diversity of the landscapes and types of vegetative cover in Jasper County results in many recreational opportunities. The survey area includes prairies, rolling grassland hills, and forest-covered hills and stream valleys.

Recreational facilities in the urban areas of the county include sports arenas, parks, and golf courses.

The soils of the survey area are rated in table 13 according to limitations that affect their suitability for recreational uses. Soils are rated for camp areas, picnic areas, playgrounds, and paths and trails.

The ratings in the table are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are

limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect recreational site development. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

The information in table 13 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding

should require little or no cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, a water table, ponding, flooding, slope, and texture of the surface layer. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to frequent flooding during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Bob Schroeppel, wildlife biologist, Missouri Department of Conservation, helped prepare this section.

Jasper County is in the southwestern part of Missouri, where the prairies of the West begin to grade into the woodlands of the Ozarks. Early records indicated that presettlement tall grass prairie made up nearly 447 square miles, or 69 percent of the county's land base. This huge expanse of native grassland remained relatively unsettled because early settlers put more value on wooded land than on the prairies. In early accounts the prairie was described as a "vast wasteland of bluestem grass, growing as high as the back of a horse" (Abbott and Hoff, 1971).

In presettlement times, section 35, T. 30 N., R. 29 W., in northeastern Jasper County, had the distinction as the place in Missouri where one could stand in prairie at the farthest distance (5.6 miles) from any mapped point of timber in the entire state (Schroeder, 1982). When Joseph Brown surveyed the western boundary of western Missouri in 1823, he summarized it as 5 to 6 miles of timber near the Missouri River (present Kansas City), otherwise all prairie except for "very narrow strips of timber on the creeks," as far south as Shoal Creek in Jasper County (Brown, 1824). The prairie in this area was vast.

Several factors contributed to the demise of the presettlement prairie. By 1831, early settlements were in place along the Spring River. These early pioneers saw the potential of the prairie grasses for livestock use. However, these early settlers were used to the cool-season grasses of the eastern United States and had no experience with the native grasses of the prairies. This lack of experience with warm-season grasses led to fencing, overgrazing, and the control of wildfires. Fire was not seen as a helpful method of improving and maintaining the prairie grasses.

In the early 1800's, settlers began to control wildfires, probably for safety reasons. This practice allowed woody species to expand from the wooded stream valleys into the prairies. This process of timber invasion was described in the following account from neighboring Lawrence County: "As the prairie lands were fenced and prairie fires were checked, the forests began to encroach on the prairies. Growth of hazel and sumac skirted the edges of the prairie, and here and there a lone hickory, a small clump of post oak, or a persimmon advanced onto the prairie, in many places following the courses of small streams. These trees were in time surrounded by others, forming larger clumps which spread until extensive areas became forested" (Sweet and Jordan, 1928).

The farming of row crops was introduced to the fertile bottom-land fields along the streams of the Spring River watershed and gradually spread to the prairie uplands. The plow destroyed many of the native plant communities as settlers grew corn and wheat for food and export. By the early 1870's, the railroad system was in place, resulting in increased access to remote parts of the county. Mining of zinc and lead assumed importance from 1870 to 1940, leaving large waste areas and numerous mine shafts in many parts of the county (Bicknese, 1988).

Jasper County falls within two natural divisions of Missouri (Thom and Wilson, 1980). The northwest corner of the county is in the Osage Plains Natural Division. This section was primarily prairie in presettlement time, but savanna, upland and bottom-land deciduous forest, and marsh also occurred. Streams in this division commonly have shallow valleys and broad flood plains with sloughs and marshes. Pin oak and pecan are typical trees in areas of bottom land (Thom and Wilson, 1980). Soils in the area are nearly level to gently sloping, and geological formations of the Osage Plains are primarily Pennsylvanian-age sandstone and Meramecian-series limestone of Mississippian age (Koenig, 1961).

The rest of the county is in the Springfield Plateau Section of the Ozark Natural Division. This section is less highly dissected than the other sections of the Ozarks. It is characterized by higher elevations, numerous karst features, Ozark border soils, and Mississippian and Ordovician bedrock. Glades, prairies, savannas, and deciduous forests characterized this region in presettlement times. The geology of the Springfield Plateau Division is mostly Osagean-series Mississippian limestone (Koenig, 1961).

The Missouri Department of Conservation manages several areas and stream accesses in Jasper County. These include the 160-acre Wah-Sha-She Prairie Natural Area, close to the Kansas state line north of Asbury; the 25-acre Kellogg City Lake near Carthage's eastern city limits; the Center Creek accesses Stones Corner (9 acres) and Carl Junction (3 acres); and La Russell Access (1 acre) along the Spring River.

In 1988, the Missouri Department of Conservation identified high-quality natural communities in Jasper County. As would be expected, prairie is the most abundant natural community in the county even though many of the presettlement prairies are gone. In the inventory, Jasper County included numerous chert, hardpan, and sandstone prairies that received a notable or higher ranking (Bicknese, 1988).

The transitional land use in this area between the western prairies and eastern woodlands of the Ozarks created a region rich with wildlife diversity. Elk, wolves, bison, geese, turkey, mountain lions, bears, prairie chickens, ducks, and deer were common throughout the region. Early settlers in the area reduced the numbers of many of these animals through over-harvest, either for a food source, to protect crops, or for personal protection (Bicknese, 1989).

According to published and/or documented accounts, 264 fish and wildlife species are known to occur in Jasper County and another 133 species are listed as "likely to occur." These statistics are for 1987 and were obtained from the Missouri Department of Conservation, Missouri Fish and Wildlife Information System. Typical nongame species include golden shiner, southern leopard frog, prairie ringneck snake, turkey vulture, yellow-billed cuckoo, eastern bluebird, prairie vole, and southern flying squirrel. The most common game species include white-tailed deer, wild turkey, northern bobwhite quail, eastern cottontail rabbit, white crappie, bass, and bluegill.

The abundance of larger Missouri mammals in Jasper County is similar to that of other western Ozark border counties. Sightings compiled from the Missouri Department of Conservation cooperative archery hunter survey show that Jasper County has a slightly lower occurrence of red fox, gray fox, bobcat, raccoon, and opossum than the state average but higher numbers of coyote and deer. This survey is based on sightings per 1,000 hours of hunter trips (Missouri Department of Conservation, Study 68, 1990). Furbearer harvest in Jasper County during 1988–89 was higher than in neighboring counties. Species harvested included opossum, muskrat, raccoon, mink, red fox, gray fox, coyote, bobcat, beaver, and badger (Missouri Department of Conservation, Study 10, 1990).

Wildlife species associated with prairie habitat are generally unique to prairies and are not found in any other habitat type in the state. The plight of the greater prairie chicken has been well documented. Populations of this species have continued to decline since the late 1950's. Destruction and degradation of native prairies, either through plowing or mismanagement, are the primary reasons. Today, more than 93 percent of the original prairie in Missouri is gone. Jasper County continues to have a remnant prairie chicken population, including a resident flock in the Wah-Sha-She Prairie Natural Area. Several other species are also dependent on the habitat provided by Jasper County prairies. These include Henslow's sparrow, short-eared owl, upland sandpiper, northern crawfish frog, prairie mole cricket, northern harrier, and scissor-tailed flycatcher.

Several fish and wildlife species found in Jasper County maintain special status in regard to State and Federal rare and/or endangered species lists. A few of the documented species include the Ozark cavefish, pied-billed grebe, Neosho madtom, gray bat, spotted skunk, black-tailed jackrabbit, and long-tailed weasel. Other species identified in the Natural Features Inventory of 1988 included the regal fritillary butterfly, greater prairie chicken, southern brook lamprey, prairie mole cricket, Arkansas darter, northern harrier, and northern crawfish frog (Bicknese, 1988).

Many plant species found in Jasper County also are listed on various sensitive/protected lists. Some of the prairie and glade species on these lists are prairie dandelion (***Agoseris cuspidata***), running-buffalo clover (***Trifolium stoloniferum***), prairie white-fringed orchid (***Platanthera leucophaea***), geocarpon (***Geocarpon minimum***), and royal catchfly (***Silene regia***) (Bicknese, 1988).

Openland wildlife species, such as bobwhite quail and rabbits, suffer from the lack of hard winter cover, poor grassland management, and limited winter food supplies (USDA, 1982). The shortage of available small grain crops limits the winter food supply for many birds and animals. Establishing food plots or leaving a few rows of unharvested crops in fields can help to overcome this problem. The cropland in the county is commonly in areas of Maplegrove, Newtonia, Barden, and Opolis soils. Nearly 26 percent of the total land area in the county is grassland, and fescue is the dominant grass. Much of this conversion to fescue resulted from the plowing or overseeding of native prairies. The number of small game species is limited as a result of fescue's growth characteristics and common management practices (such as early haying and overgrazing). Increasing the acreage and improving the management of native warm-season grasses would improve the diversity and quality of the county's grasslands for wildlife. In addition, the use of planned grazing systems can protect critical areas needed for nesting and escape cover.

Only about 6 or 7 percent of Jasper County is forested. Typically, most of the woodland is in areas of Rueter, Pomme, and Goss soils. The primary game animal in these areas is white-tailed deer; hunting pressure of this animal is considered fair. Jasper

County harvested 1,557 deer during the 1998 firearms and archery seasons.

Several factors affect the quality of the woodland habitat in Jasper County. All woodland species suffer greatly from misuse of the timber resource, most notably the grazing of timber. According to a national inventory completed in 1982, 26 percent of the woodlands inventoried in the county had been grazed (USDA, 1982). Grazing of woodlands can lead to tree damage, destruction of wildlife habitat, increased soil erosion, and soil compaction. Various wildlife species suffer from woodland grazing, including the three-toed box turtle, the American woodcock, and the great horned owl.

Wetland habitat in Jasper County is very limited. This type of habitat is closely associated with the county's farm ponds and its rivers and streams. Some of the more important of these are the Spring River, the North Fork of the Spring River, Dry Creek, Center Creek, and Turkey Creek (fig. 19).

Several waterfowl species, including Canada goose, wood duck, and mallard, are known residents of the county. Cedargap, Hepler, Bearthicket, and Verdigris soils are the major soils associated with riparian areas along the county's rivers and creeks. Three heron rookeries have been found on the bottom land along the major rivers and creeks. The largest of these is along one of the tributaries of the North Fork of the Spring River. In 1986, 21 individual birds and 15 active nests were recorded in this rookery.

The primary sport-fishing species in the county include largemouth bass, channel catfish, bluegill, and white crappie.

Soils affect the kind and amount of vegetation that

Figure 19.—The Spring River and other streams in the county are important to wildlife. Goss extremely gravelly silt loam, 15 to 35 percent slopes, rocky, is in the background.

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

In tables 14 and 15, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Habitat is easily established, improved, or maintained. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Habitat can be established, improved, or maintained. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. Habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. Habitat is difficult to create, improve, or maintain in most places. Management is difficult and must be very intensive. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. Habitat is usually impractical or impossible to create, improve, or maintain. Management would be very difficult, and unsatisfactory results can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation class for the component is based on the most severe limitation.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Selection should be made from a list of locally adapted species.

Domestic grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Selection should be made from a list of locally adapted species.

Upland wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Selection should be made from a list of locally adapted species.

Upland shrubs and vines are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs and vines are depth of the root zone, available water capacity, salinity, and soil moisture. Selection should be made from a list of locally adapted species.

Upland deciduous trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees are depth of the root zone, available water capacity, and wetness. Selection should be made from a list of locally adapted species.

Upland mixed deciduous-conifer trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, browse, seeds, and foliage. Soil properties and features that affect the growth of these trees are depth of the root zone, available water capacity, and wetness. Selection should be made from a list of locally adapted species.

Riparian herbaceous plants are annual and perennial native or naturally established grasses and forbs that grow on moist or wet sites. Soil properties and features affecting riparian herbaceous plants are surface texture, wetness, flooding, ponding, and surface stones. Selection should be made from a list of locally adapted species.

Riparian shrubs, vines, and trees are bushy woody plants and trees that grow on moist or wet sites. Soil properties and features affecting these plants are surface texture, wetness, flooding, ponding, and surface stones. Selection should be made from a list of locally adapted species.

Freshwater wetland plants are grasses, forbs, and shrubs that are adapted to wet soil conditions. The soils suitable for this habitat generally occur adjacent to springs, seeps, depressions, areas of bottom land, marshes, or backwater areas on flood plains. Most areas are ponded for some period of time during the year. Soil properties and features affecting these plants are surface texture, wetness, ponding, and soil reaction. Selection should be made from a list of locally adapted species.

Irrigated freshwater wetland plants are grasses, forbs, and shrubs that are adapted to wet soil conditions. The soils suitable for this habitat generally occur in areas of cropland, in previously cropped areas, and in marginal areas associated with cropland and wetlands. These areas may be ponded for some period of time during the year. They are generally suitable for restoring wetland features temporarily or permanently. Soil properties and features affecting these plants are surface texture, permeability, wetness, ponding, and soil reaction. Selection should be made from a list of locally adapted species.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, waste management, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; evaluate sites for agricultural waste management; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 16 shows the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect

the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, a water table, and ponding.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

The soils of the survey area are rated in table 17 according to limitations that affect their suitability for sanitary facilities. Soils are rated for septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect sanitary facilities. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may be contaminated. Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, hillside seepage, and contamination of ground water, can affect public health.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for

the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A ***trench sanitary landfill*** is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an ***area sanitary landfill***, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick

enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 18 shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 mg/l. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 mg/l. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater through irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (slow rate treatment of wastewater and rapid infiltration of wastewater).

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

Land application of manure and food-processing waste not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure

and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste.

Land application of municipal sewage sludge not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also improves crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals.

Treatment of wastewater by slow rate process is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water percolates to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste.

Treatment of wastewater by rapid infiltration process is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil, eventually reaching the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a

necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. A water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance.

Construction Materials and Excavating

The soils of the survey area are rated in table 19 as a source of roadfill, sand, gravel, or topsoil. Normal compaction, minor processing, and other standard construction practices are assumed. The soils are also rated according to limitations that affect their suitability for shallow excavations. The ratings in the table are both verbal and numerical.

For sand and gravel, the soils are rated as a ***probable, possible,*** or ***improbable*** source. A rating of ***probable*** indicates that the source material is likely to be in or below the soil. A rating of ***possible*** indicates that the source material may be in or below the soil and that further investigation is warranted. A rating of ***improbable*** indicates that the source material is unlikely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. A numerical rating of 1.00 indicates that the soil is an improbable source. A numerical rating of less than 1.00 indicates the degree to which the soil is a possible or probable source of sand or gravel.

Other rating class terms used in this table indicate the extent to which the soils are limited by soil features that affect their use as a source for roadfill or topsoil or their suitability for shallow excavations. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings for roadfill, topsoil, and shallow excavations indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

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

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Sand and ***gravel*** are natural aggregates suitable for

commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of the thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Water Management

Table 20 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas, drainage, irrigation, terraces and diversions, and grassed waterways.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. ***Not limited*** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. ***Slightly limited*** indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. ***Moderately limited*** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. ***Limited*** indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but overcoming them generally requires special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high maintenance can be expected. ***Very limited*** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited	0.00
Slightly limited	0.01 to 0.30
Moderately limited	0.31 to 0.60
Limited	0.61 to 0.99
Very limited	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms and numerical ratings are shown for each limiting soil feature listed. As many as

three soil features may be listed for each component. The overall limitation rating for the component is based on the most severe limitation.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Slope can affect the storage capacity of the reservoir area.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, permeability, depth to a water table, ponding, slope, and flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the likelihood that cutbanks will cave. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. The availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to a water table, ponding, flooding, available water capacity, intake rate, permeability, erodibility, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, reaction, and the amount of salts, sodium, sulfur, lime, or gypsum.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, a water table, ponding, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, erodibility, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, a water table, slope, and depth to bedrock affect the construction of grassed waterways. Erodibility, soil moisture regime, available water capacity, restricted rooting depth, restricted permeability, and toxic substances, such as salts and sodium, affect the growth and maintenance of the grass after construction.

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

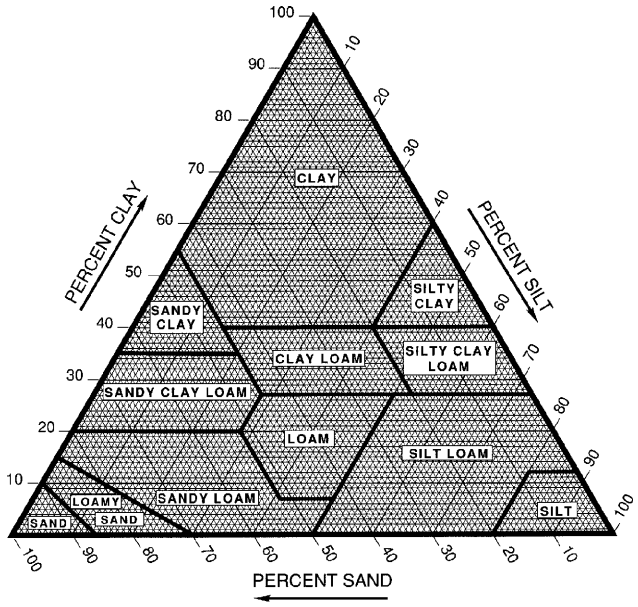

Figure 20.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 21 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in abbreviations of the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 20). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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

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

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

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

Physical Properties

Table 22 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 22, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In table 22, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 22, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

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

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value

indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 23 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases 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. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Soil Features

Table 24 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A ***restrictive layer*** is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. ***Depth to top*** is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

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

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as ***low, moderate,*** or ***high,*** is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as ***low, moderate,*** or ***high***. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 25 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are

thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a 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.

Water saturation refers to a saturated zone in the soil. Table 25 indicates, by month, depth to the top (***upper limit***) and base (***lower limit***) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered in the table.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and ***frequency*** are estimated. Duration is expressed as ***extremely brief*** if 0.1 hour to 4 hours, ***very brief*** if 4 hours to 2 days, ***brief*** if 2 to 7 days, ***long*** if 7 to 30 days, and ***very long*** if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. ***None*** means that flooding is not probable; ***very rare*** that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); ***rare*** that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); ***occasional*** that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); ***frequent*** that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and ***very frequent*** that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year). Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 26 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in ***sol***. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udoll (***Ud***, meaning humid, plus ***oll***, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiudolls (***Argi***, referring to an argillic horizon, plus ***udolls***, the suborder of the Mollisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Oxyaquic Argiudolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, active, thermic Oxyaquic Argiudolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Barco Series

Depth to root-restricting feature: Deep (40 to 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Hills on plains
Position on the landform: Summits
Parent material: Colluvium over residuum derived from sandstone-shale

Slope: Very gently sloping (1 to 3 percent)
Elevation: 990 feet

Typical Pedon

Barco loam, 1 to 3 percent slopes, in a pasture, 550 feet east and 1,425 feet north of the southwest corner of sec. 24, T. 30 N., R. 32 W.; USGS Neck City, Missouri, topographic quadrangle; UTM coordinates 4,132,510 meters N. and 375,270 meters E.

A—0 to 11 inches; very dark gray (7.5YR 3/1) (crushed) loam, brown (7.5YR 5/2) (crushed) dry; weak very fine and fine granular structure; very friable; many very fine to medium roots throughout and common coarse roots throughout; many very fine and fine interstitial and tubular pores; 2 percent subangular sandstone gravel; slightly acid; clear smooth boundary.

BA—11 to 17 inches; 60 percent brown (7.5YR 4/2) (interior) and 40 percent brown (10YR 4/3) (interior) loam; moderate fine granular structure; very friable; many very fine to medium roots throughout and common coarse roots throughout; many very fine and fine interstitial and tubular pores; very few distinct discontinuous very dark gray (7.5YR 3/1) (moist) organic coats on faces of peds; 5 percent subangular sandstone gravel; strongly acid; abrupt smooth boundary.

Bt—17 to 22 inches; 70 percent yellowish brown (10YR 5/4) (interior) and 30 percent red (2.5YR 4/8) (interior) clay loam; common fine distinct grayish brown (10YR 5/2) (moist) mottles; weak very fine and fine subangular blocky structure; friable; common very fine to medium roots throughout; many very fine and fine interstitial and tubular pores; few distinct discontinuous brown (10YR 4/3) (moist) organic coats on faces of peds and few faint discontinuous yellowish red (5YR 4/6) (moist) clay films on faces of peds; 8 percent subangular sandstone gravel; very strongly acid; abrupt smooth boundary.

BC—22 to 30 inches; 65 percent brown (10YR 4/3) (interior) and 35 percent dark red (2.5YR 3/6) (interior) extremely gravelly fine sandy loam; common fine distinct grayish brown (10YR 5/2) (moist) mottles; weak very fine subangular blocky structure; friable; common very fine and fine roots; many very fine and fine interstitial and tubular pores; few distinct discontinuous dark reddish brown (2.5YR 3/4) (moist) clay films on faces of peds; common fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; very strongly acid; 85 percent subangular sandstone gravel; abrupt smooth boundary.

Cr—30 inches; weathered sandstone.

Range in Characteristics

Thickness of the umbric epipedon: 10 to 18 inches

A horizon:
- Hue—7.5YR or 10YR
- Value—3
- Chroma—1 or 2
- Redoximorphic features—none
- Texture of the fine-earth fraction—sandy loam, fine sandy loam, or loam
- Content of rock fragments—0 to 2 percent
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

BA horizon:
- Hue—7.5YR or 10YR
- Value—4
- Chroma—2 or 3
- Redoximorphic features—none
- Texture of the fine-earth fraction—loam
- Content of rock fragments—5 percent
- Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Bt horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—4 to 8
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—loam, sandy clay loam, or clay loam
- Content of rock fragments—0 to 20 percent
- Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

BC horizon:
- Hue—2.5YR to 10YR
- Value—3 or 4
- Chroma—3 to 6
- Redoximorphic features—masses of iron-manganese accumulation
- Texture of the fine-earth fraction—fine sandy loam
- Content of rock fragments—60 to 90 percent
- Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Barden Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Hills on plains

Position on the landform: Summits
Parent material: Loess over residuum derived from shale
Slope: Very gently sloping (1 to 3 percent)
Elevation: 940 feet

Typical Pedon

Barden silt loam, 1 to 3 percent slopes, in a pasture, 1,830 feet east and 2,330 feet south of the northwest corner of sec. 19, T. 30 N., R. 32 W.; USGS Neck City, Missouri, topographic quadrangle; UTM coordinates 4,133,370 meters N. and 367,520 meters E.

Ap—0 to 6 inches; dark brown (10YR 3/3) (crushed) silt loam, brown (10YR 5/3) (crushed) dry; moderate fine and medium granular structure; friable; many very fine and fine roots; many very fine and fine interstitial and tubular pores with moderate vertical continuity; few fine irregular black (N 2/0) iron-manganese concretions throughout; slightly acid; abrupt smooth boundary.

A—6 to 10 inches; dark brown (10YR 3/3) (crushed) silt loam, light brownish gray (10YR 6/2) (crushed) dry; moderate very fine and fine granular structure; friable; many very fine and fine roots; many very fine and fine interstitial and tubular pores with moderate vertical continuity; few fine irregular yellowish red (5YR 4/6) masses of iron accumulation throughout and few fine rounded black (N 2/0) iron-manganese concretions throughout; slightly acid; clear smooth boundary.

2Bt1—10 to 13 inches; dark yellowish brown (10YR 4/4) (interior) silty clay loam; moderate very fine and fine subangular blocky structure; friable; many very fine and fine roots; many very fine and fine interstitial and tubular pores with moderate vertical continuity; few distinct discontinuous dark yellowish brown (10YR 4/4) (moist) clay films on faces of peds, very few distinct patchy pale brown (10YR 6/3) (moist) skeletans on faces of peds, and few distinct patchy dark brown (10YR 3/3) (moist) organic coats on faces of peds; common fine irregular red (2.5YR 4/8) masses of iron accumulation between peds; strongly acid; clear wavy boundary.

2Bt2—13 to 22 inches; yellowish brown (10YR 5/4) (interior) clay; weak fine subangular blocky structure parting to moderate very fine subangular blocky; firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine interstitial and tubular pores with moderate vertical continuity; common prominent continuous yellowish brown (10YR 5/4) (moist) clay films on faces of peds and common prominent continuous dark grayish brown (10YR 4/2) (moist) clay films on faces of peds; common fine irregular red (2.5YR 4/6) masses of iron accumulation between peds; strongly acid; clear wavy boundary.

2Bt3—22 to 38 inches; dark yellowish brown (10YR 4/6) (interior) silty clay; weak fine subangular blocky structure parting to moderate very fine subangular blocky; firm, moderately sticky and moderately plastic; common very fine roots; common very fine interstitial pores with moderate vertical continuity; common prominent continuous grayish brown (10YR 5/2) (moist) clay films on faces of peds, few faint patchy dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds, and very few distinct patchy light brownish gray (10YR 6/2) (moist) silt coats on faces of peds; common fine irregular yellowish red (5YR 4/6) masses of iron accumulation between peds and common fine irregular black (N 2/0) masses of iron-manganese accumulation between peds; moderately acid; clear smooth boundary.

2Bt4—38 to 47 inches; dark yellowish brown (10YR 4/6) (interior) silty clay; weak medium prismatic structure parting to moderate fine and medium subangular blocky; extremely firm, slightly sticky and slightly plastic; common very fine roots; common very fine interstitial pores with moderate vertical continuity; common prominent continuous dark grayish brown (10YR 4/2) (moist) clay films on faces of peds, few prominent continuous dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds, and few distinct patchy light brownish gray (10YR 6/2) (moist) silt coats on faces of peds; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds and few fine irregular black (N 2/0) masses of iron-manganese accumulation between peds; strongly acid; clear wavy boundary.

3Btg1—47 to 73 inches; light brownish gray (10YR 6/2) (interior) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; extremely firm, slightly sticky; common very fine roots; common very fine interstitial pores with moderate vertical continuity; common prominent continuous gray (10YR 5/1) (moist) clay films on faces of peds, few prominent patchy dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds, and few distinct patchy light brownish gray (10YR 6/2) (moist) silt coats in root channels and/or pores; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation between peds and few fine irregular

black (N 2/0) masses of iron-manganese accumulation between peds; moderately acid; abrupt wavy boundary.

3Btg2—73 to 80 inches; 60 percent dark yellowish brown (10YR 4/6) (interior) and 40 percent gray (10YR 6/1) (interior) silty clay loam; moderate fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few very fine interstitial pores with low vertical continuity; few distinct patchy dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds; common fine irregular black (N 2/0) iron-manganese concretions between peds; 10 percent rounded sandstone-siltstone gravel; moderately acid.

Range in Characteristics

Thickness of the ochric epipedon: 7 to 10 inches
Depth to the argillic horizon: 9 to 16 inches
Depth to the lithic contact: 60 to more than 80 inches

Ap or A horizon:
- Hue—10YR
- Value—3
- Chroma—2 or 3
- Redoximorphic features—iron-manganese concretions or masses of iron accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—none
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
- Hue—10YR
- Value—4 to 6
- Chroma—2 to 8
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—clay loam, silty clay loam, silty clay, or clay
- Content of rock fragments—0 to 25 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Btg horizon:
- Hue—10YR
- Value—4 to 6
- Chroma—1 to 6
- Redoximorphic features—masses of iron accumulation, masses of iron-manganese accumulation, or iron-manganese concretions
- Texture of the fine-earth fraction—silty clay loam, clay loam, or sandy clay loam
- Content of rock fragments—0 to 10 percent
- Reaction—very strongly acid to slightly alkaline (pH 4.5 to 7.8)

Bearthicket Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains in river valleys
Position on the landform: Natural levees
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 1,050 feet

Typical Pedon

Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded (fig. 21), in an area of hayland, 2,400 feet south and 2,000 feet east of the northwest corner of sec. 6, T. 27 N., R. 29 W.; USGS Reeds, Missouri, topographic quadrangle; UTM coordinates 4,104,954 meters N. and 398,555 meters E.

Ap—0 to 3 inches; dark brown (10YR 3/3) (interior) silt loam, pale brown (10YR 6/3) (interior) dry; moderate fine subangular blocky structure; very friable; many very fine and fine roots throughout; common very fine and fine tubular pores with high vertical continuity; neutral; clear smooth boundary.

A—3 to 11 inches; brown (10YR 4/3) (interior) silt loam, pale brown (10YR 6/3) (interior) dry; moderate medium subangular blocky structure; very friable; many very fine and fine roots throughout; many very fine and fine tubular pores with high vertical continuity; neutral; clear smooth boundary.

Bt1—11 to 17 inches; dark yellowish brown (10YR 4/4) (interior) silt loam; moderate medium subangular blocky structure; very friable; common very fine and fine roots throughout; many very fine and fine tubular pores with high vertical continuity; many prominent continuous dark yellowish brown (10YR 4/4) (moist) clay films on faces of peds and in pores; neutral; gradual smooth boundary.

Bt2—17 to 22 inches; brown (7.5YR 4/4) (interior) silt loam; strong fine subangular blocky structure; firm, slightly sticky and slightly plastic; common very fine and fine roots throughout; many very fine and fine tubular pores with high vertical continuity; many prominent continuous brown (7.5YR 4/4) (moist) clay films on faces of peds and in pores and few prominent continuous pale brown (10YR 6/3) (moist) clay films on vertical faces of peds; neutral; clear smooth boundary.

Bt3—22 to 28 inches; brown (7.5YR 4/4) (interior) silt loam; weak fine prismatic structure parting to strong fine subangular blocky; firm, slightly sticky

and slightly plastic; few very fine and fine roots between peds; many very fine and fine tubular pores with high vertical continuity; many prominent continuous brown (7.5YR 4/4) (moist) clay films on faces of peds and in pores and few prominent continuous pale brown (10YR 6/3) (moist) clay films on vertical faces of peds; neutral; gradual smooth boundary.

Bt4—28 to 44 inches; brown (7.5YR 4/4) (interior) silt loam; moderate fine prismatic structure parting to strong fine subangular blocky; firm, slightly sticky and slightly plastic; few very fine and fine roots between peds; many very fine and fine tubular pores with high vertical continuity; many prominent continuous dark brown (7.5YR 3/4) (moist) clay films on faces of peds and in pores and common prominent continuous pale brown (10YR 6/3) (moist) clay films on vertical faces of peds; slightly acid; gradual smooth boundary.

Bt5—44 to 60 inches; brown (7.5YR 4/4) (interior) silty clay loam; moderate fine prismatic structure parting to strong fine subangular blocky; firm, slightly sticky and slightly plastic; few very fine roots between peds; common very fine and fine tubular pores with high vertical continuity; many prominent continuous dark brown (7.5YR 3/3) (moist) clay films on faces of peds and in pores and common prominent continuous pale brown (10YR 6/3) (moist) clay films on vertical faces of peds; moderately acid; clear smooth boundary.

Bt6—60 to 64 inches; brown (7.5YR 5/4) (interior) silty clay loam; weak coarse prismatic structure parting to strong fine subangular blocky; firm, slightly sticky and slightly plastic; few very fine roots between peds; common very fine and fine tubular pores with high vertical continuity; many prominent continuous dark brown (7.5YR 3/4) (moist) clay films on faces of peds and in pores; 4 percent rounded chert gravel; strongly acid; abrupt smooth boundary.

2Bt7—64 to 69 inches; pale brown (10YR 6/3) (interior) extremely gravelly silty clay loam; weak fine subangular blocky structure; firm; common fine and few medium tubular pores with moderate vertical continuity; common distinct continuous pale brown (10YR 6/3) (moist) clay films on faces of peds and in pores and few distinct patchy black (N 2/0) (moist) stains on horizontal faces of peds; 80 percent rounded chert gravel; strongly acid; clear smooth boundary.

2Bt8—69 to 80 inches; brown (7.5YR 4/4) (interior) extremely gravelly clay loam; weak fine subangular blocky structure; firm; few fine tubular pores with moderate vertical continuity; common distinct continuous dark brown (7.5YR 3/3) (moist) clay films on vertical and horizontal faces of peds and few prominent patchy black (N 2/0) (moist) stains on horizontal faces of peds; 80 percent rounded chert gravel; moderately acid.

Range in Characteristics

Thickness of the ochric epipedon: 9 to 19 inches
Depth to the argillic horizon: 9 to 19 inches

Ap or A horizon:
- Hue—10YR
- Value—3 or 4
- Chroma—3
- Redoximorphic features—none
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 3 percent
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

Bt horizon:
- Hue—7.5YR or 10YR
- Value—4 or 5
- Chroma—4 to 6
- Redoximorphic features—none
- Texture of the fine-earth fraction—silt loam or silty clay loam
- Content of rock fragments—0 to 4 percent
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
- Hue—7.5YR or 10YR
- Value—4 to 6
- Chroma—3 or 4
- Redoximorphic features—none
- Texture of the fine-earth fraction—loam, clay loam, silty clay loam, or silty clay
- Content of rock fragments—0 to 80 percent
- Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Carl Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Very slow
Landform: Terraces on plains
Position on the landform: Treads
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 918 feet

Typical Pedon

Carl silty clay loam, 0 to 1 percent slopes, rarely flooded, in an area of cropland, 3,900 feet south and

700 feet east of the northwest corner of sec. 4, T. 29 N., R. 31 W.; USGS Jasper, Missouri, topographic quadrangle; UTM coordinates 4,126,919 meters N. and 382,786 meters E.

Ap—0 to 4 inches; very dark gray (10YR 3/1) (crushed) silty clay loam, gray (10YR 5/1) (crushed) dry; moderate thin platy structure parting to weak fine subangular blocky; very firm, moderately sticky and moderately plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; 1 percent angular chert gravel; slightly alkaline; clear smooth boundary.

A—4 to 13 inches; black (10YR 2/1) (crushed) silty clay loam, dark gray (10YR 4/1) (crushed) dry; moderate thin platy structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; many prominent continuous pressure faces throughout and common prominent continuous clay films throughout; 1 percent angular chert gravel; slightly acid; clear wavy boundary.

Bt—13 to 27 inches; black (10YR 2/1) (crushed) silty clay, dark gray (10YR 4/1) (crushed) dry; moderate medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; many prominent continuous pressure faces throughout and common prominent continuous clay films throughout; 1 percent angular chert gravel; neutral; clear wavy boundary.

Bgss1—27 to 38 inches; dark gray (10YR 4/1) (interior) silty clay; moderate medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; very few prominent continuous intersecting slickensides on faces of peds, many prominent continuous pressure faces throughout, and common prominent continuous clay films throughout; common medium and coarse irregular extremely hard carbonate concretions (pedogenic) throughout, common fine and medium rounded black (N 2/0) soft masses of iron-manganese accumulation (pedogenic) throughout, and common fine and medium irregular yellowish brown (10YR 5/4) masses of iron accumulation throughout; 1 percent angular chert gravel; neutral; clear wavy boundary.

Bgss2—38 to 47 inches; gray (10YR 5/1) (interior) silty clay; strong medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; very few prominent continuous intersecting slickensides on faces of peds, many prominent continuous pressure faces throughout, common prominent continuous clay films throughout, and very few distinct discontinuous manganese or iron-manganese stains on faces of peds; common medium and coarse irregular extremely hard carbonate concretions (pedogenic) throughout, common fine and medium rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout, and common fine and medium irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; 1 percent angular chert gravel; slightly alkaline; clear wavy boundary.

Bgss3—47 to 53 inches; gray (10YR 5/1) (interior) silty clay; strong medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; very few prominent continuous intersecting slickensides on faces of peds, many prominent continuous pressure faces throughout, common prominent continuous clay films throughout, and very few distinct discontinuous manganese or iron-manganese stains on faces of peds; common medium and coarse irregular extremely hard carbonate concretions (pedogenic) throughout, common fine and medium rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout, and common fine and medium irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; 3 percent angular chert gravel; slightly alkaline; gradual wavy boundary.

Bgss4—53 to 68 inches; gray (10YR 5/1) (interior) silty clay; strong medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; very few prominent continuous intersecting slickensides on faces of peds, many prominent continuous pressure faces throughout,

common prominent continuous clay films throughout, and very few distinct discontinuous manganese or iron-manganese stains on faces of peds; common medium and coarse irregular extremely hard carbonate concretions (pedogenic) throughout, common fine and medium rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout, and common fine and medium irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; 4 percent angular chert gravel; slightly alkaline; clear wavy boundary.

2Btg—68 to 80 inches; gray (10YR 6/1) (interior) very gravelly clay; weak coarse prismatic structure parting to moderate fine subangular blocky; very firm, very sticky and very plastic; common very fine and fine tubular pores with low vertical continuity; many prominent continuous clay films on faces of peds; common fine and medium rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout and common fine and medium irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; 30 percent angular chert gravel and 1 percent angular chert cobbles; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 15 to 44 inches
Depth to slickensides: 12 to 28 inches
Depth to the argillic horizon: 12 to 75 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Content of rock fragments—0 to 1 percent
Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

Bt horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1
Redoximorphic features—iron concretions, iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Content of rock fragments—0 to 10 percent
Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

Bss horizon (if it occurs):
Hue—10YR
Value—2 or 3
Chroma—1
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—1 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

Bgss horizon:
Hue—10YR
Value—4 or 5
Chroma—1
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—0 to 10 percent
Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

Btgk horizon (if it occurs):
Hue—10YR
Value—5 to 7
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam, loam, or sandy clay loam
Content of rock fragments—1 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

2Btg horizon:
Hue—10YR
Value—4 to 6
Chroma—1
Redoximorphic features—iron-manganese concretions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—15 to 85 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

Cedargap Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Landform: Flood plains
Parent material: Alluvium
Slope: Level to very gently sloping (0 to 3 percent)
Elevation: 860 feet

Typical Pedon

Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded, in a pasture, 300 feet east and 800 feet north of the southwest corner of sec. 17, T. 29 N., R. 33 W.; USGS Carl Junction, Missouri, topographic quadrangle; UTM coordinates 4,121,690 meters N. and 361,560 meters E.

Ap—0 to 11 inches; black (10YR 2/1) (crushed) gravelly silt loam, dark gray (10YR 4/1) (crushed) dry; weak fine granular structure; friable; many fine and common medium roots; common fine tubular pores; 5 percent chert; strongly acid; clear smooth boundary.

A1—11 to 26 inches; black (10YR 2/1) (crushed) very gravelly clay loam, very dark gray (10YR 3/1) (crushed) dry; weak fine subangular blocky structure; friable; many fine roots; common tubular pores; 35 percent chert; strongly acid; clear smooth boundary.

A2—26 to 37 inches; black (10YR 2/1) (crushed) very gravelly clay loam, very dark gray (10YR 3/1) (crushed) dry; weak fine subangular blocky structure; firm; common fine roots; few tubular pores; 55 percent chert; strongly acid; clear smooth boundary.

2C1—37 to 52 inches; very dark grayish brown (10YR 3/2) (crushed) extremely gravelly clay loam, dark grayish brown (10YR 4/2) (crushed) dry; weak fine subangular blocky structure; firm; few fine roots; 70 percent chert; moderately acid; clear smooth boundary.

2C2—52 to 80 inches; very dark grayish brown (10YR 3/2) (crushed) extremely gravelly clay, very dark grayish brown (10YR 3/2) (crushed) dry; weak fine subangular blocky structure; firm; few fine roots; 70 percent chert; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 30 to 37 inches
Depth to the C horizon: 30 to 37 inches

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—10 to 65 percent
Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

A horizon:
Hue—10YR
Value—2
Chroma—1
Texture of the fine-earth fraction—clay loam
Content of rock fragments—35 to 65 percent
Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

2C horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—sandy clay loam, clay loam, or clay
Content of rock fragments—35 to 85 percent
Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

Cherokee Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Terraces on plains
Position on the landform: Treads
Parent material: Loess over alluvium
Slope: Level (0 to 1 percent)
Elevation: 890 feet

Typical Pedon

Cherokee silt loam, 0 to 1 percent slopes (fig. 22), in an old field, 4,450 feet east and 3,200 feet south of the northwest corner of sec. 6, T. 29 N., R. 33 W.; USGS Asbury, Missouri-Kansas, topographic quadrangle; UTM coordinates 4,128,598 meters N. and 361,654 meters E.

Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) (crushed) silt loam, pale brown (10YR 6/3) (crushed) dry; moderate fine granular structure; many very fine and fine roots throughout; many very fine and fine tubular pores with moderate vertical continuity; slightly acid; abrupt smooth boundary.

Ap2—5 to 11 inches; dark grayish brown (10YR 4/2) (crushed) silt loam, pale brown (10YR 6/3) (crushed) dry; weak medium subangular blocky

structure parting to moderate medium granular; many very fine and fine roots throughout; common very fine and fine tubular pores with moderate vertical continuity; neutral; clear smooth boundary.

E—11 to 16 inches; dark grayish brown (10YR 4/2) (crushed) silt loam, pale brown (10YR 6/3) (crushed) dry; weak medium subangular blocky structure parting to strong medium granular; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; strongly acid; abrupt smooth boundary.

2Btg—16 to 20 inches; 80 percent very dark brown (10YR 2/2) (exterior) and 20 percent very dark grayish brown (10YR 3/2) (exterior) silty clay; strong medium subangular blocky structure; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; many distinct continuous black (10YR 2/1) (moist) clay films on vertical and horizontal faces of peds; common coarse irregular red (2.5YR 5/6) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Btgss—20 to 29 inches; very dark brown (10YR 2/2) (exterior) silty clay; moderate fine prismatic structure parting to strong medium angular blocky; common very fine roots between peds; common very fine tubular pores with moderate vertical continuity; many distinct continuous black (10YR 2/1) (moist) clay films on vertical and horizontal faces of peds and few distinct continuous intersecting slickensides on vertical and horizontal faces of peds; common coarse irregular red (2.5YR 5/6) masses of iron accumulation throughout and common coarse irregular dark brown (7.5YR 3/4) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Btg1—29 to 35 inches; 60 percent very dark gray (10YR 3/1) (exterior) and 40 percent dark gray (10YR 4/1) (exterior) silty clay loam; moderate medium prismatic structure parting to moderate coarse subangular blocky; common very fine roots between peds; common very fine tubular pores with moderate vertical continuity; few distinct continuous grayish brown (10YR 5/2) (moist) silt coats on vertical faces of peds, common distinct continuous black (10YR 2/1) (moist) clay films on vertical and horizontal faces of peds, and common distinct continuous very dark gray (10YR 3/1) (moist) clay films on vertical and horizontal faces of peds; common coarse irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout and common medium irregular yellowish red (5YR 4/6) masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

3Btg2—35 to 42 inches; dark gray (10YR 4/1) (exterior) clay loam; weak coarse prismatic structure parting to moderate fine prismatic; common very fine roots throughout; common very fine and fine tubular pores with moderate vertical continuity; few distinct continuous grayish brown (10YR 5/2) (moist) silt coats on vertical and horizontal faces of peds, few distinct continuous very dark gray (10YR 3/1) (moist) clay films on vertical faces of peds, and common distinct continuous dark gray (10YR 4/1) (moist) clay films on vertical and horizontal faces of peds; few coarse rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout, many coarse irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout, and common medium irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; very strongly acid; gradual smooth boundary.

3Btg3/E—42 to 51 inches; gray (10YR 6/1) (exterior) loam; weak coarse prismatic structure; common very fine roots throughout; common very fine and fine tubular pores with moderate vertical continuity; Bt material is clay loam, and E material is silty clay loam; very few prominent continuous very dark gray (10YR 3/1) (moist) clay films in root channels and/or pores and common distinct continuous gray (10YR 6/1) (moist) clay films on vertical and horizontal faces of peds; few coarse rounded dark red (2.5YR 3/6) soft iron-manganese concretions (pedogenic) throughout, many coarse irregular dark yellowish brown (10YR 4/6) masses of iron accumulation throughout, and common fine and medium irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; very strongly acid; diffuse smooth boundary.

3Btg4/E—51 to 60 inches; gray (10YR 6/1) (exterior) clay loam; weak coarse prismatic structure parting to moderate coarse subangular blocky; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; few prominent continuous very dark gray (10YR 3/1) (moist) clay films in root channels and/or pores and few distinct continuous gray (10YR 6/1) (moist) clay films on faces of peds; common coarse rounded black (N 2/0) soft iron-manganese concretions (pedogenic) throughout, many coarse

irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout, and common fine and medium irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; very strongly acid; gradual smooth boundary.

4Btg5/E—60 to 71 inches; gray (10YR 6/1) (exterior) clay loam; moderate coarse prismatic structure parting to moderate coarse subangular blocky; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; many prominent continuous dark gray (10YR 4/1) (moist) clay films on vertical and horizontal faces of peds and few prominent continuous gray (10YR 6/1) (moist) clay films on faces of peds; common coarse rounded black (N 2/0) soft masses of iron-manganese accumulation (pedogenic) throughout and many fine and medium irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; very strongly acid; gradual smooth boundary.

4Bt1/E—71 to 85 inches; 55 percent brownish yellow (10YR 6/8) (exterior) and 45 percent light gray (5Y 7/2) (exterior) clay; moderate medium prismatic structure; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; few distinct continuous dark gray (10YR 4/1) (moist) clay films on vertical faces of peds, common prominent continuous brownish yellow (10YR 6/8) (moist) clay films on faces of peds, and common prominent continuous light brownish gray (10YR 6/2) (moist) clay films on faces of peds; common coarse rounded black (N 2/0) soft masses of iron-manganese accumulation (pedogenic) in cracks and many fine and medium irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout; very strongly acid; gradual smooth boundary.

4Bt2/E—85 to 99 inches; 60 percent yellowish brown (10YR 5/6) (exterior) and 40 percent light gray (5Y 7/1) (exterior) silty clay; weak medium prismatic structure; common very fine roots throughout; common very fine tubular pores with moderate vertical continuity; very few prominent continuous dark gray (10YR 4/1) (moist) clay films in root channels and/or pores, few prominent continuous brownish yellow (10YR 6/8) (moist) clay films on faces of peds, and common prominent continuous light gray (5Y 7/1) (moist) clay films on faces of peds; very strongly acid; abrupt wavy boundary.

Cr—99 to 105 inches; weathered sandstone.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 15 inches
Depth to the albic horizon: 6 to 15 inches
Depth to abrupt textural change: 15 to 22 inches
Depth to the argillic horizon: 15 to 22 inches

Ap or A horizon:
- Hue—7.5YR or 10YR
- Value—3 or 4
- Chroma—2
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 1 percent
- Reaction—slightly acid or neutral (pH 6.1 to 7.3)

E horizon:
- Hue—10YR
- Value—4 to 6
- Chroma—1 or 2
- Redoximorphic features—iron concretions, iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 1 percent
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Btg or 2Btgss horizon:
- Hue—7.5YR to 2.5Y
- Value—2 to 6
- Chroma—1 or 2
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
- Content of rock fragments—0 to 2 percent
- Reaction—extremely acid to strongly acid (pH 3.5 to 5.5)

3Btg horizon:
- Hue—10YR or 2.5Y
- Value—4 to 7
- Chroma—1 or 2
- Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—clay loam, silty clay loam, silty clay, or clay
- Content of rock fragments—0 to 5 percent
- Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

3Btg/E horizon:
- Hue—10YR
- Value—6
- Chroma—1
- Redoximorphic features—masses of iron

accumulation, iron-manganese concretions, or masses of iron-manganese accumulations
Texture of the fine-earth fraction—silty clay loam or clay loam
Content of rock fragments—0 to 1 percent
Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

3Bt horizon (if it occurs):
Hue—7.5YR
Value—5
Chroma—8
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—none
Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

4Btg/E horizon:
Hue—10YR
Value—6
Chroma—1
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay loam
Content of rock fragments—0 to 1 percent
Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

4Bt/E horizon:
Hue—10YR or 5Y
Value—5 to 7
Chroma—3 to 8
Redoximorphic features—none to masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam, clay, or silty clay
Content of rock fragments—none
Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

Crackerneck Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landform: Ridges on plateaus
Position on the landform: Backslopes
Parent material: Colluvium over residuum derived from limestone
Slope: Moderately sloping to steep (3 to 35 percent)
Elevation: 1,150 feet

Typical Pedon

Crackerneck very gravelly silt loam, 3 to 8 percent slopes, in a pasture, 400 feet west and 1,300 feet south of the northeast corner of sec. 16, T. 27 N., R. 29 W.; USGS Sarcoxie, Missouri, topographic quadrangle; UTM coordinates 4,101,780 meters N. and 402,550 meters E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) (crushed) very gravelly silt loam, grayish brown (10YR 5/2) (crushed) dry; moderate very fine subangular blocky structure parting to weak very fine granular; friable; many very fine roots throughout; many very fine and fine and common medium interstitial and tubular pores with moderate vertical continuity; 20 percent subrounded chert gravel and 20 percent rounded chert gravel; slightly acid; clear smooth boundary.

AB—4 to 7 inches; dark yellowish brown (10YR 4/4) (crushed) extremely gravelly silt loam, pale brown (10YR 6/3) (crushed) dry; moderate very fine subangular blocky structure; friable; many very fine to medium roots throughout; many very fine and fine and common medium interstitial and tubular pores with moderate vertical continuity; few distinct continuous very dark grayish brown (10YR 3/2) (moist) organic coats on faces of peds and in pores; 21 percent subrounded chert gravel, 20 percent rounded chert gravel, and 20 percent subangular chert gravel; moderately acid; clear smooth boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/4) (interior) extremely gravelly silt loam; moderate very fine and fine subangular blocky structure; friable; many very fine to medium roots, common coarse roots, and common very coarse roots throughout; many very fine and fine and common medium interstitial and tubular pores with moderate vertical continuity; few distinct continuous dark grayish brown (10YR 4/2) (moist) organic coats in root channels and/or pores, few distinct continuous brown (10YR 4/3) (moist) organic coats in root channels and/or pores, and few faint discontinuous yellowish brown (10YR 5/4) (moist) clay films on faces of peds and in pores; 21 percent subrounded chert gravel, 20 percent rounded chert gravel, and 20 percent subangular chert gravel; moderately acid; clear smooth boundary.

Bt2—13 to 20 inches; yellowish brown (10YR 5/4) (interior) extremely gravelly silt loam; moderate

very fine and fine subangular blocky structure; friable; many very fine to medium roots and common coarse roots throughout; many very fine and fine and common medium interstitial and tubular pores with moderate vertical continuity; few faint patchy dark yellowish brown (10YR 4/4) (moist) clay films on faces of peds and few faint discontinuous brown (10YR 5/3) (moist) skeletans on rock fragments; common fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 40 percent subrounded chert gravel, 20 percent rounded chert gravel, and 20 percent subangular chert gravel; strongly acid; clear smooth boundary.

Bt3—20 to 25 inches; 85 percent yellowish brown (10YR 5/4) (interior), 5 percent yellowish red (5YR 4/6) (interior), and 10 percent brown (10YR 5/3) (interior) extremely stony silt loam; moderate very fine and fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine interstitial and tubular pores with moderate vertical continuity; few faint patchy dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds; common fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 48 percent subrounded chert gravel, 20 percent subangular chert cobbles, and 15 percent subangular chert stones; strongly acid; gradual smooth boundary.

Bt4—25 to 29 inches; 75 percent yellowish brown (10YR 5/4) (interior), 5 percent yellowish red (5YR 4/6) (interior), and 20 percent brown (10YR 5/3) (interior) extremely stony silt loam; weak very fine and fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine interstitial and tubular pores with moderate vertical continuity; few faint patchy dark yellowish brown (10YR 4/6) (moist) clay films on faces of peds; few fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 48 percent subrounded chert gravel, 20 percent subangular chert cobbles, and 15 percent subangular chert stones; very strongly acid; abrupt wavy boundary.

2Bt5—29 to 42 inches; 60 percent dark red (2.5YR 3/6) (interior) and 40 percent strong brown (7.5YR 5/6) (interior) extremely cobbly clay loam; strong thick platy structure parting to moderate fine subangular blocky; firm; common very fine and fine roots in cracks; many very fine interstitial pores with high vertical continuity; common distinct continuous dark red (10R 3/6) (moist) clay films on vertical and horizontal faces of peds, few prominent continuous strong brown (7.5YR 4/6) (moist) clay films on vertical and horizontal faces of peds, and few distinct continuous gray (10YR 5/1) (moist) clay films on vertical and horizontal faces of peds; 45 percent angular chert gravel and 40 percent angular chert cobbles; very strongly acid; gradual wavy boundary.

3Bt6—42 to 65 inches; dark red (2.5YR 3/6) (interior) extremely cobbly clay; strong fine and medium angular blocky structure; firm; common very fine and fine roots in cracks; many very fine interstitial pores with high vertical continuity; many prominent continuous dark red (10R 3/6) (moist) clay films on vertical and horizontal faces of peds and few distinct continuous light brownish gray (2.5Y 6/2) (moist) skeletans on vertical and horizontal faces of peds; 20 percent angular chert gravel and 65 percent angular chert cobbles; extremely acid; abrupt irregular boundary.

4R—65 inches; chert bedrock.

Range in Characteristics

Thickness of the ochric epipedon: 7 to 19 inches
Depth to the argillic horizon: 7 to 29 inches
Depth to the lithic contact: 65 to 70 inches

A horizon:

Hue—10YR
Value—2 to 6
Chroma—1 to 3
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam or silt
Content of rock fragments—15 to 90 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

AB horizon:

Hue—10YR
Value—4
Chroma—4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—50 to 85 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

E horizon (if it occurs):

Hue—10YR
Value—5 or 6
Chroma—3 or 4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—2 to 80 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

BE horizon (if it occurs):
Hue—10YR
Value—5
Chroma—4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—70 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

Bt horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—3 to 6
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam, silty clay loam, or silty clay
Content of rock fragments—5 to 83 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—4 to 8
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam, clay loam, silty clay loam, or clay
Content of rock fragments—65 to 85 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

3Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—4 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—20 to 85 percent
Reaction—extremely acid or very strongly acid (pH 3.5 to 5.0)

Creldon Series

Depth to root-restricting feature: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow above the fragipan and very slow in the fragipan
Landform: Interfluves on plateaus
Position on the landform: Backslopes or summits
Parent material: Loess over colluvium over residuum derived from limestone
Slope: Very gently sloping (1 to 3 percent)
Elevation: 1,140 feet

Typical Pedon

Creldon silt loam, 1 to 3 percent slopes, in an area of cropland, 2,500 feet south and 150 feet east of the northwest corner of sec. 26, T. 30 N., R. 28 W.; USGS Kings Point topographic quadrangle; UTM coordinates 4,129,590 meters N. and 412,200 meters E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) (exterior) silt loam, grayish brown (10YR 5/2) (exterior) dry; moderate fine granular structure; friable; common fine roots; 5 percent chert gravel; neutral; clear smooth boundary.
Bt1—8 to 12 inches; brown (10YR 4/3) (exterior) silty clay loam, pale brown (10YR 6/3) (exterior) dry; weak very fine and fine subangular blocky structure; friable; common fine roots; few faint patchy clay films on faces of peds; few fine brown (10YR 4/3) masses of iron accumulation; 5 percent chert gravel; slightly acid; clear wavy boundary.
Bt2—12 to 19 inches; brown (10YR 4/3) (exterior) clay; moderate fine subangular blocky structure; firm; common fine roots; common distinct clay films; many fine brown (7.5YR 4/4) masses of iron accumulation; 5 percent chert gravel; slightly acid; clear smooth boundary.
Bt3—19 to 27 inches; dark yellowish brown (10YR 4/4) (exterior) silty clay loam; moderate very fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine brown (7.5YR 4/4) masses of iron accumulation; 10 percent chert gravel; neutral; clear wavy boundary.
2Btx—27 to 37 inches; grayish brown (10YR 5/2) (exterior) very gravelly silt loam; moderate very coarse prismatic structure parting to weak fine subangular blocky; very firm, brittle; few faint clay films on rock fragments; 55 percent chert gravel; moderately alkaline; clear wavy boundary.
3Bt—37 to 60 inches; red (2.5YR 4/6) (exterior) very gravelly clay; moderate fine subangular blocky structure; very firm; common distinct clay films on faces of peds; common coarse yellowish brown (10YR 5/6) masses of iron accumulation; 40 percent chert gravel; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 16 inches
Depth to the argillic horizon: 8 to 25 inches
Depth to the fragipan: 25 to 30 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 5 percent
Reaction—very strongly acid to slightly alkaline (pH 4.5 to 7.8)

AB horizon (if it occurs):
Hue—10YR
Value—4
Chroma—3
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—none
Reaction—very strongly acid (pH 4.5 to 5.0)

BA horizon (if it occurs):
Hue—10YR
Value—3 to 6
Chroma—2 to 4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—none
Reaction—slightly acid (pH 6.1 to 6.5)

Bt horizon:
Hue—5YR to 10YR
Value—3 to 5
Chroma—2 to 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silt loam, silty clay loam, silty clay, or clay
Content of rock fragments—0 to 12 percent
Reaction—very strongly acid to slightly alkaline (pH 4.5 to 7.8)

2Btx horizon:
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—2 to 8
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—silt loam or clay loam
Content of rock fragments—0 to 70 percent
Reaction—very strongly acid to moderately alkaline (pH 4.5 to 8.4)

2Bt horizon (if it occurs):
Hue—5YR to 10YR
Value—5 or 6
Chroma—1 to 8
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—clay loam
Content of rock fragments—0 to 5 percent
Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

3Btx horizon (if it occurs):
Hue—5YR to 10YR
Value—4 to 6
Chroma—2 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—loam or sandy clay loam
Content of rock fragments—45 to 50 percent
Reaction—neutral (pH 6.6 to 7.3)

3Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 7
Chroma—4 to 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—0 to 60 percent
Reaction—strongly acid to slightly alkaline (pH 5.1 to 7.8)

3C horizon (if it occurs):
Hue—10YR
Value—8
Chroma—3
Redoximorphic features—none
Texture of the fine-earth fraction—clay loam
Content of rock fragments—none
Reaction—slightly alkaline (pH 7.4 to 7.8)

4Bt horizon (if it occurs):
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—4 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—sandy clay or clay
Content of rock fragments—5 to 30 percent
Reaction—slightly alkaline (pH 7.4 to 7.8)

Eldorado Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Hills on plateaus

Position on the landform: Backslopes and summits
Parent material: Colluvium over residuum derived from limestone
Slope: Moderately sloping (3 to 8 percent)
Elevation: 925 feet

Typical Pedon

Eldorado very gravelly silt loam, 3 to 8 percent slopes, very stony, in a pasture, 4,000 feet north and 800 feet west of the southeast corner of sec. 5, T. 29 N., R. 31 W.; USGS Jasper, Missouri, topographic quadrangle; UTM coordinates 4,125,134 meters N. and 382,613 meters E.

Ap—0 to 6 inches; dark brown (7.5YR 3/2) (crushed) very gravelly silt loam, brown (7.5YR 5/2) (crushed) dry; moderate medium subangular blocky structure parting to weak fine granular; friable; many fine roots, many medium roots, and few coarse roots throughout; common very fine and fine tubular pores with low vertical continuity; 25 percent subangular chert gravel and 25 percent subangular chert cobbles; moderately acid; clear smooth boundary.

A—6 to 15 inches; dark brown (7.5YR 3/2) (crushed) extremely cobbly silt loam, brown (10YR 5/3) (crushed) dry; moderate medium subangular blocky structure; friable; many fine and many medium roots throughout; common very fine and fine tubular pores with low vertical continuity; 30 percent subangular chert gravel, 50 percent subangular chert cobbles, and 1 percent subangular chert stones; strongly acid; clear wavy boundary.

Bt1—15 to 24 inches; brown (7.5YR 4/4) (interior) extremely cobbly silt loam; moderate fine subangular blocky structure; friable; many fine and common medium roots throughout; common very fine and fine tubular pores with low vertical continuity; many distinct continuous brown (7.5YR 4/4) (moist) clay films on vertical and horizontal faces of peds; 30 percent subangular chert gravel, 50 percent subangular chert cobbles, and 1 percent subangular chert stones; strongly acid; clear wavy boundary.

Bt2—24 to 34 inches; reddish brown (5YR 4/4) (interior) extremely cobbly silty clay loam; moderate fine subangular blocky structure; friable; many fine roots throughout; common very fine and fine tubular pores with low vertical continuity; many prominent continuous reddish brown (5YR 4/4) (moist) clay films on vertical and horizontal faces of peds; 25 percent subangular chert gravel, 45 percent subangular chert cobbles, and 1 percent subangular chert stones; strongly acid; clear smooth boundary.

2Bt3—34 to 42 inches; yellowish red (5YR 4/6) (interior) extremely cobbly clay; weak coarse prismatic structure parting to moderate fine subangular blocky; firm; common fine roots between peds; common very fine and fine tubular pores with low vertical continuity; many prominent continuous yellowish red (5YR 4/6) (moist) clay films on vertical and horizontal faces of peds; common fine and medium rounded black (N 2/0) slightly hard dark concretions (pedogenic) throughout; 20 percent subangular chert gravel, 40 percent subangular chert cobbles, and 1 percent subangular chert stones; strongly acid; clear smooth boundary.

2Bt4—42 to 53 inches; yellowish red (5YR 4/6) (interior) cobbly clay; weak coarse prismatic structure parting to moderate fine angular blocky; very firm, moderately sticky and moderately plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; many prominent continuous yellowish red (5YR 4/6) (moist) clay films on faces of peds and in pores, few prominent continuous yellowish red (5YR 4/6) (moist) intersecting slickensides on faces of peds and in pores, and very few distinct patchy black (N 2/0) (moist) stains on faces of peds and in pores; common fine and medium rounded black (N 2/0) slightly hard dark concretions (pedogenic) throughout; 10 percent subangular chert cobbles, 5 percent subangular chert gravel, and 5 percent subangular chert stones; strongly acid; clear wavy boundary.

2Btss—53 to 64 inches; yellowish red (5YR 4/6) (interior) cobbly clay; weak coarse prismatic structure parting to strong fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; many prominent continuous yellowish red (5YR 4/6) (moist) clay films on faces of peds and in pores, few prominent continuous yellowish red (5YR 4/6) (moist) intersecting slickensides on faces of peds and in pores, few prominent continuous strong brown (7.5YR 4/6) (moist) intersecting slickensides on faces of peds and in pores, and very few distinct patchy black (N 2/0) (moist) stains on faces of peds and in pores; common fine and medium rounded black (N 2/0) slightly hard dark concretions (pedogenic) throughout; 5 percent subangular chert gravel, 10

percent subangular chert cobbles, and 5 percent subangular chert stones; slightly acid; abrupt irregular boundary.
3R—64 inches; limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 15 to 28 inches
Depth to the argillic horizon: 15 to 28 inches

Ap or A horizon:
Hue—7.5YR or 10YR
Value—3
Chroma—1 or 2
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 85 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

Bt horizon:
Hue—2.5YR to 7.5YR
Value—4
Chroma—4 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
Content of rock fragments—70 to 85 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

2Bt/E horizon (if it occurs):
Hue—10R or 7.5YR
Value—4 to 6
Chroma—4 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam or clay
Content of rock fragments—80 percent
Reaction—strongly acid (pH 5.1 to 5.5)

2Bt horizon:
Hue—10R to 10YR
Value—3 to 6
Chroma—1 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—10 to 90 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

2Btss horizon:
Hue—5YR
Value—4
Chroma—6
Redoximorphic features—none
Texture of the fine-earth fraction—clay
Content of rock fragments—20 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

3Bt horizon (if it occurs):
Hue—10R
Value—3 or 4
Chroma—6 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—15 to 25 percent
Reaction—strongly acid (pH 5.1 to 5.5)

Gerald Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Depressions on plateaus
Parent material: Loess over colluvium over residuum
Slope: Level (0 to 2 percent)
Elevation: 1,170 feet

Typical Pedon

Gerald silt loam, 0 to 2 percent slopes, in a pasture, 2,400 feet west and 70 feet north of the southeast corner of sec. 18, T. 27 N., R. 29 W.; USGS Reeds, Missouri, topographic quadrangle; UTM coordinates 4,100,830 meters N. and 398,690 meters E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) (crushed) silt loam, grayish brown (10YR 5/2) (crushed) dry; weak medium subangular blocky structure; very friable; many very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; very few distinct discontinuous very dark grayish brown (10YR 3/2) (moist) organic coats on faces of peds; common fine irregular dark yellowish brown (10YR 3/4) masses of iron accumulation throughout; neutral; clear smooth boundary.
E—9 to 14 inches; light brownish gray (10YR 6/2) (crushed) silt loam, light gray (10YR 7/2) (crushed) dry; weak medium subangular blocky structure; very friable; common very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; very few distinct discontinuous very dark grayish brown (10YR 3/2) (moist) organic coats on faces of peds; common fine irregular dark yellowish brown (10YR 4/6) masses of iron accumulation throughout and common fine

rounded black (N 2/0) masses of iron-manganese accumulation throughout; slightly acid; abrupt smooth boundary.

2Btg—14 to 20 inches; very dark grayish brown (10YR 3/2) (interior) silty clay; strong fine subangular blocky structure; very firm, very sticky and very plastic; common very fine and fine roots between peds; common very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous very dark grayish brown (10YR 3/2) (moist) clay films on faces of peds; common fine irregular red (2.5YR 4/8) masses of iron accumulation throughout and common fine irregular reddish brown (5YR 4/4) masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

2Bt—20 to 31 inches; dark yellowish brown (10YR 4/4) (interior) silty clay; moderate medium prismatic structure parting to moderate fine subangular blocky; very firm, very sticky and very plastic; common very fine and fine roots between peds; common very fine and fine interstitial and tubular pores with moderate vertical continuity; few prominent continuous very dark grayish brown (10YR 3/2) (moist) clay films on faces of peds, few prominent continuous dark grayish brown (10YR 4/2) (moist) clay films on faces of peds, and many prominent continuous dark yellowish brown (10YR 4/4) (moist) clay films on faces of peds; very strongly acid; clear smooth boundary.

3Btg—31 to 49 inches; light brownish gray (10YR 6/2) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots between peds; many very fine and fine interstitial and tubular pores with moderate vertical continuity; common prominent continuous dark grayish brown (10YR 4/2) (moist) clay films on faces of peds, few prominent continuous light brownish gray (10YR 6/2) (moist) clay films on faces of peds, and few distinct discontinuous light brownish gray (10YR 6/2) (moist) silt coats on faces of peds; common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout, common fine irregular black (N 2/0) masses of iron-manganese accumulation between peds, and few fine irregular yellowish red (5YR 5/8) masses of iron accumulation throughout; 3 percent subrounded chert gravel; very strongly acid; clear smooth boundary.

3Bt—49 to 80 inches; red (2.5YR 4/8) (interior) silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; many very fine and fine interstitial and tubular pores with moderate vertical continuity; common distinct discontinuous red (2.5YR 4/8) (moist) clay films on faces of peds, few distinct discontinuous yellowish red (5YR 5/8) (moist) clay films on faces of peds, few distinct discontinuous light brownish gray (10YR 6/2) (moist) silt coats on faces of peds, and very few distinct discontinuous grayish brown (10YR 5/2) (moist) clay films on faces of peds; few fine irregular black (N 2/0) masses of iron-manganese accumulation throughout and common fine and medium irregular yellowish red (5YR 5/8) masses of iron accumulation throughout; 10 percent subrounded chert gravel; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 9 to 12 inches
Depth to the albic horizon: 9 to 12 inches
Depth to abrupt textural change: 14 inches
Depth to the argillic horizon: 14 to 17 inches

Ap horizon:
- Hue—10YR
- Value—4
- Chroma—2
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 3 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

E horizon:
- Hue—10YR
- Value—4 to 6
- Chroma—2
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 2 percent
- Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

2Btg horizon:
- Hue—2.5YR or 10YR
- Value—3 to 6
- Chroma—1 or 2
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silty clay or clay
- Content of rock fragments—0 to 2 percent

Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

2Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—4 to 6
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—0 to 1 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

3Btg horizon:
Hue—10YR
Value—5 or 6
Chroma—2
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—2 to 3 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon:
Hue—2.5YR
Value—3 or 4
Chroma—6 to 8
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam or clay
Content of rock fragments—10 to 15 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Goss Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Hills on plateaus
Position on the landform: Backslopes
Parent material: Colluvium over residuum derived from limestone
Slope: Moderately steep and steep (15 to 35 percent)
Elevation: 1,100 feet

Typical Pedon

Goss extremely gravelly silt loam, 15 to 35 percent slopes, rocky, in a forest, 600 feet south and 1,800 feet east of the northwest corner of sec. 6, T. 27 N., R. 29 W.; USGS Reeds, Missouri, topographic quadrangle; UTM coordinates 4,105,478 meters N. and 398,512 meters E.

A—0 to 7 inches; very dark grayish brown (10YR 3/2) (crushed) extremely gravelly silt loam, light brownish gray (10YR 6/2) (crushed) dry; moderate medium subangular blocky structure; friable; many fine roots, common medium roots, and few coarse roots throughout; common fine tubular pores with moderate vertical continuity; 20 percent angular chert cobbles and 50 percent angular chert gravel; moderately acid; clear smooth boundary.

E—7 to 16 inches; brown (10YR 4/3) (interior) very gravelly silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots and few coarse roots throughout; few fine tubular pores with low vertical continuity; 15 percent angular chert cobbles and 40 percent angular chert gravel; moderately acid; clear smooth boundary.

Bt1—16 to 24 inches; brown (7.5YR 5/4) (interior) very gravelly silt loam; moderate medium subangular blocky structure; firm; few fine roots, common medium roots, and few coarse roots throughout; few fine tubular pores with low vertical continuity; common distinct discontinuous yellowish brown (10YR 5/4) (moist) clay films on vertical and horizontal faces of peds; 15 percent angular chert cobbles and 40 percent angular chert gravel; moderately acid; clear smooth boundary.

2Bt2—24 to 32 inches; yellowish red (5YR 4/6) (interior) extremely gravelly silty clay loam; moderate medium subangular blocky structure; very firm; few fine and few medium roots throughout; few fine tubular pores with low vertical continuity; many distinct discontinuous yellowish red (5YR 4/6) (moist) clay films on vertical and horizontal faces of peds; 5 percent angular chert stones, 20 percent angular chert cobbles, and 50 percent angular chert gravel; moderately acid; clear smooth boundary.

2Bt3—32 to 41 inches; red (2.5YR 4/6) (interior) very gravelly silty clay; moderate medium subangular blocky structure; very firm; few fine and few medium roots throughout; few fine tubular pores with low vertical continuity; many prominent continuous red (2.5YR 4/6) (moist) clay films on vertical and horizontal faces of peds; 5 percent angular chert stones, 15 percent angular chert cobbles, and 40 percent angular chert gravel; strongly acid; clear smooth boundary.

3Bt4—41 to 56 inches; dark red (10R 3/6) (interior) very gravelly clay; strong fine subangular blocky

structure; very firm; few fine and few medium roots throughout; few fine tubular pores with low vertical continuity; many prominent continuous dark red (10R 3/6) (moist) clay films on vertical and horizontal faces of peds; 5 percent angular chert stones, 15 percent angular chert cobbles, and 40 percent angular chert gravel; very strongly acid; gradual wavy boundary.

3Bt5—56 to 80 inches; dark red (10R 3/6) (interior) very gravelly clay; strong fine subangular blocky structure; very firm; few fine and few medium roots throughout; few fine tubular pores with low vertical continuity; many prominent continuous dark red (10R 3/6) (moist) clay films on vertical and horizontal faces of peds; 5 percent angular chert stones, 15 percent angular chert cobbles, and 40 percent angular chert gravel; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 16 inches
Depth to the argillic horizon: 24 inches

A horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

E horizon:
Hue—10YR
Value—4
Chroma—3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Bt horizon:
Hue—7.5YR
Value—5
Chroma—4
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Bt horizon:
Hue—2.5YR or 5YR
Value—4
Chroma—6
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon:
Hue—10R
Value—3
Chroma—6
Texture of the fine-earth fraction—clay
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Hepler Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Flood plains in river valleys
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 890 feet

Typical Pedon

Hepler silt loam, 0 to 1 percent slopes, occasionally flooded (fig. 23), in an area of cropland, 3,300 feet south and 200 feet west of the northeast corner of sec. 1, T. 29 N., R. 32 W.; USGS Jasper, Missouri, topographic quadrangle; UTM coordinates 4,127,500 meters N. and 379,210 meters E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) (crushed) silt loam, grayish brown (10YR 5/2) (crushed) dry; moderate medium platy structure parting to weak medium subangular blocky; very friable; common very fine and fine roots throughout; many very fine and fine tubular pores with low vertical continuity; slightly acid; clear smooth boundary.

E1—8 to 14 inches; dark grayish brown (10YR 4/2) (crushed) silt loam; moderate medium subangular blocky structure; very friable; many very fine and fine roots in mat at top of horizon and common very fine and fine roots throughout; many very fine and fine tubular pores with low vertical continuity; common prominent continuous very dark grayish brown (10YR 3/2) (moist) organic coats on vertical faces of peds; common fine irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout; moderately acid; clear smooth boundary.

E2—14 to 18 inches; grayish brown (10YR 5/2) (interior) silt loam; strong medium subangular

blocky structure; very friable; common very fine and fine roots throughout; many very fine and fine tubular pores with moderate vertical continuity; few distinct discontinuous very dark grayish brown (10YR 3/2) (moist) organic coats on vertical faces of peds; many fine irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; gradual smooth boundary.

Btg1—18 to 26 inches; grayish brown (10YR 5/2) (interior) silt loam; moderate medium subangular blocky structure; firm; common very fine and fine roots throughout; many very fine and fine tubular pores with moderate vertical continuity; few distinct continuous grayish brown (10YR 5/2) (moist) clay films on vertical and horizontal faces of peds and few distinct continuous gray (10YR 6/1) (moist) silt coats on vertical faces of peds; many fine irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; clear wavy boundary.

Btg2—26 to 34 inches; grayish brown (10YR 5/2) (interior) silt loam; moderate medium subangular blocky structure; firm; few very fine and fine roots throughout; few very fine and fine tubular pores with low vertical continuity; common prominent continuous grayish brown (10YR 5/2) (moist) clay films on vertical and horizontal faces of peds; many fine irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; gradual smooth boundary.

Btg3—34 to 48 inches; grayish brown (10YR 5/2) (interior) silty clay loam; moderate medium subangular blocky structure; firm; few very fine and fine roots throughout; few very fine and fine tubular pores with low vertical continuity; many prominent continuous grayish brown (10YR 5/2) (moist) clay films on vertical and horizontal faces of peds; many fine irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; gradual smooth boundary.

Btg4—48 to 64 inches; dark gray (10YR 4/1) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; few very fine and fine tubular pores with low vertical continuity; many prominent continuous dark gray (10YR 4/1) (moist) clay films on vertical and horizontal faces of peds; many fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout and common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout; 1 percent subrounded chert gravel; moderately acid; clear smooth boundary.

Btgss—64 to 80 inches; dark gray (10YR 4/1) (interior) silty clay; moderate coarse prismatic structure parting to moderate medium subangular blocky; very firm; few very fine and fine tubular pores with low vertical continuity; common prominent continuous dark gray (10YR 4/1) (moist) clay films on vertical and horizontal faces of peds, common prominent continuous dark gray (10YR 4/1) (moist) pressure faces on faces of peds, and few prominent continuous dark gray (10YR 4/1) (moist) intersecting slickensides on faces of peds; many fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout, common fine and medium rounded black (N 2/0) masses of iron-manganese accumulation throughout, and few fine and medium rounded black (N 2/0) iron-manganese concretions throughout; 1 percent subrounded chert gravel; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 4 to 8 inches
Depth to the argillic horizon: 4 to 23 inches
Depth to the albic horizon: 4 to 14 inches

Ap or A horizon:
- Hue—10YR
- Value—3
- Chroma—1 or 2
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silt loam or silty clay loam
- Content of rock fragments—none
- Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

E horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—2 or 3
- Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—none

Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Btg horizon (upper part):
Hue—10YR
Value—4 or 5
Chroma—2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—none
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Btg horizon (lower part):
Hue—10YR
Value—4 to 7
Chroma—1
Redoximorphic features—masses of iron accumulation, masses of iron-manganese accumulation, or iron-manganese concretions
Texture of the fine-earth fraction—silt loam, clay loam, silty clay loam, or silty clay
Content of rock fragments—0 to 1 percent
Reaction—moderately acid (pH 5.6 to 6.0)

Hoberg Series

Depth to root-restricting feature: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Landform: Interfluves on deeply dissected plateaus
Position on the landform: Shoulders or summits
Parent material: Loess over colluvium over residuum derived from limestone
Slope: Gently sloping (2 to 5 percent)
Elevation: 1,010 feet

Typical Pedon

Hoberg silt loam (fig. 24), 2 to 5 percent slopes, in a pasture, 2,400 feet east and 300 feet south of the northwest corner of sec. 3, T. 30 N., R. 26 W.; USGS South Greenfield topographic quadrangle; UTM coordinates 4,136,180 meters N. and 430,970 meters E.

Ap—0 to 7 inches; dark brown (7.5YR 3/2) silt loam, brown (7.5YR 4/4) dry; weak thin platy structure parting to moderate medium granular; friable; many fine and medium roots; 5 percent gravel; strongly acid; abrupt smooth boundary.

BA—7 to 12 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure; friable; many fine and medium roots; 5 percent gravel; moderately acid; clear smooth boundary.

Bt1—12 to 17 inches; dark brown (7.5YR 3/4) silt loam; moderate fine subangular blocky structure; friable; many fine and medium roots; few faint clay films on faces of peds; few fine iron-manganese concretions; 5 percent gravel; moderately acid; clear smooth boundary.

Bt2—17 to 26 inches; dark brown (7.5YR 3/4) gravelly silt loam; moderate very fine and fine subangular blocky structure; firm; many fine and medium roots; few faint clay films on faces of peds; 15 percent gravel and 5 percent cobbles; moderately acid; abrupt wavy boundary.

2Btx1—26 to 33 inches; strong brown (7.5YR 4/6) and dark brown (7.5YR 3/4) very gravelly silt loam; moderate very coarse prismatic structure parting to weak thin platy; very firm, brittle; few fine roots in cracks; common faint clay films on faces of peds; few fine masses of iron accumulation; 35 percent gravel and 35 percent cobbles; moderately acid; gradual smooth boundary.

2Btx2—33 to 42 inches; strong brown (7.5YR 4/6) and reddish yellow (7.5YR 6/8) very gravelly silty clay loam; moderate very coarse prismatic structure parting to weak thin platy; very firm, brittle; common faint clay films on faces of peds; few fine masses of iron accumulation; 35 percent gravel and 35 percent cobbles; strongly acid; clear smooth boundary.

3Bt1—42 to 52 inches; dark red (2.5YR 3/6) extremely gravelly silty clay; moderate very fine angular blocky structure; firm; many distinct clay films on faces of peds; few fine masses of iron accumulation; 35 percent gravel and 40 percent cobbles; very strongly acid; clear smooth boundary.

3Bt2—52 to 62 inches; dark red (2.5YR 3/6) extremely gravelly clay; moderate fine angular blocky structure; very firm; many distinct clay films on faces of peds; few fine masses of iron accumulation; 30 percent gravel and 30 percent cobbles; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 14 inches
Depth to the argillic horizon: 8 to 17 inches
Depth to the fragipan: 16 to 36 inches

Ap horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—2 to 4

Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 12 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

BA horizon:
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 5 percent
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—3 to 8
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Content of rock fragments—0 to 30 percent
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

2Bt horizon (if it occurs):
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—3 to 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—clay loam, silty clay loam, or clay
Content of rock fragments—0 to 70 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2Btx horizon:
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—2 to 8
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—loam, silt loam, clay loam, or silty clay loam
Content of rock fragments—0 to 80 percent
Reaction—extremely acid to moderately acid (pH 3.5 to 6.0)

3Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—2 to 6
Redoximorphic features—none
Texture of the fine-earth fraction—loam, silty clay loam, silty clay, or clay
Content of rock fragments—0 to 75 percent
Reaction—extremely acid to moderately acid (pH 3.5 to 6.0)

4Bt horizon (if it occurs):
Hue—2.5YR
Value—3
Chroma—6
Redoximorphic features—none
Texture of the fine-earth fraction—clay
Content of rock fragments—15 to 70 percent
Reaction—neutral (pH 6.6 to 7.3)

Kanima Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves on plains
Parent material: Mine spoil and earthy fill derived from shale and siltstone
Slope: Moderately sloping to very steep (3 to 50 percent)
Elevation: 920 feet

Typical Pedon

Kanima very channery loam, 3 to 50 percent slopes, in a forest, 350 feet east and 2,200 feet south of the northwest corner of sec. 32, T. 30 N., R. 32 W.; USGS Neck City, Missouri, topographic quadrangle; UTM coordinates 4,129,100 meters N. and 368,480 meters E.

A—0 to 6 inches; 98 percent brown (10YR 4/3), 1 percent yellowish brown (10YR 5/8), and 1 percent red (2.5YR 4/8) very channery loam, pale brown (10YR 6/3) and brownish yellow (10YR 6/8) dry; moderate fine subangular blocky structure; friable; common very fine and fine roots; many very fine and fine interstitial and tubular pores with high vertical continuity; 50 percent shale channers; strongly acid; clear smooth boundary.

C1—6 to 69 inches; 97 percent brown (10YR 4/3), 1 percent yellowish brown (10YR 5/8), 1 percent red (2.5YR 4/8), and 1 percent gray (10YR 6/1) very channery loam, pale brown (10YR 6/3), brownish yellow (10YR 6/8), and light gray (10YR 7/1) dry; moderate medium subangular blocky structure; friable; common very fine and fine roots; common very fine and fine interstitial and tubular pores with moderate vertical continuity; few distinct patchy brown (10YR 4/3) clay films on faces of peds; 45 percent shale channers; very strongly acid; gradual wavy boundary.

C2—69 to 85 inches; 91 percent brown (10YR 4/3), 5

percent gray (10YR 5/1), 2 percent yellowish brown (10YR 5/8), and 2 percent red (2.5YR 4/8) very channery clay loam; moderate medium subangular blocky structure; firm; common very fine and fine roots; common very fine and fine interstitial and tubular pores with moderate vertical continuity; very few distinct patchy dark gray (10YR 4/1) clay films on faces of peds and few distinct patchy brown (10YR 4/3) clay films on faces of peds; 45 percent shale channers; extremely acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 inches
Depth to the C horizon: 6 inches

A horizon:
Hue—2.5YR to 10YR
Value—4 or 5
Chroma—3 to 8
Texture of the fine-earth fraction—loam
Content of rock fragments—35 to 60 percent
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

C horizon:
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—1 to 8
Texture of the fine-earth fraction—loam or clay loam
Content of rock fragments—35 to 60 percent
Reaction—extremely acid to slightly acid (pH 3.5 to 6.5)

Keeno Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Landform: Hills on plateaus
Position on the landform: Shoulders or summits
Parent material: Colluvium over residuum derived from limestone
Slope: Moderately sloping (3 to 8 percent)
Elevation: 1,135 feet

Typical Pedon

Keeno gravelly silt loam, 3 to 8 percent slopes, in an area of cropland, 750 feet west and 200 feet north of the southeast corner of sec. 30, T. 30 N., R. 26 W.; USGS South Greenfield topographic quadrangle; UTM coordinates 4,128,390 meters N. and 426,550 meters E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; strong fine granular structure; very friable; common medium roots; 10 percent chert gravel and 5 percent chert cobbles; neutral; abrupt smooth boundary.
Bt1—6 to 13 inches; dark yellowish brown (10YR 3/4) and strong brown (7.5YR 4/6) very gravelly silty clay loam; weak medium subangular blocky structure; friable; common fine roots; very few faint clay films on faces of peds; 35 percent chert gravel and 5 percent chert cobbles; neutral; clear wavy boundary.
Bt2—13 to 19 inches; brown (7.5YR 5/4) and yellowish brown (10YR 5/4) extremely gravelly silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; very few faint clay films on faces of peds; 60 percent chert gravel and 10 percent chert cobbles; strongly acid; clear wavy boundary.
Btx—19 to 29 inches; pale brown (10YR 6/3), red (2.5YR 4/8), and dark red (2.5YR 3/6) extremely gravelly silt loam; moderate very coarse prismatic structure parting to weak medium platy; very firm, brittle; few fine roots in cracks; very few faint clay films on vertical faces of peds; 50 percent chert gravel and 15 percent chert cobbles; moderately acid; clear wavy boundary.
2Bt1—29 to 45 inches; red (2.5YR 4/6), dark red (2.5YR 3/6), and grayish brown (10YR 5/2) extremely gravelly silty clay loam; moderate fine and medium subangular blocky structure; firm; very few faint clay films on faces of peds; 60 percent chert gravel and 20 percent chert cobbles; strongly acid; clear wavy boundary.
2Bt2—45 to 60 inches; dark red (2.5YR 3/6), reddish brown (2.5YR 4/4), and light yellowish brown (10YR 6/4) very gravelly clay; strong medium subangular blocky structure; firm; very few faint clay films on faces of peds; 45 percent chert gravel and 10 percent chert cobbles; strongly acid.

Range in Characteristics

Depth to the argillic horizon: 6 to 34 inches
Depth to the fragipan: 18 to 36 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Redoximorphic features—none

Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—15 to 30 percent
Reaction—very strongly acid to slightly alkaline (pH 4.5 to 7.8)

A horizon (if it occurs):
Hue—10YR
Value—3
Chroma—2
Redoximorphic features—none
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—18 to 50 percent
Reaction—strongly acid to slightly alkaline (pH 5.1 to 7.8)

AB horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—2 to 6
Redoximorphic features—none
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—25 to 60 percent
Reaction—moderately acid (pH 5.6 to 6.0)

Ex horizon (if it occurs):
Hue—7.5YR
Value—4
Chroma—6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—loam
Content of rock fragments—35 to 70 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

BA horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Redoximorphic features—none
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—25 to 60 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

BE horizon (if it occurs):
Hue—10YR
Value—4
Chroma—4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—55 to 60 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

Bt horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—3 to 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—35 to 70 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Btx horizon:
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—2 to 8
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—loam, silt loam, or clay loam
Content of rock fragments—42 to 65 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Btx horizon (if it occurs):
Hue—2.5YR to 10YR
Value—3 to 6
Chroma—2 to 8
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—loam, silt loam, clay loam, or silty clay loam
Content of rock fragments—0 to 70 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

2Bt horizon:
Hue—10R to 10YR
Value—3 to 6
Chroma—2 to 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam or clay
Content of rock fragments—20 to 80 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

3Bt horizon (if it occurs):
Hue—2.5YR to 10YR
Value—3 to 7
Chroma—2 to 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—clay

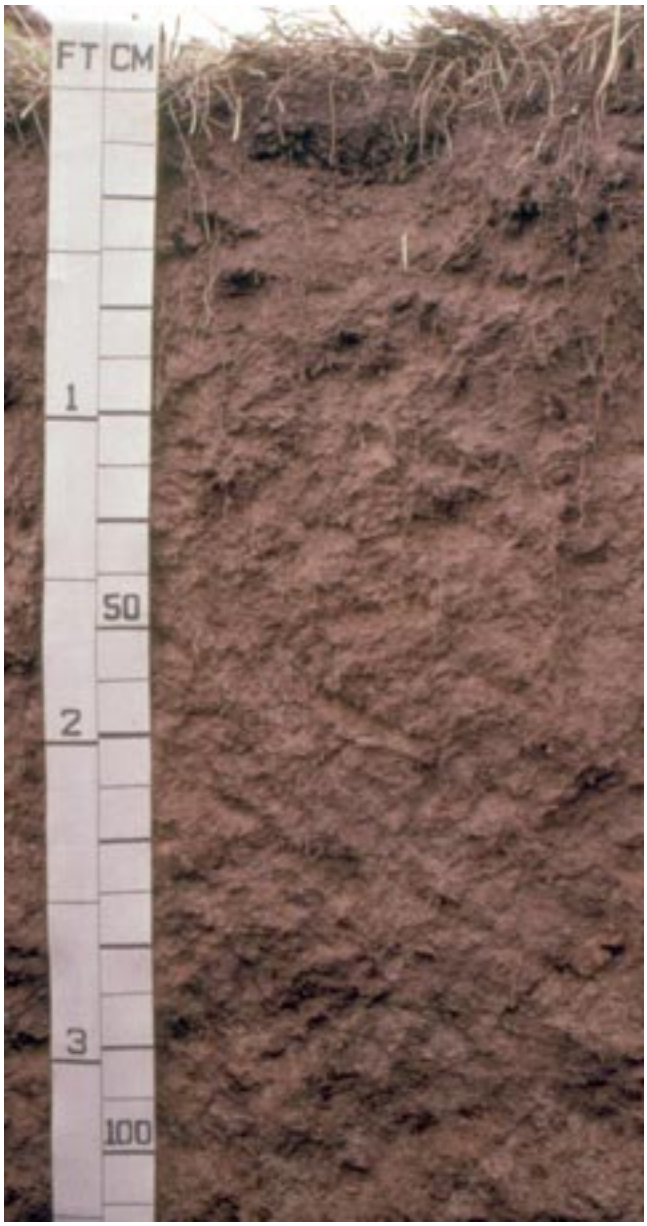

Figure 21.—Typical profile of Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded.

Figure 22.—Typical profile of Cherokee silt loam, 0 to 1 percent slopes.

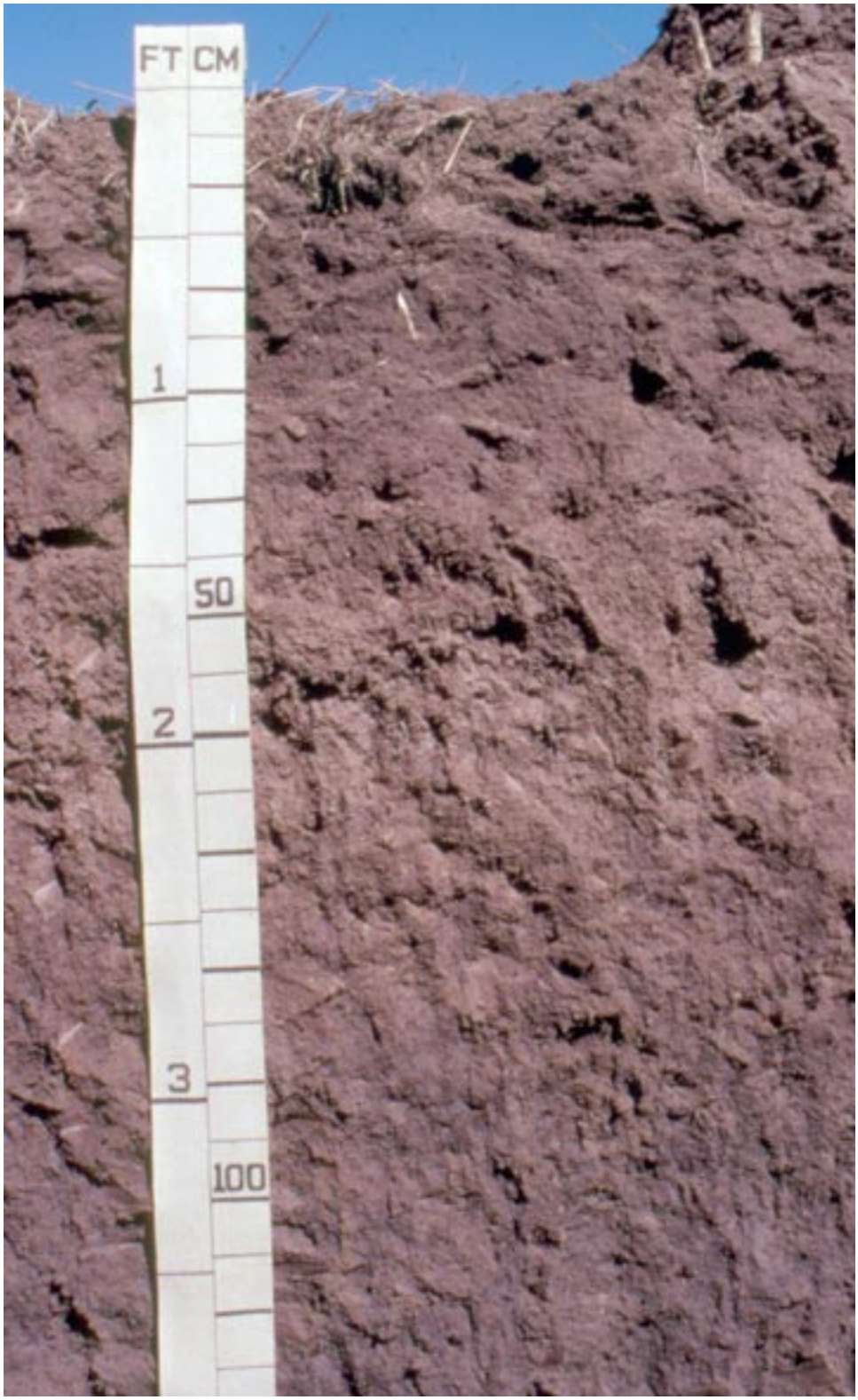

Figure 23.—Typical profile of Hepler silt loam, 0 to 1 percent slopes, occasionally flooded.

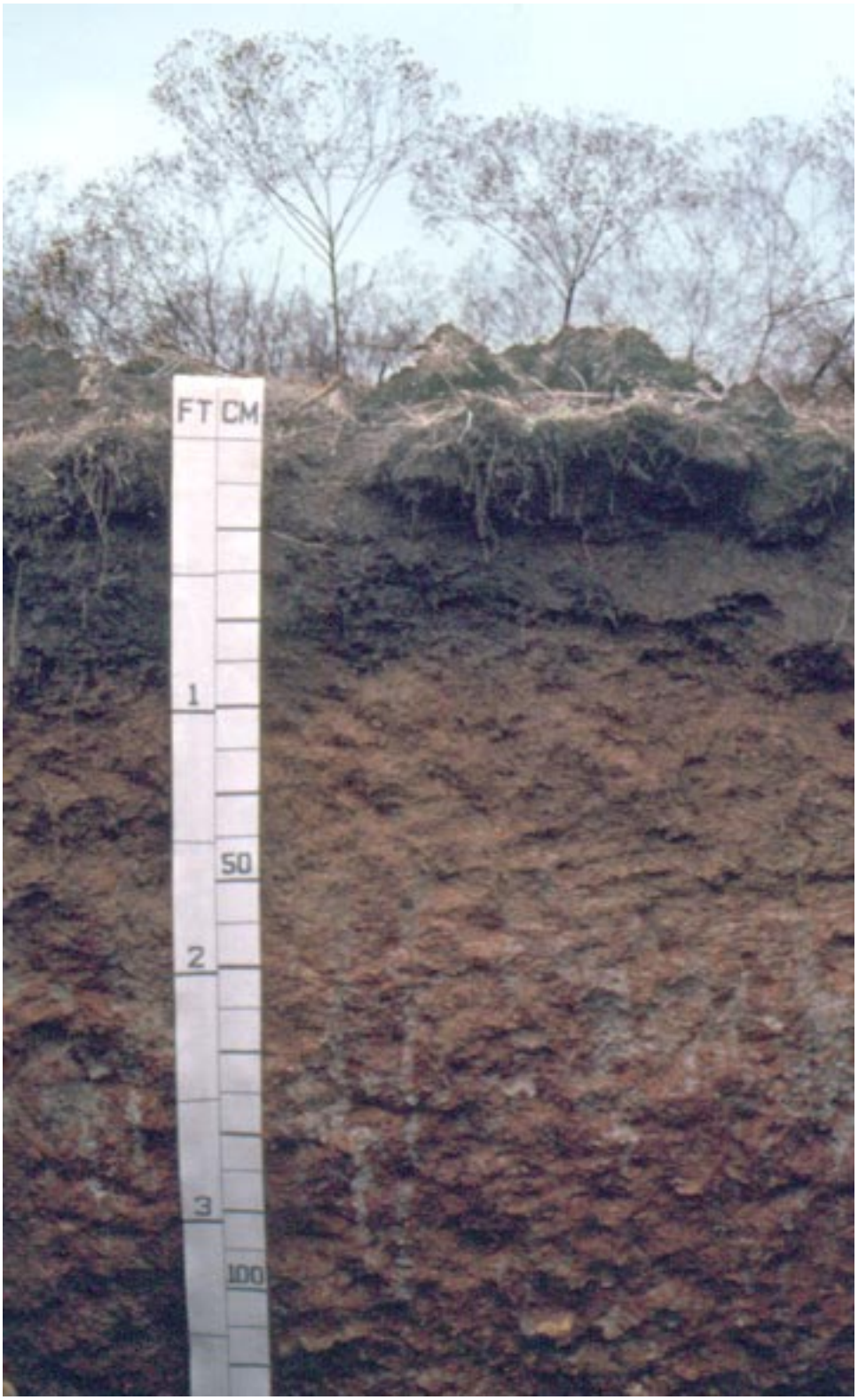

Figure 24.—Typical profile of a Hoberg silt loam.

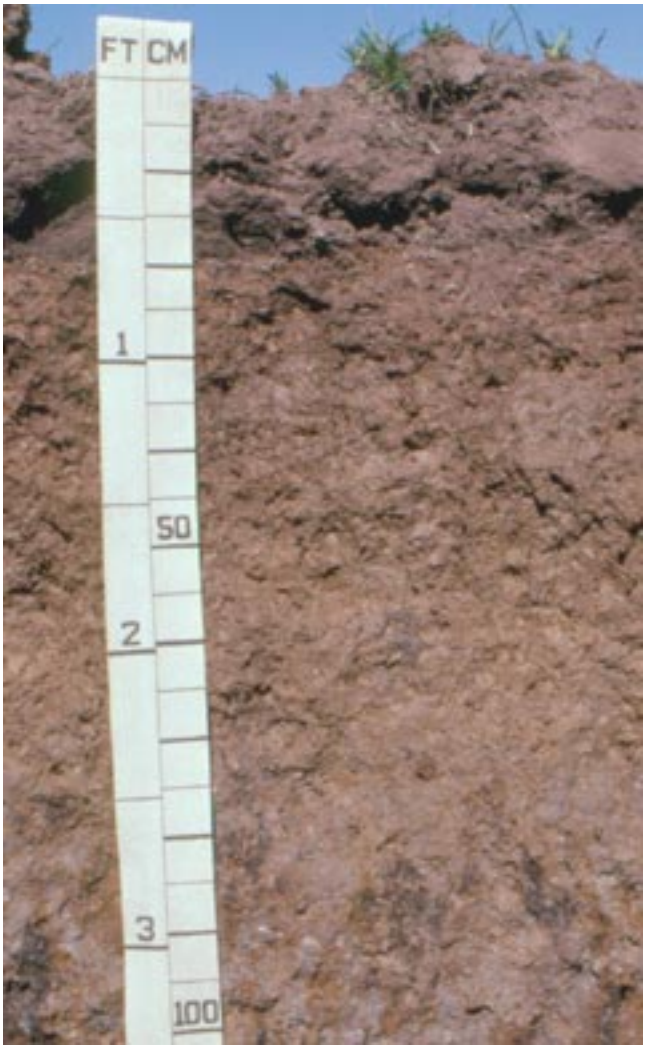

Figure 25.—Typical profile of Maplegrove silt loam, 1 to 3 percent slopes.

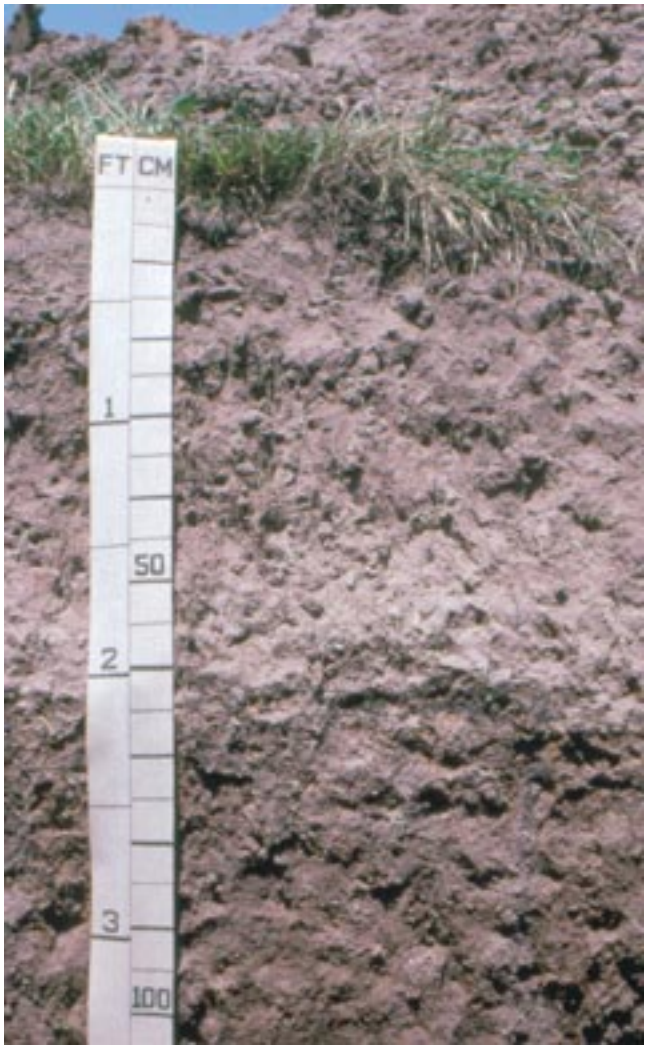

Figure 26.—Typical profile of McCune silt loam, 0 to 1 percent slopes.

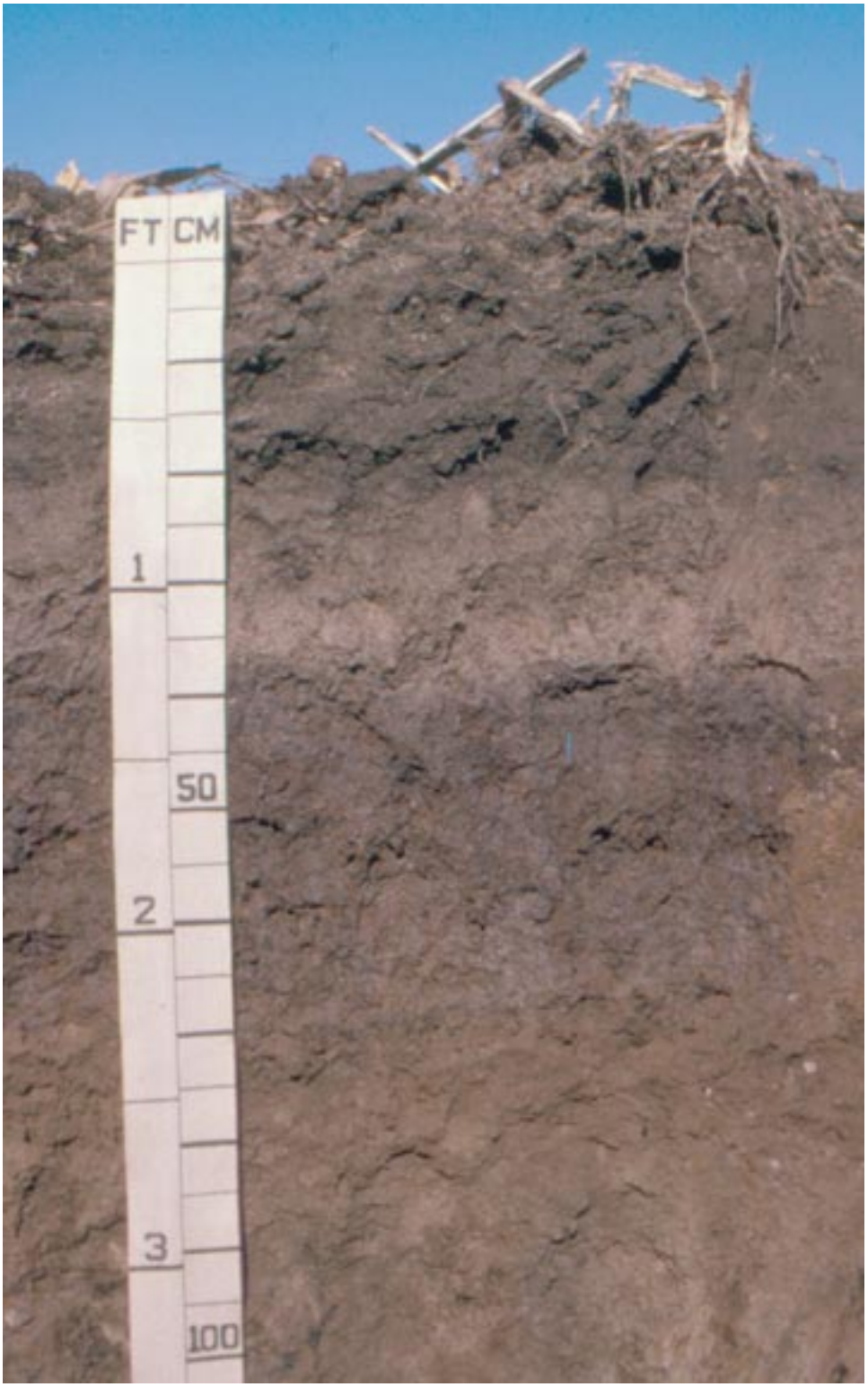

Figure 27.—Typical profile of Medoc silt loam, 0 to 1 percent slopes.

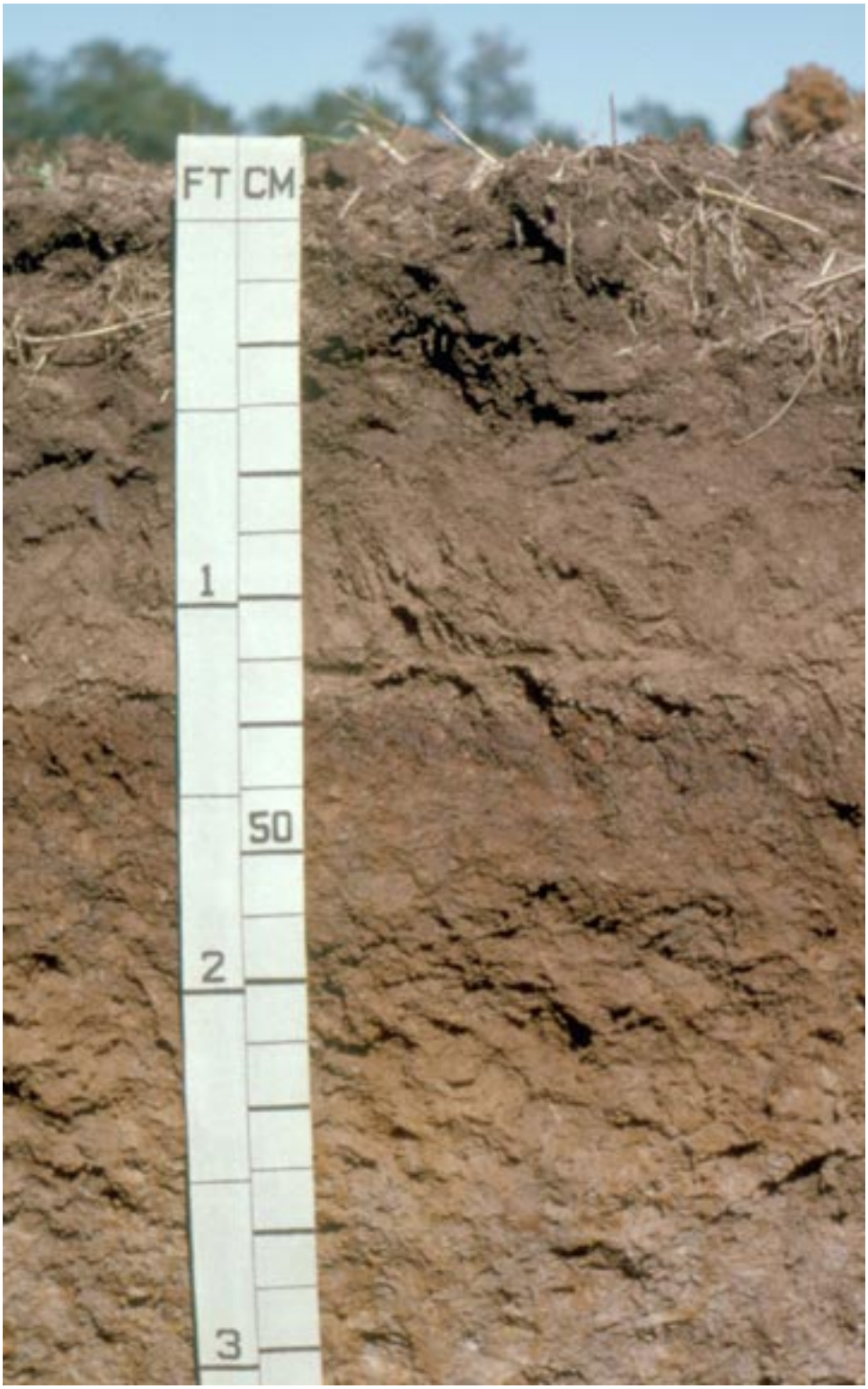

Figure 28.—Typical profile of Opolis silt loam, 0 to 1 percent slopes.

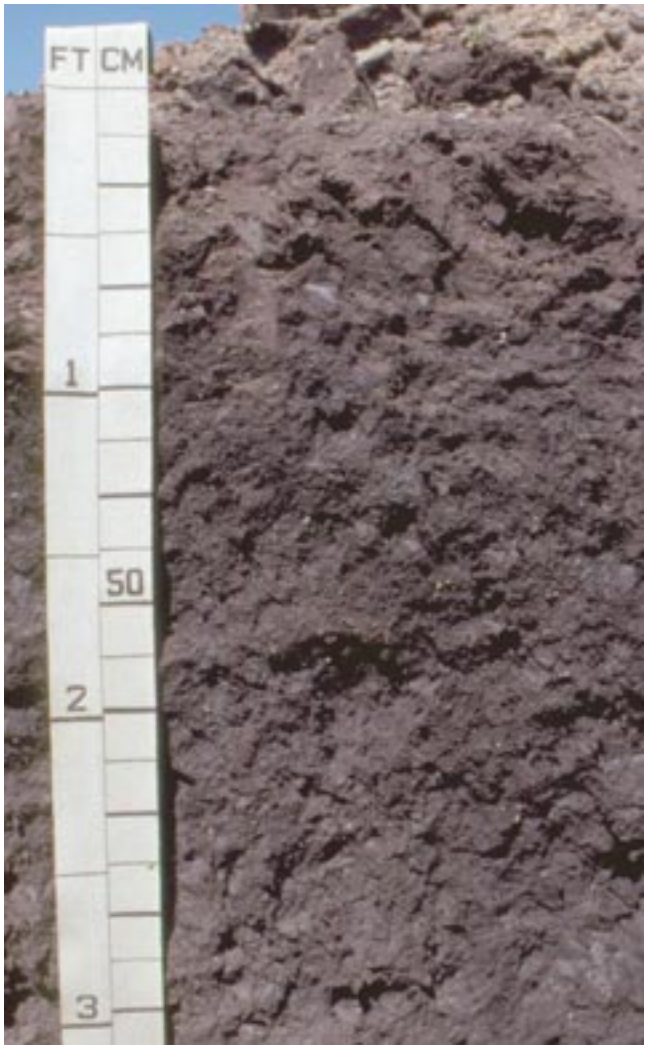

Figure 29.—Typical profile of Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded.

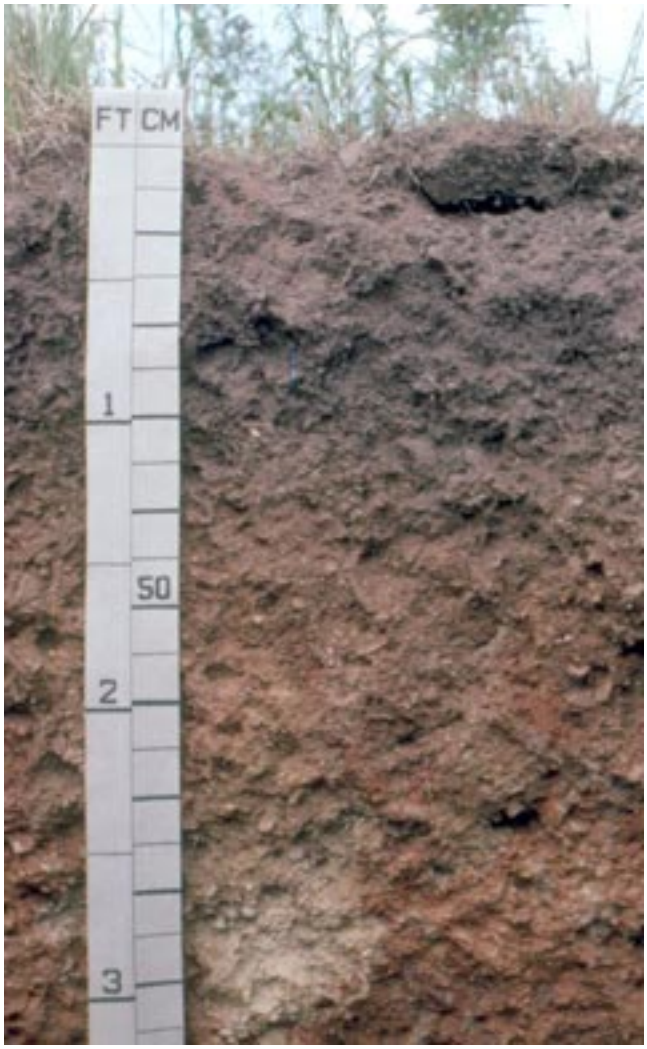

Figure 30.—Typical profile of a Sylvania soil.

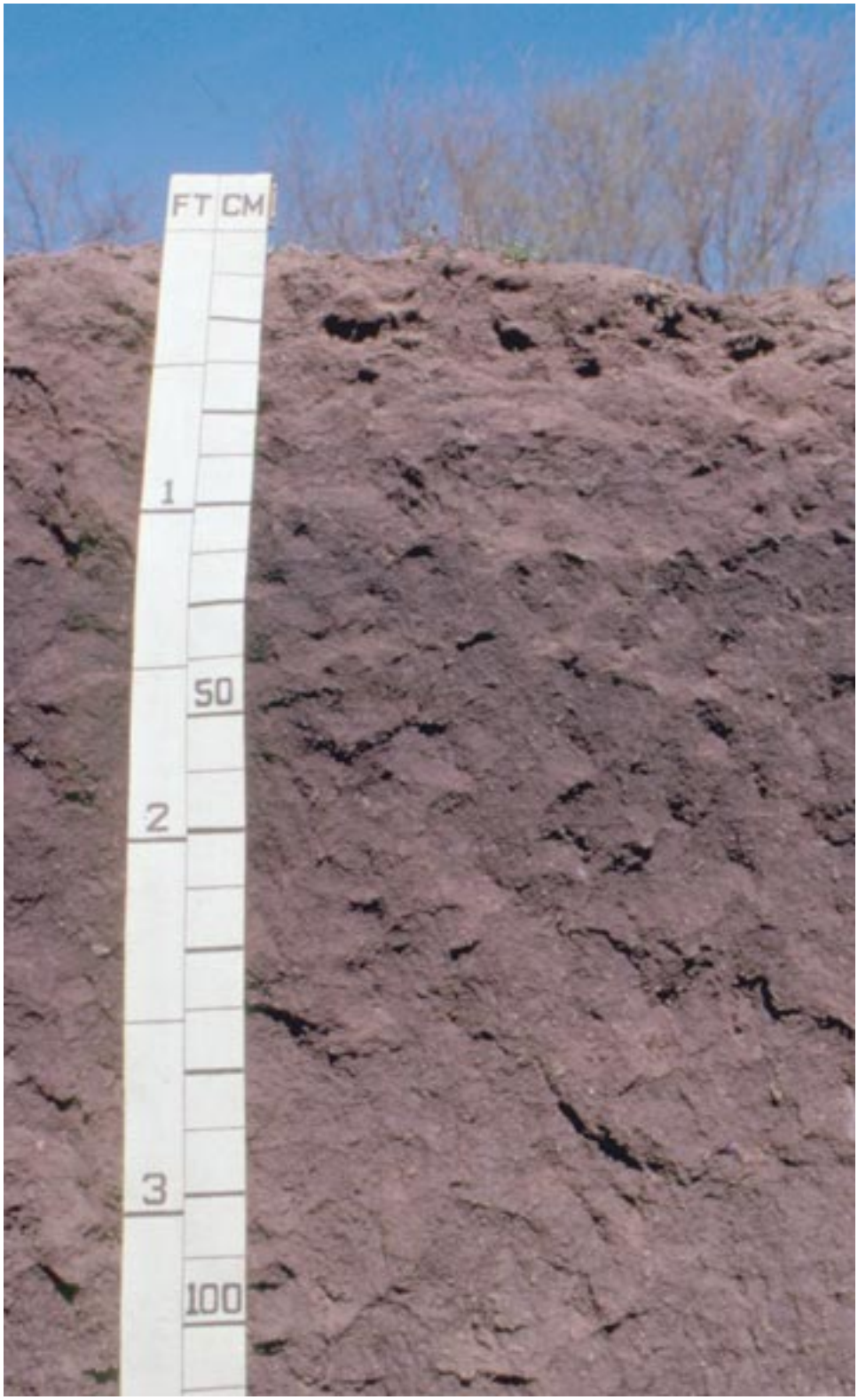

Figure 31.—Typical profile of a Verdigris silt loam.

Content of rock fragments—0 to 40 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Maplegrove Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Interfluves on plateaus
Parent material: Loess over colluvium over residuum derived from limestone
Slope: Very gently sloping (1 to 3 percent)
Elevation: 1,060 feet

Typical Pedon

Maplegrove silt loam, 1 to 3 percent slopes (fig. 25), in a pasture, 1,600 feet west and 1,250 feet south of the northeast corner of sec. 20, T. 28 N., R. 31 W.; USGS Carthage, Missouri, topographic quadrangle; UTM coordinates 4,110,897 meters N. and 381,441 meters E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) (crushed) silt loam, dark grayish brown (10YR 4/2) (crushed) dry; moderate medium subangular blocky structure parting to moderate fine granular; very friable; many very fine and fine roots; many very fine and fine tubular pores; 1 percent rounded chert gravel; slightly acid; clear smooth boundary.

A—6 to 11 inches; very dark grayish brown (10YR 3/2) (crushed) silt loam, grayish brown (10YR 5/2) (crushed) dry; moderate fine subangular blocky structure parting to weak fine granular; very friable; common very fine and fine roots; many very fine and fine tubular pores; 1 percent rounded chert gravel; moderately acid; abrupt smooth boundary.

2Bt1—11 to 17 inches; 60 percent brown (10YR 4/3) (interior) and 40 percent red (2.5YR 4/8) (interior) silty clay loam; moderate fine prismatic structure parting to strong fine angular blocky; very firm, moderately sticky and moderately plastic; common very fine and fine roots between peds; common very fine and fine interstitial and tubular pores; many prominent continuous brown (10YR 4/3) clay films on faces of peds, few prominent discontinuous yellowish red (5YR 4/6) clay films on faces of peds, and very few distinct continuous very dark grayish brown (10YR 3/2) organic coats on faces of peds and in pores; many fine and medium irregular red (2.5YR 4/8) masses of iron accumulation throughout and few fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 1 percent rounded chert gravel; moderately acid; clear smooth boundary.

2Bt2—17 to 27 inches; dark yellowish brown (10YR 4/4) (interior) silty clay; moderate fine prismatic structure parting to strong fine subangular blocky; very firm, moderately sticky and moderately plastic; few very fine and fine roots between peds; common very fine and fine interstitial and tubular pores; many prominent continuous grayish brown (10YR 5/2) clay films on faces of peds and few prominent discontinuous yellowish red (5YR 4/6) clay films on faces of peds; common fine irregular black (N 2/0) masses of iron-manganese accumulation between peds, common fine rounded black (N 2/0) iron-manganese concretions throughout, and common fine irregular red (2.5YR 4/8) masses of iron accumulation throughout; 1 percent rounded chert gravel; strongly acid; clear wavy boundary.

3Bt3—27 to 46 inches; dark yellowish brown (10YR 4/6) (interior) silty clay loam; moderate fine subangular blocky structure; very firm, very sticky and very plastic; few very fine and fine roots between peds; common very fine and fine interstitial and tubular pores; common prominent continuous very dark grayish brown (10YR 3/2) clay films on faces of peds, few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds, and few prominent patchy dark yellowish brown (10YR 4/6) clay films on faces of peds; common fine irregular black (N 2/0) masses of iron-manganese accumulation between peds, common fine rounded black (N 2/0) masses of iron-manganese accumulation throughout, and few fine irregular red (2.5YR 4/8) masses of iron accumulation throughout; 1 percent rounded chert gravel; slightly acid; clear wavy boundary.

4Bt4—46 to 62 inches; 90 percent yellowish brown (10YR 5/4) (interior), 1 percent light brownish gray (10YR 6/2) (interior), and 9 percent yellowish brown (10YR 5/8) (interior) very gravelly clay; strong fine angular blocky structure; very firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores; very few prominent discontinuous dark yellowish brown (10YR 4/6) clay films on faces of peds, many prominent continuous pale brown (10YR 6/3) clay films on faces of peds, and few prominent continuous yellowish brown (10YR 5/4) clay films on faces of peds; many fine irregular black (N 2/0) masses of iron-manganese accumulation between peds, common fine irregular black (N 2/0) masses of iron accumulation between peds, and few fine

irregular red (2.5YR 4/8) masses of iron accumulation between peds; 20 percent angular chert gravel and 30 percent subrounded chert stones; neutral; diffuse wavy boundary.

4Bt5—62 to 80 inches; 95 percent yellowish brown (10YR 5/4) (interior) and 5 percent gray (10YR 6/1) (interior) gravelly clay; strong fine angular blocky structure; very firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores; many prominent continuous yellowish brown (10YR 5/4) clay films on faces of peds and few prominent continuous gray (10YR 6/1) clay films on faces of peds; common fine irregular black (N 2/0) masses of iron-manganese accumulation between peds, common fine irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout, and few fine rounded red (2.5YR 4/8) masses of iron accumulation throughout; 18 percent angular chert gravel and 2 percent angular chert cobbles; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Depth to the argillic horizon: 6 to 19 inches
Depth to the lithic contact: More than 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 to 3
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 1 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

A horizon:
Hue—10YR
Value—3
Chroma—2
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 5 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
Hue—2.5YR to 2.5Y
Value—3 to 5
Chroma—3 to 8
Redoximorphic features—iron concretions, iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Content of rock fragments—0 to 20 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

3Bt horizon:
Hue—5YR to 2.5Y
Value—4 to 6
Chroma—1 to 8
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 50 percent
Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

4Bt horizon:
Hue—7.5YR or 10YR
Value—5 or 6
Chroma—1 to 8
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—20 to 80 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

McCune Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Terraces on plains
Position on the landform: Treads
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 910 feet

Typical Pedon

McCune silt loam, 0 to 1 percent slopes (fig. 26), in a pasture, 650 feet east and 550 feet south of the northwest corner of sec. 21, T. 30 N., R. 33 W.; USGS Asbury, Missouri-Kansas, topographic quadrangle; UTM coordinates 4,134,317 meters N. and 360,641 meters E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) (crushed) silt loam, gray (10YR 6/1) (crushed) dry; moderate medium subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; moderately acid; clear smooth boundary.

A—8 to 11 inches; dark grayish brown (10YR 4/2) (crushed) silt loam, light gray (10YR 7/2)

(crushed) dry; moderate medium subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; few distinct discontinuous brown (10YR 4/3) (moist) organic coats on vertical faces of peds; common fine irregular dark yellowish brown (10YR 3/4) masses of iron accumulation throughout and common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

E1—11 to 15 inches; light brownish gray (10YR 6/2) (interior) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots between peds; many very fine and fine tubular pores with high vertical continuity; common fine irregular brown (10YR 4/3) masses of iron accumulation throughout and common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

E2—15 to 22 inches; gray (10YR 6/1) (interior) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots between peds; many very fine and fine tubular pores with high vertical continuity and many medium tubular pores with moderate vertical continuity; some brittleness in horizon; common medium rounded black (N 2/0) slightly hard iron-manganese concretions (pedogenic) throughout, common fine and medium irregular dark yellowish brown (10YR 4/4) masses of iron accumulation throughout, and common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Btg1/E—22 to 32 inches; 85 percent gray (10YR 6/1) (interior) and 15 percent grayish brown (10YR 5/2) (interior) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few very fine and fine roots between peds; many very fine and fine and common medium tubular pores with moderate vertical continuity; 10 percent tongues of silt 2 to 4 inches wide; 5 percent interfingers; common prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores and few distinct patchy light gray (10YR 7/1) (moist) silt coats on faces of peds and in pores; common medium and coarse rounded black (N 2/0) hard iron-manganese concretions (pedogenic) throughout, common medium irregular brownish yellow (10YR 6/8) masses of iron accumulation throughout, and few fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; very strongly acid; clear wavy boundary.

2Btg2/E—32 to 57 inches; 95 percent dark gray (10YR 4/1) (interior) and 5 percent gray (10YR 5/1) (interior) silty clay loam; weak coarse prismatic structure parting to moderate fine subangular blocky; very firm, moderately sticky and moderately plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; 5 percent tongues of silt 1 to 2 inches wide; 10 percent interfingers; many prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores and few distinct patchy light gray (10YR 7/1) (moist) silt coats on faces of peds and in pores; common medium and coarse irregular red (2.5YR 4/8) soft masses of iron accumulation (pedogenic) between peds, common medium and coarse rounded black (N 2/0) slightly hard iron-manganese concretions (pedogenic) in cracks, and common fine irregular brownish yellow (10YR 6/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Btg3/E—57 to 72 inches; 75 percent gray (10YR 5/1) (interior) and 25 percent brown (10YR 5/3) (interior) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common very fine and fine tubular pores with low vertical continuity; 1 percent gray (10YR 5/1) and 25 percent brown (10YR 5/3) tongues of silt; tongues are 3 to 7 inches wide; few prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores, many distinct discontinuous gray (10YR 5/1) (moist) clay films on faces of peds and in pores, and few distinct patchy light gray (10YR 7/1) (moist) silt coats on faces of peds and in pores; common medium and coarse irregular yellowish brown (10YR 5/8) soft masses of iron accumulation (pedogenic) between peds and common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Btg4/E—72 to 80 inches; 60 percent gray (10YR 5/1) (interior) and 40 percent brown (10YR 5/3) (interior) loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common very fine and fine tubular pores with low vertical continuity; 40 percent brown (10YR 5/3) tongues of silt 3 to 7 inches wide; few prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores, many distinct discontinuous gray (10YR 5/1) (moist) clay films on faces of peds and in pores, and few distinct patchy light gray (10YR 7/1)

(moist) silt coats on faces of peds and in pores; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 11 to 13 inches
Depth to the albic horizon: 11 to 13 inches
Depth to the glossic horizon: 22 to 25 inches
Depth to the argillic horizon: 22 to 25 inches

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—none
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

A horizon:
Hue—10YR
Value—4
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—none
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

E horizon:
Hue—10YR
Value—5 or 6
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—none
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

2Btg/E horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, masses of iron-manganese accumulation, or iron concretions
Texture of the fine-earth fraction—silt loam, silty clay loam, clay loam, or loam
Content of rock fragments—none
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Medoc Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Interfluves on plains
Parent material: Loess over residuum
Slope: Level (0 to 1 percent)
Elevation: 905 feet

Typical Pedon

Medoc silt loam, 0 to 1 percent slopes (fig. 27), in an area of cropland, 300 feet south and 1,000 feet east of the northwest corner of sec. 32, T. 31 N., R. 34 W.; USGS Asbury, Missouri, topographic quadrangle; UTM coordinates 4,131,292 meters N. and 359,015 meters E.

Ap—0 to 9 inches; dark gray (10YR 4/1) (interior) silt loam, light brownish gray (10YR 6/2) (interior) dry; moderate medium subangular blocky structure; very friable; many fine roots throughout; slightly alkaline; clear smooth boundary.

E—9 to 13 inches; light brownish gray (2.5Y 6/2) (interior) silt loam; moderate medium subangular blocky structure; very friable; common fine roots between peds; common fine vesicular pores with moderate vertical continuity; neutral; abrupt smooth boundary.

2Btg—13 to 19 inches; dark gray (10YR 4/1) (interior) clay; weak medium prismatic structure parting to strong fine subangular blocky; very firm, very sticky and very plastic; common fine roots between peds; few fine vesicular pores with moderate vertical continuity; many prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores; common fine red (2.5YR 4/8) masses of iron accumulation throughout; strongly acid; clear smooth boundary.

2Bt1—19 to 22 inches; dark yellowish brown (10YR 4/4) (interior) silty clay; weak medium prismatic structure parting to strong fine subangular blocky; very firm, very sticky and very plastic; few fine roots between peds; few fine discontinuous tubular pores with low vertical continuity; many prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds and in pores; common fine dark gray (10YR 4/1) iron depletions throughout; strongly acid; clear smooth boundary.

2Bt2—22 to 24 inches; dark yellowish brown (10YR 4/4) (interior) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few fine roots between peds; few fine discontinuous

tubular pores with low vertical continuity; many prominent continuous dark yellowish brown (10YR 4/4) (moist) clay films on faces of peds and in pores; strongly acid; clear smooth boundary.

2Bt3—24 to 28 inches; yellowish brown (10YR 5/4) (interior) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few fine roots between peds; common fine discontinuous tubular pores with low vertical continuity; common distinct discontinuous yellowish brown (10YR 5/4) (moist) clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.

2Bt4—28 to 32 inches; yellowish brown (10YR 5/4) (interior) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few fine roots between peds; common fine discontinuous tubular pores with low vertical continuity; common distinct discontinuous yellowish brown (10YR 5/4) (moist) clay films on vertical and horizontal faces of peds; common fine gray (10YR 6/1) iron depletions throughout and few fine brown (7.5YR 5/4) masses of iron accumulation throughout; strongly acid; clear smooth boundary.

3Btg1—32 to 49 inches; gray (10YR 6/1) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; few fine roots between peds; common fine discontinuous tubular pores with low vertical continuity; common distinct discontinuous gray (10YR 6/1) (moist) clay films on vertical and horizontal faces of peds; common medium strong brown (7.5YR 5/8) masses of iron accumulation throughout and few fine yellowish brown (10YR 5/4) masses of iron accumulation throughout; moderately acid; clear smooth boundary.

3Btg2—49 to 62 inches; gray (10YR 6/1) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; few fine roots between peds; common fine and medium vesicular and tubular pores with moderate vertical continuity; common distinct discontinuous gray (10YR 6/1) (moist) clay films on vertical and horizontal faces of peds; common medium strong brown (7.5YR 5/8) masses of iron accumulation throughout, common fine yellowish brown (10YR 5/4) masses of iron accumulation throughout, and few medium and coarse rounded dark concretions; moderately acid; gradual smooth boundary.

3Btg3—62 to 75 inches; gray (10YR 6/1) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; few fine roots between peds; few fine and medium vesicular and tubular pores with moderate vertical continuity; common distinct discontinuous gray (10YR 6/1) (moist) clay films on vertical and horizontal faces of peds and few prominent discontinuous black stains on vertical faces of peds; common medium strong brown (7.5YR 5/8) masses of iron accumulation throughout, few fine dark yellowish brown (10YR 4/4) masses of iron accumulation throughout, and few medium and coarse rounded dark concretions; moderately acid; gradual smooth boundary.

4Btg4—75 to 85 inches; gray (10YR 6/1) (interior) silty clay; weak coarse prismatic structure parting to strong fine subangular blocky; very sticky and very plastic; few fine roots between peds; few fine vesicular and tubular pores with low vertical continuity; common distinct patchy gray (10YR 6/1) (moist) clay films on vertical faces of peds and few prominent discontinuous black stains on vertical faces of peds; common coarse yellowish brown (10YR 5/8) masses of iron accumulation throughout; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 12 inches
Depth to the albic horizon: 6 to 12 inches
Depth to abrupt textural change: 12 to 18 inches
Depth to the argillic horizon: 12 to 18 inches

Ap or A horizon:
- Hue—10YR
- Value—3 or 4
- Chroma—1 or 2
- Redoximorphic features—masses of iron accumulation in some pedons
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—none
- Reaction—strongly acid to neutral (pH 5.1 to 7.3)

E horizon:
- Hue—10YR or 2.5Y
- Value—5 or 6
- Chroma—2
- Redoximorphic features—iron-manganese concretions or masses of iron accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—none

Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Btg horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—none
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

2Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 to 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—none
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

3Btg horizon:
Hue—10YR
Value—5 or 6
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam, clay loam, or silty clay
Content of rock fragments—none
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

4Btg horizon:
Hue—10YR
Value—6
Chroma—1
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Content of rock fragments—none
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Newtonia Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves on plateaus
Parent material: Loess over residuum
Slope: Very gently sloping (1 to 3 percent)
Elevation: 975 feet

Typical Pedon

Newtonia silt loam, in an area of Newtonia-Eldorado silt loams, 1 to 3 percent slopes, in a pasture, 1,200 feet south and 1,950 feet west of the northeast corner of sec. 19, T. 30 N., R. 30 W.; USGS Jasper, Missouri, topographic quadrangle; UTM coordinates 4,132,660 meters N. and 386,540 meters E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) (rubbed) silt loam, brown (10YR 5/3) (rubbed) dry; moderate medium granular structure; friable; many fine and medium roots throughout; common fine and medium tubular pores; slightly acid; clear smooth boundary.

A—9 to 15 inches; very dark grayish brown (10YR 3/2) (rubbed) silt loam, brown (10YR 5/3) (rubbed) dry; moderate medium granular structure parting to weak fine subangular blocky; friable; many very fine and fine roots throughout; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1—15 to 22 inches; brown (7.5YR 4/4) (interior) silt loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common fine and medium tubular pores; prominent continuous brown (7.5YR 4/3) (moist) clay films on vertical and horizontal faces of peds; slightly acid; clear smooth boundary.

Bt2—22 to 29 inches; red (2.5YR 4/8) (interior) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots between peds; common fine and medium tubular pores; prominent continuous brown (7.5YR 4/3) (moist) clay films on vertical and horizontal faces of peds; moderately acid; gradual smooth boundary.

Bt3—29 to 42 inches; red (2.5YR 4/8) (interior) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots between peds; common fine tubular pores; prominent continuous brown (7.5YR 5/4) (moist) clay films

on vertical and horizontal faces of peds; moderately acid; gradual smooth boundary.
Bt4—42 to 57 inches; red (2.5YR 4/6) (interior) clay; moderate fine subangular blocky structure; firm; common very fine and fine roots between peds; common fine tubular pores; prominent continuous brown (7.5YR 5/4) (moist) clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.
Bt5—57 to 70 inches; red (2.5YR 4/6) (interior) clay; strong fine subangular blocky structure; firm; common fine roots between peds; common fine tubular pores; prominent continuous brown (7.5YR 5/4) (moist) clay films on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.
Bt6—70 to 80 inches; brown (7.5YR 5/4) (interior) clay; strong fine subangular blocky structure; firm; common fine roots between peds; prominent continuous clay films on vertical and horizontal faces of peds; moderately acid.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 15 inches
Depth to the argillic horizon: 8 to 15 inches

Ap horizon:
Hue—7.5YR or 10YR
Value—3
Chroma—2 to 4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 1 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

A horizon:
Hue—10YR
Value—3
Chroma—2
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 1 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bt horizon:
Hue—2.5YR to 7.5YR
Value—3 to 5
Chroma—4 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam, silty clay loam, clay loam, silty clay, or clay
Content of rock fragments—0 to 14 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon (if it occurs):
Hue—2.5YR to 7.5YR
Value—4
Chroma—6 to 8
Redoximorphic features—iron-manganese concretions or masses of iron-manganese accumulation
Texture of the fine-earth fraction—loam, silt loam, clay loam, silty clay loam, or silty clay
Content of rock fragments—1 to 55 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

3Bt horizon (if it occurs):
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—6 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—1 to 45 percent
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

Opolis Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Interfluves on plains
Parent material: Loess over residuum
Slope: Level (0 to 1 percent)
Elevation: 895 feet

Typical Pedon

Opolis silt loam, 0 to 1 percent slopes (fig. 28), in an area of cropland, 6,000 feet south and 2,400 feet east of the northwest corner of sec. 2, T. 29 N., R. 34 W.; USGS Asbury, Missouri-Kansas, topographic quadrangle; UTM coordinates 4,128,231 meters N. and 357,781 meters E.

Ap1—0 to 4 inches; very dark grayish brown (10YR 3/2) (interior) silt loam, light brownish gray (10YR 6/2) (interior) dry; weak fine granular structure; very friable; many very fine and fine roots throughout; few very fine and fine tubular pores with low vertical continuity; neutral; clear smooth boundary.

Ap2—4 to 8 inches; very dark grayish brown (10YR 3/2) (interior) silt loam, light brownish gray (10YR 6/2) (interior) dry; weak medium platy structure; very friable; few very fine and fine roots throughout; few very fine and fine tubular pores with low vertical continuity; neutral; clear smooth boundary.

E1—8 to 11 inches; dark grayish brown (10YR 4/2) (interior) silt loam; moderate medium subangular blocky structure; very friable; few very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; few fine irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; neutral; clear smooth boundary.

E2—11 to 15 inches; pale brown (10YR 6/3) (interior) silt loam; moderate fine subangular blocky structure; very friable; few very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; few fine irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; moderately acid; abrupt smooth boundary.

2Bt1—15 to 18 inches; red (2.5YR 4/8) (interior) clay; moderate medium prismatic structure parting to strong fine subangular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; few prominent continuous very dark gray (10YR 3/1) (moist) clay films on vertical and horizontal faces of peds, common prominent continuous red (2.5YR 4/8) (moist) clay films on faces of peds, and few prominent continuous reddish brown (5YR 4/4) (moist) clay films on faces of peds; few fine irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout; strongly acid; clear wavy boundary.

2Bt2—18 to 24 inches; strong brown (7.5YR 5/6) (interior) silty clay; moderate medium prismatic structure parting to strong fine subangular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; very few prominent continuous dark grayish brown (10YR 4/2) (moist) clay films on vertical and horizontal faces of peds, few prominent continuous brown (10YR 4/3) (moist) clay films on vertical and horizontal faces of peds, and many prominent continuous strong brown (7.5YR 5/6) (moist) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—24 to 30 inches; yellowish brown (10YR 5/6) (interior) silty clay; moderate medium prismatic structure parting to weak medium subangular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; few prominent continuous brown (10YR 4/3) (moist) clay films on vertical and horizontal faces of peds and many prominent continuous yellowish brown (10YR 5/6) (moist) clay films on faces of peds; strongly acid; clear wavy boundary.

3Btg—30 to 46 inches; light brownish gray (10YR 6/2) (interior) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm, slightly sticky and slightly plastic; few very fine and fine roots between peds; common very fine and fine tubular pores with moderate vertical continuity; 1 percent tongues of silt throughout; tongues are 1 centimeter wide; few distinct discontinuous brown (10YR 4/3) (moist) clay films on vertical faces of peds and common prominent continuous light brownish gray (10YR 6/2) (moist) clay films on faces of peds; common medium irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout; moderately acid; clear wavy boundary.

3Bt1—46 to 59 inches; yellowish brown (10YR 5/6) (interior) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; firm, slightly sticky and slightly plastic; few very fine and fine roots between peds; common very fine and fine vesicular and tubular pores with moderate vertical continuity; 1 percent tongues of silt throughout; tongues are 1 centimeter wide; few distinct discontinuous yellowish brown (10YR 5/4) (moist) clay films on vertical faces of peds and few faint patchy light gray (10YR 7/1) (moist) silt coats on faces of peds; common fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; gradual wavy boundary.

3Bt2—59 to 70 inches; yellowish brown (10YR 5/6) (interior) silty clay loam; strong fine and medium prismatic structure parting to moderate fine subangular blocky; firm, slightly sticky and slightly plastic; common very fine and fine vesicular and tubular pores with moderate vertical continuity; 1 percent tongues of silt 1 to 4 centimeter wide; very few distinct discontinuous light brownish gray (10YR 6/2) (moist) clay films on vertical faces of peds, common prominent discontinuous yellowish brown (10YR 5/6) (moist) clay films on faces of peds, and few faint patchy light gray (10YR 7/1) (moist) silt coats on faces of peds; common medium irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout and

common fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid; clear wavy boundary.

4Btg—70 to 80 inches; light gray (10YR 7/2) (interior) silty clay; strong medium prismatic structure parting to strong fine subangular blocky; very firm, very sticky and very plastic; few very fine and fine tubular pores with low vertical continuity; common distinct continuous light gray (10YR 7/2) (moist) clay films on vertical and horizontal faces of peds; common medium and coarse irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout and common fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 23 inches
Depth to abrupt textural change: 6 to 23 inches
Depth to the argillic horizon: 6 to 23 inches
Depth to the paralithic contact: More than 60 inches in some pedons
Depth to the lithic contact: More than 60 inches in some pedons

Ap or A horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Redoximorphic features—none
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—none
Reaction—very strongly acid to neutral (pH 5.1 to 7.3)

E horizon:
Hue—10YR
Value—4 to 6
Chroma—2 or 3
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—none
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
Hue—2.5YR to 10YR
Value—3 to 5
Chroma—3 to 8
Redoximorphic features—iron depletions, iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay loam, silty clay loam, silty clay, or clay
Content of rock fragments—none
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Btg horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—0 to 1 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 8
Redoximorphic features—iron depletions, iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—loam, silt loam, clay loam, silty clay loam, or silty clay
Content of rock fragments—0 to 1 percent
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

4Btg horizon:
Hue—10YR
Value—7
Chroma—2
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—none
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

4Bt/E horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—6 to 8
Redoximorphic features—iron-manganese concretions or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam or clay loam
Content of rock fragments—0 to 20 percent

Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

5Bt horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—1 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—clay loam
Content of rock fragments—none
Reaction—strongly acid (pH 5.1 to 5.5)

Osage Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains in river valleys
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 890 feet

Typical Pedon

Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded (fig. 29), in an area of cropland, SW¼NE¼ sec. 7, T. 29 N., R. 32 W.; 1,500 feet west and 1,500 feet south of the northeast corner of sec. 7; USGS Neck City, Missouri, topographic quadrangle; UTM coordinates 4,124,780 meters N. and 370,560 meters E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) (crushed) silty clay loam, dark gray (10YR 4/1) (crushed) dry; moderate medium granular structure parting to moderate medium angular blocky; friable, moderately sticky and moderately plastic; few very fine and fine roots throughout; few very fine and fine tubular pores with low vertical continuity; 1 percent subrounded chert gravel; neutral; abrupt smooth boundary.

A—7 to 10 inches; black (10YR 2/1) (crushed) silty clay, dark gray (10YR 4/1) (crushed) dry; moderate fine subangular blocky structure; firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; many prominent continuous black (10YR 2/1) (moist) clay films on faces of peds and few prominent continuous black (10YR 2/1) (moist) pressure faces on faces of peds; few fine rounded yellowish red (5YR 4/6) masses of iron accumulation throughout; 1 percent subrounded chert gravel; neutral; clear smooth boundary.

Bss1—10 to 24 inches; black (10YR 2/1) (crushed) silty clay, dark gray (10YR 4/1) (crushed) dry; moderate medium prismatic structure parting to moderate fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine tubular pores with low vertical continuity; common prominent continuous black (10YR 2/1) (moist) clay films on faces of peds, common prominent continuous black (10YR 2/1) (moist) intersecting slickensides on faces of peds, and few prominent continuous black (10YR 2/1) (moist) pressure faces on faces of peds; common fine irregular dark brown (10YR 3/3) masses of iron accumulation throughout; 1 percent subrounded chert gravel; slightly acid; clear wavy boundary.

Bss2—24 to 37 inches; very dark gray (10YR 3/1) (crushed) silty clay, gray (10YR 5/1) (crushed) dry; moderate medium prismatic structure parting to moderate fine angular blocky; very firm, very sticky and very plastic; few very fine and fine roots between peds; few very fine and fine interstitial and tubular pores with low vertical continuity; common prominent continuous very dark gray (10YR 3/1) (moist) clay films on faces of peds, common prominent continuous very dark gray (10YR 3/1) (moist) intersecting slickensides on faces of peds, and few prominent continuous very dark gray (10YR 3/1) (moist) pressure faces on faces of peds; few fine irregular dark yellowish brown (10YR 4/4) masses of iron accumulation between peds and few fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 1 percent subrounded chert gravel; moderately acid; clear wavy boundary.

Bgss—37 to 43 inches; dark gray (10YR 4/1) (interior) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores with low vertical continuity; common prominent continuous dark gray (10YR 4/1) (moist) clay films on faces of peds, few prominent continuous dark gray (10YR 4/1) (moist) intersecting slickensides on faces of peds, and few prominent continuous dark gray (10YR 4/1) (moist) pressure faces on faces of peds; common fine irregular brown (10YR 4/3) masses of iron accumulation between peds, few fine rounded yellowish brown (10YR 5/8) masses of iron accumulation throughout, and few fine rounded black (N 2/0) masses of iron-manganese accumulation throughout; 1 percent subrounded chert gravel; slightly acid; clear wavy boundary.

Btgk1—43 to 52 inches; gray (10YR 5/1) (interior) silty

clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores with low vertical continuity; many prominent continuous gray (10YR 5/1) (moist) clay films on faces of peds; common fine irregular yellowish brown (10YR 5/4) masses of iron accumulation between peds, common fine rounded black (N 2/0) iron-manganese concretions throughout, and common fine and medium irregular light gray (10YR 7/1) carbonate concretions throughout; 1 percent subrounded chert gravel; neutral; gradual wavy boundary.

Btgk2—52 to 65 inches; gray (10YR 5/1) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores with low vertical continuity; many prominent continuous gray (10YR 5/1) (moist) clay films on faces of peds and in pores; common fine irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout, common fine and medium irregular black (N 2/0) masses of iron-manganese accumulation throughout, common fine rounded black (N 2/0) iron-manganese concretions throughout, and common fine and medium irregular light gray (10YR 7/1) carbonate concretions throughout; 1 percent subrounded chert gravel; slightly alkaline; gradual wavy boundary.

Btgk3—65 to 75 inches; gray (10YR 6/1) (interior) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores with low vertical continuity; many prominent continuous gray (10YR 6/1) (moist) clay films on faces of peds and in pores; common fine irregular brownish yellow (10YR 6/8) masses of iron accumulation between peds, common fine and medium irregular black (N 2/0) masses of iron-manganese accumulation throughout, and common fine and medium irregular light gray (10YR 7/1) carbonate concretions throughout; 1 percent subrounded chert gravel; slightly alkaline; clear wavy boundary.

Btgk4—75 to 80 inches; light gray (10YR 7/2) (interior) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm, very sticky and very plastic; few very fine and fine interstitial and tubular pores with low vertical continuity; common prominent continuous gray (10YR 5/1) (moist) clay films on faces of peds and in pores and common prominent continuous gray (10YR 6/1) (moist) clay films on faces of peds and in pores; common fine irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout, common fine and medium irregular black (N 2/0) masses of iron-manganese accumulation throughout, and common fine irregular brownish yellow (10YR 6/8) masses of iron accumulation throughout; 1 percent subrounded chert gravel; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 22 to 37 inches

Ap horizon:

- Hue—10YR
- Value—3
- Chroma—1
- Redoximorphic features—masses of iron accumulation in some pedons
- Texture of the fine-earth fraction—silty clay loam
- Content of rock fragments—0 to 1 percent
- Reaction—slightly acid or neutral (pH 6.1 to 7.3)

A horizon:

- Hue—10YR
- Value—2
- Chroma—1
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silty clay
- Content of rock fragments—0 to 1 percent
- Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bss horizon:

- Hue—10YR
- Value—2 or 3
- Chroma—1
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silty clay
- Content of rock fragments—0 to 1 percent
- Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

Bgss horizon:

- Hue—10YR
- Value—4
- Chroma—1
- Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silty clay

Content of rock fragments—0 to 1 percent
Reaction—moderately acid to slightly alkaline (pH 5.6 to 7.8)

Btgk horizon:
Hue—10YR
Value—5 to 7
Chroma—1 or 2
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 5 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

Pomme Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Interfluves or sinkholes on plateaus
Position on the landform: Summits
Parent material: Loess over colluvium over residuum derived from limestone
Slope: Very gently sloping (1 to 3 percent)
Elevation: 1,040 feet

Typical Pedon

Pomme silt loam, in an area of Pomme-Rueter complex, 1 to 3 percent slopes, in a pasture, 2,400 feet west and 2,100 feet north of the southeast corner of sec. 35, T. 28 N., R. 31 W.; USGS Fidelity, Missouri, topographic quadrangle; UTM coordinates 4,106,784 meters N. and 385,969 meters E.

Ap—0 to 6 inches; brown (10YR 4/3) (crushed) silt loam, light yellowish brown (10YR 6/4) (crushed) dry; weak fine subangular blocky structure parting to moderate fine granular; very friable; many very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; 1 percent subrounded chert gravel; neutral; clear smooth boundary.

Bt1—6 to 10 inches; strong brown (7.5YR 5/6) (interior) silt loam; moderate medium subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous strong brown (7.5YR 5/6) (moist) clay films on faces of peds and few distinct discontinuous dark grayish brown (10YR 4/2) (moist) organic coats on faces of peds and in pores; few fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; 3 percent subrounded chert gravel; neutral; clear smooth boundary.

Bt2—10 to 16 inches; yellowish red (5YR 5/6) (interior) silty clay loam; moderate fine subangular blocky structure; friable; common very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous yellowish red (5YR 4/6) (moist) clay films on faces of peds; few fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; 5 percent subrounded chert gravel; neutral; gradual smooth boundary.

Bt3—16 to 24 inches; yellowish red (5YR 5/6) (interior) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous red (2.5YR 4/6) (moist) clay films on faces of peds and few distinct discontinuous yellowish red (5YR 5/6) (moist) clay films on faces of peds; common fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; 5 percent subrounded chert gravel; very strongly acid; gradual smooth boundary.

2Bt4—24 to 44 inches; 80 percent red (2.5YR 4/8) (interior) and 20 percent yellowish red (5YR 5/6) (interior) very gravelly silt loam; moderate medium subangular blocky structure; firm; few very fine and fine roots throughout; common very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous red (2.5YR 4/8) (moist) clay films on faces of peds, few prominent continuous yellowish red (5YR 5/6) (moist) clay films on faces of peds, and few distinct discontinuous light brown (7.5YR 6/4) (moist) silt coats on faces of peds; few fine irregular black (N 2/0) masses of iron-manganese accumulation throughout; 55 percent subrounded chert gravel; very strongly acid; gradual smooth boundary.

3Bt5—44 to 65 inches; yellowish red (5YR 5/6) (interior) extremely gravelly loam; moderate fine subangular blocky structure; firm; few very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; common prominent continuous yellowish red (5YR 4/6) (moist) clay films on faces of peds, few prominent continuous red (2.5YR 4/8) (moist) clay films on faces of peds, few distinct discontinuous light reddish brown (5YR 6/3)

(moist) silt coats on faces of peds, and few distinct discontinuous yellowish red (5YR 5/6) (moist) clay films on faces of peds; 55 percent subangular chert gravel and 20 percent angular chert cobbles; strongly acid; gradual smooth boundary.

3Bt6—65 to 80 inches; 80 percent red (2.5YR 4/8) (interior) and 20 percent reddish yellow (7.5YR 6/8) (interior) extremely gravelly clay; moderate fine subangular blocky structure; very firm; few very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous red (2.5YR 4/8) (moist) clay films on faces of peds, few prominent continuous reddish yellow (7.5YR 6/8) (moist) clay films on faces of peds, and few prominent continuous light brownish gray (10YR 6/2) (moist) clay films on faces of peds; 40 percent subangular chert gravel and 20 percent angular chert cobbles; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 5 to 18 inches
Depth to the argillic horizon: 6 to 18 inches

Ap or A horizon:
- Hue—10YR or 7.5YR
- Value—3 or 4
- Chroma—3
- Redoximorphic features—masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—1 to 20 percent
- Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bt horizon:
- Hue—2.5YR to 7.5YR
- Value—4 or 5
- Chroma—3 to 6
- Redoximorphic features—iron-manganese concretions or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
- Content of rock fragments—2 to 30 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Bt horizon:
- Hue—2.5YR to 7.5YR
- Value—3 to 5
- Chroma—4 to 8
- Redoximorphic features—iron-manganese concretions or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam, silty clay loam, or clay
- Content of rock fragments—35 to 85 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon:
- Hue—2.5YR to 7.5YR
- Value—3 to 6
- Chroma—6 to 8
- Redoximorphic features—masses of iron-manganese accumulation
- Texture of the fine-earth fraction—loam, clay loam, or clay
- Content of rock fragments—35 to 85 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Rueter Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Somewhat excessively drained
Permeability: Moderate
Landform: Hills on plateaus
Position on the landform: Backslopes, shoulders, or summits
Parent material: Colluvium over residuum derived from limestone
Slope: Very gently sloping to strongly sloping (1 to 15 percent)
Elevation: 1,100 feet

Typical Pedon

Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony, in a pasture, 2,400 feet south and 800 feet west of the northeast corner of sec. 11, T. 28 N., R. 29 W.; USGS LaRussell, Missouri, topographic quadrangle; UTM coordinates 4,112,665 meters N. and 405,975 meters E.

Ap—0 to 8 inches; dark brown (10YR 3/3) (crushed) extremely gravelly silt loam, light brownish gray (10YR 6/2) (crushed) dry; moderate fine subangular blocky structure; friable; common fine and many medium roots throughout; common very fine and fine tubular pores with low vertical continuity; 25 percent subangular chert cobbles and 45 percent subangular chert gravel; moderately acid; clear smooth boundary.

A—8 to 14 inches; brown (7.5YR 4/4) (crushed) extremely gravelly silt loam, pale brown (10YR 6/3) (crushed) dry; common fine prominent dark brown (10YR 3/3) (moist) irregular mottles between peds; moderate fine subangular blocky

structure; friable; common medium roots throughout; common very fine and fine tubular pores with low vertical continuity; 30 percent subangular chert cobbles and 45 percent subangular chert gravel; moderately acid; clear smooth boundary.

Bt1—14 to 21 inches; brown (7.5YR 4/4) (interior) extremely gravelly silt loam; common fine distinct strong brown (7.5YR 4/6) (moist) irregular mottles between peds; moderate fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; many distinct continuous brown (7.5YR 4/4) (moist) clay films on faces of peds and in pores; 30 percent subangular chert cobbles and 50 percent subangular chert gravel; moderately acid; gradual smooth boundary.

Bt2—21 to 33 inches; brown (7.5YR 5/4) (interior) extremely gravelly silt loam; common fine prominent brown (10YR 5/3) (moist) irregular mottles between peds, common fine prominent light brownish gray (10YR 6/2) (moist) irregular mottles between peds, and common fine prominent red (2.5YR 4/8) (moist) irregular mottles between peds; moderate fine subangular blocky structure; firm; common very fine and fine roots between peds; many very fine and fine tubular pores with moderate vertical continuity; 30 percent brittleness; many distinct continuous brown (7.5YR 5/4) (moist) clay films on faces of peds and in pores and few distinct patchy light brownish gray (10YR 6/2) (moist) silt coats on faces of peds; 30 percent subangular chert cobbles and 45 percent subangular chert gravel; moderately acid; clear wavy boundary.

Bt3—33 to 40 inches; red (2.5YR 4/8) (interior) very cobbly silt loam; many fine and medium prominent strong brown (7.5YR 5/6) (moist) irregular mottles between peds; weak medium prismatic structure parting to strong fine subangular blocky; firm; common very fine and fine roots between peds; common very fine and fine tubular pores with low vertical continuity; many distinct continuous red (2.5YR 4/8) (moist) clay films on faces of peds and in pores; 30 percent subangular chert cobbles and 30 percent subangular chert gravel; moderately acid; clear wavy boundary.

2Bt4—40 to 50 inches; red (10R 4/8) (interior) cobbly clay; many fine and medium prominent reddish yellow (7.5YR 6/6) (moist) irregular mottles between peds; weak medium prismatic structure parting to strong fine subangular blocky; very firm; common very fine and fine tubular pores with low vertical continuity; many prominent continuous red (10R 4/8) (moist) clay films on vertical and horizontal faces of peds; 20 percent subangular chert cobbles and 5 percent subangular chert gravel; moderately acid; clear wavy boundary.

2Bt5—50 to 60 inches; red (10R 4/6) (interior) cobbly clay; common fine and medium prominent strong brown (7.5YR 5/8) (moist) irregular mottles between peds; weak medium prismatic structure parting to strong fine subangular blocky; very firm; common very fine and fine tubular pores with low vertical continuity; many prominent continuous red (10R 4/6) (moist) clay films on vertical and horizontal faces of peds, very few prominent discontinuous red (10R 4/6) (moist) pressure faces on vertical faces of peds, and very few prominent continuous light gray (10YR 7/1) (moist) clay films on faces of peds; 15 percent subangular chert cobbles and 5 percent subangular chert gravel; strongly acid; gradual wavy boundary.

2Bt6—60 to 72 inches; red (10R 4/8) (interior) cobbly clay; common fine and medium prominent strong brown (7.5YR 5/8) (moist) irregular mottles between peds; weak medium prismatic structure parting to strong fine subangular blocky; very firm; common very fine and fine tubular pores with low vertical continuity; many prominent continuous red (10R 4/8) (moist) clay films on vertical and horizontal faces of peds, very few prominent discontinuous red (10R 4/8) (moist) pressure faces on vertical faces of peds, very few distinct continuous intersecting slickensides on vertical faces of peds, and few prominent continuous light gray (10YR 7/1) (moist) clay films on faces of peds; 15 percent subangular chert cobbles and 5 percent subangular chert gravel; strongly acid; gradual wavy boundary.

2Bt7—72 to 90 inches; red (10R 4/8) (interior) cobbly clay; common fine and medium prominent strong brown (7.5YR 5/8) (moist) irregular mottles between peds; weak medium prismatic structure parting to strong fine subangular blocky; very firm; common very fine and fine tubular pores with low vertical continuity; many prominent continuous red (10R 4/8) (moist) clay films on vertical and horizontal faces of peds, very few prominent discontinuous red (10R 4/8) (moist) pressure faces on vertical faces of peds, and very few distinct continuous intersecting slickensides on vertical faces of peds; 15 percent subangular chert cobbles and 5 percent subangular chert gravel; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 3 to 14 inches
Depth to the argillic horizon: 6 to 17 inches

Ap horizon:
Hue—10YR
Value—2 to 4
Chroma—2 to 4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—35 to 85 percent
Reaction—strongly acid to slightly alkaline (pH 5.1 to 7.8)

A horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—2 to 4
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—35 to 75 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

E horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—3
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam
Content of rock fragments—32 to 66 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Bt horizon:
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—3 to 8
Redoximorphic features—iron-manganese concretions, masses of iron accumulation, or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Bt horizon:
Hue—10R to 10YR
Value—3 to 5
Chroma—4 to 8
Redoximorphic features—iron-manganese concretions or masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—35 to 85 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

3Bt horizon (if it occurs):
Hue—2.5YR to 7.5YR
Value—3 to 5
Chroma—6 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—27 to 80 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Sylvania Series

Depth to root-restricting feature: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Landform: Hills on plains
Position on the landform: Backslopes, shoulders, or summits
Parent material: Colluvium over residuum derived from sandstone-shale
Slope: Nearly level to strongly sloping (1 to 15 percent)
Elevation: 960 feet

Typical Pedon

Sylvania loam (fig. 30), 8 to 15 percent slopes, in a pasture, 1,500 feet west and 400 feet north of the southeast corner of sec. 23, T. 30 N., R. 32 W.; USGS Neck City, Missouri, topographic quadrangle; UTM coordinates 4,132,100 meters N. and 374,479 meters E.

Ap—0 to 8 inches; dark brown (10YR 3/3) (crushed) loam, pale brown (10YR 6/3) (crushed) dry; moderate medium subangular blocky structure parting to moderate fine granular; friable; many very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; 1 percent subrounded sandstone gravel; very strongly acid; clear smooth boundary.

2Bt1—8 to 11 inches; yellowish red (5YR 5/6) (interior) clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; many distinct continuous yellowish brown (10YR 5/4) (moist) clay films on vertical and horizontal faces of peds and few distinct continuous very dark grayish brown (10YR 3/2) (moist) organic coats on vertical

and horizontal faces of peds; 1 percent subrounded sandstone cobbles; very strongly acid; clear smooth boundary.

2Bt2—11 to 15 inches; yellowish red (5YR 5/6) (interior) silty clay; moderate fine subangular blocky structure; very firm; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; many prominent continuous strong brown (7.5YR 5/6) (moist) clay films on vertical and horizontal faces of peds; 1 percent subrounded sandstone gravel; very strongly acid; clear smooth boundary.

2Bt3—15 to 21 inches; brown (7.5YR 5/4) (interior) clay; moderate fine subangular blocky structure; very firm; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; many prominent continuous brown (7.5YR 5/4) (moist) clay films on vertical and horizontal faces of peds; common fine irregular red (2.5YR 4/8) masses of iron accumulation throughout; 1 percent subrounded sandstone gravel; very strongly acid; clear smooth boundary.

2Bt4/C—21 to 30 inches; gray (10YR 6/1) (interior) silty clay and weathered shale; common fine prominent red (2.5YR 4/8) mottles and few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; very firm; common very fine and fine roots throughout; common very fine and fine tubular pores with low vertical continuity; common distinct continuous pale brown (10YR 6/3) (moist) clay films on vertical and horizontal faces of peds; 1 percent subangular shale gravel; very strongly acid; gradual wavy boundary.

2CB1—30 to 42 inches; gray (10YR 5/1) (interior) and red (2.5YR 4/8) (interior), weathered shale and silty clay; weak thick platy and weak medium subangular blocky structure; extremely firm; few very fine and fine roots in cracks; few very fine and fine tubular pores with low vertical continuity; few distinct discontinuous gray (10YR 5/1) (moist) clay films on rock fragments; few fine irregular black (N 2/0) masses of iron-manganese accumulation around stones; very strongly acid; clear smooth boundary.

2CB2—42 to 56 inches; gray (10YR 6/1) (interior) and brownish yellow (10YR 6/8) (interior), partially weathered shale and silty clay; moderate medium platy structure; extremely firm; few very fine and fine roots in cracks; few very fine and fine tubular pores with low vertical continuity; few distinct discontinuous gray (10YR 6/1) (moist) clay films on rock fragments; very strongly acid; clear smooth boundary.

2C—56 to 69 inches; brown (10YR 5/3) (interior), slightly weathered shale; moderate medium platy structure; extremely firm; 5 percent laminated ironstone; few prominent continuous light gray (10YR 7/1) (moist) clay films on vertical faces of peds; very strongly acid; clear smooth boundary.

2Cr—69 to 80 inches; slightly weathered shale.

Range in Characteristics

Thickness of the mollic epipedon: 8 to 20 inches
Depth to the argillic horizon: 8 to 23 inches
Depth to the paralithic contact: 44 to 56 inches

Ap horizon:
- Hue—10YR
- Value—3
- Chroma—1 to 3
- Redoximorphic features—none
- Texture of the fine-earth fraction—fine sandy loam, loam, or silt loam
- Content of rock fragments—0 to 55 percent
- Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

A horizon (if it occurs):
- Hue—5YR to 10YR
- Value—3 or 4
- Chroma—1 to 4
- Redoximorphic features—none
- Texture of the fine-earth fraction—fine sandy loam, silt loam, clay loam, or silty clay loam
- Content of rock fragments—5 to 80 percent
- Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

BA horizon (if it occurs):
- Hue—7.5YR
- Value—6
- Chroma—4
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silty clay
- Content of rock fragments—35 to 85 percent
- Reaction—very strongly acid (pH 4.5 to 5.0)

2Bt horizon:
- Hue—10R to 5Y
- Value—3 to 7
- Chroma—1 to 8
- Redoximorphic features—iron depletions, masses of iron accumulation, or masses of iron-manganese accumulation
- Texture of the fine-earth fraction—clay loam, silty clay loam, silty clay, or clay

Content of rock fragments—0 to 10 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

2Bt/C horizon:
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—1 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—silty clay
Content of rock fragments—1 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

2BC horizon (if it occurs):
Hue—10R to 5Y
Value—4 to 7
Chroma—1 to 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—clay or silty clay
Content of rock fragments—none
Reaction—extremely acid or very strongly acid (pH 3.5 to 5.0)

2CB horizon:
Hue—2.5YR to 10YR
Value—4 to 7
Chroma—1 to 8
Redoximorphic features—masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—0 to 30 percent
Reaction—extremely acid or very strongly acid (pH 3.5 to 5.0)

2C horizon:
Hue—2.5YR to 10YR
Value—4 to 7
Chroma—1 to 8
Redoximorphic features—none
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—0 to 90 percent
Reaction—extremely acid or very strongly acid (pH 3.5 to 5.0)

Verdigris Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains in river valleys
Parent material: Alluvium
Slope: Level (0 to 1 percent)
Elevation: 890 feet

Typical Pedon

Verdigris silt loam (fig. 31), 0 to 1 percent slopes, frequently flooded, in a wooded area, 1,800 feet west and 2,900 feet north of the southeast corner of sec. 4, T. 29 N., R. 33 W.; USGS Asbury, Missouri-Kansas, topographic quadrangle; UTM coordinates 125,390 meters N. and 364,260 meters E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) (crushed) silt loam, dark grayish brown (10YR 4/2) (crushed) dry; strong medium subangular blocky structure; friable; many fine roots throughout; common fine tubular pores with low vertical continuity; slightly acid; clear smooth boundary.

AB—3 to 39 inches; very dark grayish brown (10YR 3/2) (crushed) and grayish brown (10YR 5/2) (crushed) silt loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; common fine roots throughout; common fine tubular pores with low vertical continuity; common distinct discontinuous very dark grayish brown (10YR 3/2) (moist) clay films on vertical and horizontal faces of peds; slightly acid; clear smooth boundary.

Bt1—39 to 49 inches; brown (10YR 4/3) (interior) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few fine roots throughout; few fine tubular pores with low vertical continuity; common distinct discontinuous brown (10YR 4/3) (moist) clay films on vertical and horizontal faces of peds and few distinct discontinuous very dark grayish brown (10YR 3/2) (moist) organic coats on vertical faces of peds; slightly acid; gradual smooth boundary.

Bt2—49 to 80 inches; brown (10YR 4/3) (interior) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few fine roots throughout; few fine tubular pores with low vertical continuity; common distinct discontinuous brown (10YR 4/3) (moist) clay films on vertical and horizontal faces of peds; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 39 inches
Depth to the cambic horizon: 24 to 39 inches

Ap horizon (if it occurs):
Hue—10YR
Value—3
Chroma—2
Redoximorphic features—masses of iron accumulation

Texture of the fine-earth fraction—silt loam
Content of rock fragments—1 percent
Reaction—slightly acid (pH 6.1 to 6.5)

AB horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Redoximorphic features—none
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—none
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Redoximorphic features—none
Texture of the fine-earth fraction—loam, silt loam, clay loam, or silty clay loam
Content of rock fragments—none
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Btg horizon (if it occurs):
Hue—10YR
Value—4
Chroma—1
Redoximorphic features—masses of iron accumulation or masses of iron-manganese accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—1 percent
Reaction—moderately acid (pH 5.6 to 6.0)

Winnipeg Series

Depth to root-restricting feature: Very deep (more than 60 inches)
Drainage class: Well drained
Landform: Footslopes on plateaus
Parent material: Loess over colluvium
Slope: Very gently sloping (1 to 3 percent)
Elevation: 1,040 feet

Typical Pedon

Winnipeg silt loam, 1 to 3 percent slopes, in a pasture, 1,800 feet west and 800 feet south of the northeast corner of sec. 17, T. 27 N., R. 30 W.; USGS Reeds, Missouri, topographic quadrangle; UTM coordinates 4,102,540 meters N. and 390,840 meters E.

Ap—0 to 9 inches; brown (10YR 4/3) (crushed) silt loam, pale brown (10YR 6/3) (crushed) dry; moderate medium subangular blocky structure; very friable; common very fine and fine roots throughout; many very fine and fine tubular pores with moderate vertical continuity; slightly alkaline; clear smooth boundary.

Bt1—9 to 38 inches; strong brown (7.5YR 4/6) (interior) silt loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common very fine and fine roots throughout; common very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous strong brown (7.5YR 4/6) (moist) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—38 to 45 inches; 95 percent strong brown (7.5YR 4/6) (interior) and 5 percent red (2.5YR 4/8) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky and slightly plastic; few very fine and fine roots throughout; many very fine and fine interstitial and tubular pores with moderate vertical continuity; many prominent continuous strong brown (7.5YR 4/6) (moist) clay films on faces of peds and few prominent discontinuous red (2.5YR 4/8) (moist) clay films on faces of peds; 1 percent subrounded chert gravel; neutral; clear smooth boundary.

2Bt3—45 to 64 inches; 90 percent red (2.5YR 4/8) (interior) and 10 percent reddish yellow (7.5YR 6/6) (interior) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; few very fine and fine roots throughout; common very fine and fine interstitial and tubular pores with moderate vertical continuity; few prominent continuous dark red (2.5YR 3/6) (moist) clay films on faces of peds, common prominent continuous red (2.5YR 4/8) (moist) clay films on faces of peds, few prominent continuous reddish yellow (7.5YR 6/6) (moist) clay films on faces of peds, and few distinct patchy light brown (7.5YR 6/4) (moist) silt coats on faces of peds; 1 percent subrounded chert gravel; moderately acid; clear smooth boundary.

3Bt4—64 to 80 inches; yellowish red (5YR 4/6) (interior) extremely gravelly loam; weak medium subangular blocky structure; firm, moderately sticky and moderately plastic; common very fine and fine interstitial and tubular pores with moderate vertical continuity; common prominent continuous yellowish red (5YR 4/6) (moist) clay films on faces of peds; 75 percent subrounded chert gravel; slightly acid.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 10 inches
Depth to the argillic horizon: 8 to 10 inches

Ap or A horizon:
- Hue—10YR
- Value—4
- Chroma—2 or 3
- Redoximorphic features—none
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—0 to 1 percent
- Reaction—strongly acid to slightly alkaline (pH 5.1 to 7.8)

Bt horizon:
- Hue—2.5YR to 7.5YR
- Value—4
- Chroma—4 to 8
- Redoximorphic features—masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silt loam or silty clay loam
- Content of rock fragments—0 to 1 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Bt horizon:
- Hue—2.5YR to 7.5YR
- Value—4 to 6
- Chroma—6 to 8
- Redoximorphic features—masses of iron-manganese accumulation
- Texture of the fine-earth fraction—silty clay loam or silty clay
- Content of rock fragments—0 to 1 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon:
- Hue—5YR
- Value—4
- Chroma—6
- Redoximorphic features—none
- Texture of the fine-earth fraction—loam or silty clay loam
- Content of rock fragments—30 to 75 percent
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Formation of the Soils

Soils are continually changing through processes that act on accumulated or deposited geologic material. The characteristics of the soil are determined by five major factors—the parent material and its physical and mineralogical composition; the climate under which the soil material accumulated and has existed since accumulation; the living organisms on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material (Jenny, 1941). The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the impact of any one factor unless conditions are specified for the others.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The accumulation of parent material is the first step in the formation of a soil. The nature of this material is the most important factor in determining the type of soil that forms. It influences soil texture, color, mineralogy, fertility, and many other soil characteristics. The parent material in Jasper County includes weathered limestone, shale, and sandstone bedrock; alluvium; loess; or a combination of these.

Most of the material weathered from limestone bedrock in Jasper County is of the Mississippian geologic age. This material tends to form a deep or very deep, cherty clay soil. Rueter and Goss soils formed in limestone bedrock. Shale from the Pennsylvanian age typically weathers into a clayey material. Sylvania soils formed in shale. The sandstone bedrock from the Pennsylvanian age weathers to a clay loam or other loamy material. Barco soils formed in sandstone bedrock.

Alluvium is material transported by water and deposited on flood plains and terraces in stream valleys. The origin of alluvium varies greatly because of such factors as stream gradient or material from upslope. Bearthicket, Carl, Cedargap, Hepler, Osage, and Verdigris soils formed in alluvial material.

Loess is silty material deposited by the wind. None of the soils in Jasper County formed solely in this material. Its influence is evident, however, in level or nearly level areas. Most upland soils in Jasper County show this influence.

Climate

The climate under which the soils in the county formed greatly influenced their formation. The rate of geologic weathering or deposition of parent material and the shape of the land vary with different climatic conditions. Climate, especially temperature and rainfall, also affects the abundance and species composition of plant and animal life.

Higher temperatures and rainfall encourage rapid chemical change and physical disintegration of the soil. When calcium carbonate and other soluble salts are removed by leaching, soil fertility declines. This type of climate is also conducive to the rapid breakdown of minerals that results in the formation of clay within the soil. The clay is moved downward within the soil profile into the subsoil. This process is known as illuviation. Nearly all of the upland soils, such as Newtonia and Goss soils, show these effects.

Some evidence suggests that changes in climate have occurred over geologic time. Geologic erosion, stone lines, and loess deposition indicate climatic conditions different from those prevalent today.

Most of the differences among the soils in the county, however, cannot be attributed to the climate, which has been relatively uniform throughout the county. Differences in the degree of weathering and leaching and in the translocation of clay are caused chiefly by variations in all of the soil-forming factors.

Living Organisms

Living organisms significantly influence the kind and extent of horizonation in the soil. Plants, burrowing animals, earthworms, insects, micro-organisms, and human activities directly influence soil formation. They influence the content of organic matter, color, structure, aeration, and other soil properties.

The composition of plant communities varies, depending on climate and the fertility, available water

capacity, drainage, and depth of the soil. In areas of grassland, the organic matter in the surface layer is derived mainly from the decay of annual and biennial plants. The thick dark surface layer of soils that formed under grassland vegetation is high in organic matter and micro-organisms. Newtonia, Maplegrove, Opolis, Cherokee, Medoc, Eldorado, and Sylvania soils are examples. In contrast, the surface layer of soils that formed under forest vegetation is thin and light colored. These soils have a low content of organic matter derived mainly from leaves, twigs, and logs. Rueter, Pomme, and Goss soils formed under this plant cover. Some areas in Jasper County, however, formed under mixed grass and forest vegetation. Hoberg and Creldon soils are examples of soils that formed in these transitional areas.

Worms, insects, and, especially, micro-organisms play an important part in the decomposition of plant residue and enhance the movement of air, water, and plant nutrients. When the plant material is reduced to humus, plant nutrients are released, soil structure is enhanced, and the physical condition of the surface layer is improved. Human activities also have affected soil formation. Areas of native and introduced grasses have been overgrazed by livestock. In areas that have been tilled, the content of organic matter has been reduced and a plowpan has formed. Construction and excavation activities, including the mining of lignite and the resulting stockpiling of the overburden, also alter the soils. In time, the processes of soil formation begin all over again.

Relief

Relief influences soil formation through its effect on drainage, runoff, erosion, decomposition, and the penetration of soil moisture. Relief refers to the length, shape, aspect, and uniformity of the slopes that make up a landscape.

The influence of relief on the soils in Jasper County is especially evident in the rate at which water runs off the surface and in the internal drainage characteristics of the soils. In areas of Gerald, McCune, Cherokee, Hepler, and other nearly level, somewhat poorly drained soils, relief has a great influence on the depth to seasonal water saturation and the length of the period when the saturation occurs.

Soils in level areas or on gentle slopes commonly have a lower runoff rate and a higher rate of water infiltration than soils in the steeper areas. The result is a deeper soil with a more developed profile. In contrast, soils on steep slopes are characterized by rapid runoff, little infiltration, and a more severe hazard of erosion.

Relief can influence weathering and plant composition through its effect on temperature and on exposure to sunlight. South- and west-facing slopes tend to be warmer and drier than their north- and east-facing counterparts. The Mississippian limestone geology in Jasper County has resulted in a karst landscape in parts of the county. Sinkholes have formed on this landscape. The soils in these sinkholes have been greatly influenced by relief.

Time

Time is required for the formation of soils. Profile development is an expression of the age of a soil. It is not necessarily a reflection of a period of years but is rather a result of the interaction of the various processes of soil formation acting upon the parent material over time.

The soils in Jasper County have a wide range in ages. Those that formed in recent alluvial deposits, such as Cedargap soils, are among the youngest. Some of the oldest soils have the greatest number of profile features. The clay has been concentrated in a distinct subsoil through weathering and through translocation caused by percolating water. Soils that have a fragipan, such as Hoberg and Keeno soils, are among the most developed soils in Jasper County.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

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

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

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

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

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

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

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

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

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

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

Cement rock. Shaly limestone used in the manufacture of cement.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

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

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil

or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

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

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

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—***excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,*** and ***very poorly drained***. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Droughty (in tables). The soil holds an insufficient amount of water for plants during dry periods.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

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.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called ***normal field capacity, normal moisture capacity,*** or ***capillary capacity***.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and

biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

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 as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

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

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Highly erodible (in tables). The soil has a wind erodibility index greater than 8 and is very susceptible to erosion by water.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these;

(2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

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

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

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

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

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. Descriptive terms are as follows: abundance—***few, common,*** and ***many;*** size—***fine, medium,*** and ***coarse;*** and contrast—***faint, distinct,*** and ***prominent***. The size measurements are of the diameter along the greatest dimension. ***Fine*** indicates less than 5 millimeters (about 0.2 inch); ***medium,*** from 5 to 15 millimeters (about 0.2 to 0.6 inch); and ***coarse,*** more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal

structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, ***hardpan, fragipan, claypan, plowpan,*** and ***traffic pan***.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

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 movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

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

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

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

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil

material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

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

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

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

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

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

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

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

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

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). 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.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

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.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

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.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Very gently sloping	1 to 3 percent
Gently sloping	2 to 5 percent
Moderately sloping	3 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

Classes for complex slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Gently undulating	1 to 3 percent
Undulating	2 to 5 percent
Gently rolling	3 to 8 percent
Rolling	8 to 15 percent
Hilly	15 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

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

Slow intake (in tables). The slow movement of water into the soil.

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

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

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

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—***platy*** (laminated), ***prismatic*** (vertical axis of aggregates longer than horizontal), ***columnar*** (prisms with rounded tops), ***blocky*** (angular or subangular), and ***granular***. ***Structureless*** soils are either ***single grain*** (each grain by itself, as in dune sand) or ***massive*** (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion 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. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is 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.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are ***sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,*** and ***clay***. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The abbreviations (see table 21) are ***C—clay, CL—clay loam, COS—coarse sand, COSL—coarse sandy loam, FS—fine sand, FSL—fine sandy loam, L—loam, LCOS—loamy coarse sand, LFS—loamy fine sand, LS—loamy sand, LVFS—loamy very fine sand, S—sand, SC—sandy clay, SCL—sandy clay loam, SI—silt, SIC—silty clay, SICL—silty clay loam, SIL—silt loam, SL—sandy loam, VFS—very fine sand,*** and ***VFSL—very fine sandy loam.*** Terms used in lieu of texture descriptions are ***WB—weathered bedrock*** and ***UWB—unweathered bedrock.*** The texture modifiers that may apply to textural classes are ***BY—bouldery, BYV—very bouldery, BYX—extremely bouldery, CB—cobbly, CBV—very cobbly, CBX—extremely cobbly, CN—channery, CNV—very channery, CNX—extremely channery, FL—flaggy, FLV—very flaggy, FLX—extremely flaggy, GR—gravelly, GRV—very gravelly, GRX—extremely gravelly, SR—stratified, ST—stony, STV—very stony,*** and ***STX—extremely stony.***

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

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

Valley. An elongated depressional area primarily developed by stream action.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Joplin, Missouri)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	41.8	22.7	32.2	71	-5	10	1.54	0.55	2.46	3	3.3
February---	47.1	27.4	37.2	76	-1	24	2.11	.91	3.14	4	3.5
March------	58.0	37.0	47.5	84	11	109	3.55	1.85	5.04	6	2.4
April------	69.5	47.2	58.4	89	26	282	3.98	1.85	5.81	6	.0
May--------	76.8	56.1	66.4	90	36	510	4.66	2.71	6.40	7	.0
June-------	84.6	64.9	74.8	96	48	743	5.39	3.02	7.49	7	.0
July-------	90.2	69.9	80.0	103	54	931	2.79	1.07	4.22	4	.0
August-----	88.6	67.5	78.1	101	51	870	4.26	2.01	6.20	6	.0
September--	80.5	60.1	70.3	96	37	610	5.47	2.22	8.20	6	.0
October----	70.8	48.5	59.6	90	28	319	3.68	1.26	5.68	5	.0
November---	57.2	37.5	47.3	79	14	97	3.30	.97	5.18	4	.6
December---	45.5	27.0	36.3	72	-2	20	2.49	1.17	3.62	4	2.7
Yearly:											
Average---	67.6	47.1	57.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	104	-8	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,525	43.22	35.14	50.89	62	12.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Joplin, Missouri)

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--	Mar. 31	Apr. 13	Apr. 24
2 years in 10 later than--	Mar. 25	Apr. 6	Apr. 19
5 years in 10 later than--	Mar. 14	Mar. 26	Apr. 9
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 4	Oct. 22	Oct. 5
2 years in 10 earlier than--	Nov. 9	Oct. 28	Oct. 10
5 years in 10 earlier than--	Nov. 18	Nov. 7	Oct. 22

Table 3.--Growing Season

(Recorded in the period 1961-90 at Joplin, Missouri)

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	223	199	173
8 years in 10	232	208	180
5 years in 10	248	225	195
2 years in 10	265	243	209
1 year in 10	273	252	217

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
40000	Barden silt loam, 1 to 3 percent slopes	20,694	5.0
40011	Barco loam, 1 to 3 percent slopes	2,180	0.5
40015	Eldorado silt loam, 1 to 3 percent slopes, very stony	6,604	1.6
40016	Eldorado very gravelly silt loam, 3 to 8 percent slopes, very stony	29,268	7.1
40017	Maplegrove silt loam, 1 to 3 percent slopes	81,151	19.8
40018	Medoc silt loam, 0 to 1 percent slopes	5,657	1.4
40019	Newtonia-Eldorado silt loams, 1 to 3 percent slopes	54,745	13.3
40020	Newtonia-Eldorado silt loams, 1 to 3 percent slopes, moderately eroded	637	0.2
40021	Opolis-Hepler silt loams, 1 to 15 percent slopes	2,971	0.7
40022	Opolis silt loam, 0 to 1 percent slopes	7,732	1.9
40023	Opolis silt loam, 1 to 3 percent slopes	11,060	2.7
40024	Opolis loam, 1 to 3 percent slopes, moderately eroded	1,034	0.3
40026	Sylvania gravelly silt loam, 1 to 3 percent slopes	1,045	0.3
40027	Sylvania very gravelly silt loam, 3 to 8 percent slopes	2,041	0.5
40028	Sylvania loam, 3 to 8 percent slopes	4,135	1.0
40029	Sylvania loam, 8 to 15 percent slopes	2,337	0.6
44000	Cherokee silt loam, 0 to 1 percent slopes	13,818	3.4
44002	Carl silty clay loam, 0 to 1 percent slopes, rarely flooded	7,520	1.8
44004	McCune silt loam, 0 to 1 percent slopes	2,846	0.7
46001	Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	8,366	2.0
46002	Hepler silt loam, 0 to 1 percent slopes, occasionally flooded	6,281	1.5
46004	Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded	600	0.1
46005	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	14,884	3.6
70006	Creldon silt loam, 1 to 3 percent slopes	568	0.1
70012	Hoberg silt loam, 2 to 5 percent slopes	272	*
70045	Keeno gravelly silt loam, 3 to 8 percent slopes	604	0.1
70056	Crackerneck extremely gravelly silt loam, 8 to 15 percent slopes	272	*
70057	Crackerneck extremely gravelly silt loam, 15 to 35 percent slopes	1,871	0.5
70058	Crackerneck very gravelly silt loam, 3 to 8 percent slopes	1,227	0.3
70059	Goss extremely gravelly silt loam, 15 to 35 percent slopes, rocky	4,132	1.0
70060	Hoberg-Eldorado-Pomme silt loams, 1 to 3 percent slopes	4,310	1.1
70061	Pomme silt loam, karst, 1 to 3 percent slopes	3,689	0.9
70062	Pomme-Rueter complex, 1 to 3 percent slopes	17,154	4.2
70063	Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony	26,533	6.5
70064	Rueter very gravelly silt loam, 1 to 3 percent slopes	6,335	1.5
70065	Rueter very gravelly silt loam, 3 to 8 percent slopes	14,128	3.4
70066	Winnipeg silt loam, 1 to 3 percent slopes	5,585	1.4
71751	Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded	9,583	2.3
73031	Gerald silt loam, 0 to 2 percent slopes	3,245	0.8
75376	Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded	14,950	3.6
99000	Pits and Quarries	667	0.2
99001	Water	920	0.2
99002	Borrow areas	205	*
99003	Miscellaneous water	349	*
99005	Landfill	211	*
99010	Dumps and Pits complex	5,802	1.4
99011	Kanima very channery loam, 3 to 50 percent slopes	175	*
	Total	410,393	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Map unit name
40000	Barden silt loam, 1 to 3 percent slopes
40011	Barco loam, 1 to 3 percent slopes
40017	Maplegrove silt loam, 1 to 3 percent slopes
40018	Medoc silt loam, 0 to 1 percent slopes
40019	Newtonia-Eldorado silt loams, 1 to 3 percent slopes
40020	Newtonia-Eldorado silt loams, 1 to 3 percent slopes, moderately eroded
40022	Opolis silt loam, 0 to 1 percent slopes
40023	Opolis silt loam, 1 to 3 percent slopes
40024	Opolis loam, 1 to 3 percent slopes, moderately eroded
44000	Cherokee silt loam, 0 to 1 percent slopes
44002	Carl silty clay loam, 0 to 1 percent slopes, rarely flooded (where drained)
44004	McCune silt loam, 0 to 1 percent slopes
46001	Verdigris silt loam, 0 to 1 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
46002	Hepler silt loam, 0 to 1 percent slopes, occasionally flooded
46004	Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded (where drained)
46005	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded
70006	Creldon silt loam, 1 to 3 percent slopes
70061	Pomme silt loam, karst, 1 to 3 percent slopes
70062	Pomme-Rueter complex, 1 to 3 percent slopes
70066	Winnipeg silt loam, 1 to 3 percent slopes
71751	Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded
73031	Gerald silt loam, 0 to 2 percent slopes

Table 6.--Land Capability and Yields per Acre of Crops

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

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
40000:						
Barden	2e	113	113	39	420	59
40011:						
Barco	2e	76	75	26	280	39
40015:						
Eldorado	6s	---	---	---	---	---
40016:						
Eldorado	6s	---	---	---	---	---
40017:						
Maplegrove	2e	108	108	37	400	56
40018:						
Medoc	2s	103	102	35	380	54
40019:						
Newtonia	2e	119	118	40	440	62
Eldorado	2e	76	75	26	280	39
40020:						
Newtonia	3e	113	113	39	420	59
Eldorado	2s	70	70	24	260	37
40021:						
Opolis	6e	---	---	---	---	---
Hepler	3w	---	---	---	---	---
40022:						
Opolis	2s	103	102	35	380	54
40023:						
Opolis	2e	97	97	33	360	51
40024:						
Opolis	3e	89	89	30	330	46
40026:						
Sylvania	2e	84	83	29	310	44
40027:						
Sylvania	4e	78	78	27	290	41
40028:						
Sylvania	4e	81	81	28	300	42
40029:						
Sylvania	6e	---	---	---	---	---
44000:						
Cherokee	2s	103	102	35	380	54

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
44002:						
Carl----------	3w	92	91	31	340	19
44004:						
McCune--------	2w	113	113	39	420	24
46001:						
Verdigris-----	5w	---	---	---	---	---
46002:						
Hepler--------	2w	119	118	40	440	25
46004:						
Osage---------	3w	92	91	31	340	19
46005:						
Verdigris-----	2w	113	113	39	420	59
70006:						
Creldon-------	2e	97	73	32	350	39
70012:						
Hoberg--------	2e	100	75	33	360	40
70045:						
Keeno---------	4s	54	42	18	200	22
70056:						
Crackerneck---	6e	---	---	---	---	---
70057:						
Crackerneck---	7e	---	---	---	---	---
70058:						
Crackerneck---	4e	65	65	22	240	34
70059:						
Goss----------	7e	---	---	---	---	---
70060:						
Hoberg--------	2e	97	97	33	360	51
Eldorado------	2e	76	75	26	280	39
Pomme---------	2e	84	83	29	310	44
70061:						
Pomme---------	2e	84	83	29	310	44
70062:						
Pomme---------	2e	84	83	29	310	44
Rueter--------	3s	65	65	22	240	34
70063:						
Rueter--------	6e	---	---	---	---	---
70064:						
Rueter--------	3s	65	65	22	240	34
70065:						
Rueter--------	4e	59	59	20	220	31

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
70066: Winnipeg------	2e	113	113	39	420	59
71751: Bearthicket---	2w	108	108	37	400	56
73031: Gerald--------	3w	89	67	30	320	36
75376: Cedargap------	3w	54	54	18	200	28
99000. Pits and Quarries						
99001. Water						
99002. Borrow areas						
99003. Miscellaneous water						
99005. Landfill						
99010: Dumps---------	8s	---	---	---	---	---
Pits----------	8s	---	---	---	---	---
99011: Kanima--------	7s	---	---	---	---	---

Table 7.--Land Capability and Yields per Acre of Pasture

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

Map symbol and soil name	Land capability	Caucasian bluestem hay	Improved bermudagrass hay	Orchard-grass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay
		Tons	Tons	Tons	Tons	Tons
40000:						
Barden	2e	4.3	3.6	3.7	3.8	4.5
40011:						
Barco	2e	2.8	1.8	2.2	2.2	2.6
40015:						
Eldorado	6s	3.8	2.7	3.0	2.9	3.4
40016:						
Eldorado	6s	3.6	2.5	2.8	2.7	3.1
40017:						
Maplegrove	2e	4.1	3.4	3.5	3.6	4.2
40018:						
Medoc	2s	3.9	3.3	3.4	3.4	4.0
40019:						
Newtonia	2e	4.3	3.8	3.8	3.6	4.3
Eldorado	2e	3.8	2.7	3.0	2.9	3.4
40020:						
Newtonia	3e	4.1	3.7	3.7	3.5	4.1
Eldorado	2s	3.6	2.5	2.8	2.7	3.1
40021:						
Opolis	6e	3.2	2.7	2.7	2.8	3.3
Hepler	3w	---	3.9	3.3	3.1	3.6
40022:						
Opolis	2s	3.9	3.3	3.4	3.4	4.0
40023:						
Opolis	2e	3.7	3.1	3.2	3.3	3.8
40024:						
Opolis	3e	3.4	2.8	2.9	3.0	3.5
40026:						
Sylvania	2e	4.2	3.0	3.3	3.2	3.7
40027:						
Sylvania	4e	4.0	2.8	3.1	3.0	3.5
40028:						
Sylvania	4e	3.1	2.6	2.7	2.7	3.2
40029:						
Sylvania	6e	2.8	2.3	2.4	2.4	2.9
44000:						
Cherokee	2s	3.9	3.3	3.4	3.4	4.0

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Caucasian bluestem hay	Improved bermudagrass hay	Orchard-grass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay
		Tons	Tons	Tons	Tons	Tons
44002:						
Carl	3w	---	4.0	---	3.2	3.8
44004:						
McCune	2w	---	3.7	3.1	3.0	3.5
46001:						
Verdigris	5w	3.7	3.3	3.2	2.8	3.3
46002:						
Hepler	2w	---	3.9	3.3	3.1	3.6
46004:						
Osage	3w	---	4.0	---	3.2	3.8
46005:						
Verdigris	2w	4.3	3.9	3.7	3.3	3.9
70006:						
Creldon	2e	3.4	2.0	4.1	2.9	3.4
70012:						
Hoberg	2e	3.5	2.0	4.2	3.0	3.5
70045:						
Keeno	4s	1.9	1.8	2.3	1.7	1.9
70056:						
Crackerneck	6e	2.9	2.0	2.2	2.2	2.5
70057:						
Crackerneck	7e	2.5	1.7	1.9	1.8	2.2
70058:						
Crackerneck	4e	3.3	2.3	2.5	2.5	2.9
70059:						
Goss	7e	1.8	1.2	1.4	1.3	1.6
70060:						
Hoberg	2e	2.7	2.0	2.0	2.3	2.7
Eldorado	2e	3.8	2.7	3.0	2.9	3.4
Pomme	2e	3.0	2.7	2.7	2.6	3.0
70061:						
Pomme	2e	3.0	2.7	2.7	2.6	3.0
70062:						
Pomme	2e	3.0	2.7	2.7	2.6	3.0
Rueter	3s	3.3	2.3	2.5	2.5	2.9
70063:						
Rueter	6e	2.6	1.8	2.0	2.0	2.3
70064:						
Rueter	3s	3.3	2.3	2.5	2.5	2.9
70065:						
Rueter	4e	3.0	2.1	2.3	2.3	2.6

Table 7.--Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Land capability	Caucasian bluestem hay	Improved bermudagrass hay	Orchard-grass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay
		Tons	Tons	Tons	Tons	Tons
70066: Winnipeg	2e	4.1	3.7	3.7	3.5	4.1
71751: Bearthicket	2w	4.1	3.7	3.6	3.1	3.7
73031: Gerald	3w	---	2.1	2.5	2.7	3.1
75376: Cedargap	3w	1.8	1.3	0.8	1.2	1.4
99000. Pits and Quarries						
99001. Water						
99002. Borrow areas						
99003. Miscellaneous water						
99005. Landfill						
99010: Dumps	8s	---	---	---	---	---
Pits	8s	---	---	---	---	---
99011: Kanima	7s	2.1	1.4	1.6	1.5	1.8

Table 8.--Pasture and Hayland Suitability Groups

(See text for descriptions of the groups listed in this table.)

Map symbol	Map unit name	Component name	Pasture and hayland group
40000	Barden silt loam, 1 to 3 percent slopes	Barden	CyU
40011	Barco loam, 1 to 3 percent slopes	Barco	MDU
40015	Eldorado silt loam, 1 to 3 percent slopes, very stony	Eldorado	GrU
40016	Eldorado very gravelly silt loam, 3 to 8 percent slopes, very stony	Eldorado	GrU
40017	Maplegrove silt loam, 1 to 3 percent slopes	Maplegrove	CyU
40018	Medoc silt loam, 0 to 1 percent slopes	Medoc	CyU
40019	Newtonia-Eldorado silt loams, 1 to 3 percent slopes	Newtonia	LyU
		Eldorado	GrU
40020	Newtonia-Eldorado silt loams, 1 to 3 percent slopes, moderately eroded	Newtonia	LyU
		Eldorado	GrU
40021	Opolis-Hepler silt loams, 1 to 15 percent slopes	Opolis	CyU
		Hepler	WLO
40022	Opolis silt loam, 0 to 1 percent slopes	Opolis	CyU
40023	Opolis silt loam, 1 to 3 percent slopes	Opolis	CyU
40024	Opolis loam, 1 to 3 percent slopes, moderately eroded	Opolis	CyU
40026	Sylvania gravelly silt loam, 1 to 3 percent slopes	Sylvania	GrU
40027	Sylvania very gravelly silt loam, 3 to 8 percent slopes	Sylvania	GrU
40028	Sylvania loam, 3 to 8 percent slopes	Sylvania	CyU
40029	Sylvania loam, 8 to 15 percent slopes	Sylvania	CyU
44000	Cherokee silt loam, 0 to 1 percent slopes	Cherokee	CyU
44002	Carl silty clay loam, 0 to 1 percent slopes, rarely flooded	Carl	WCB
44004	McCune silt loam, 0 to 1 percent slopes	McCune	WLO
46001	Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	Verdigris	LyO
46002	Hepler silt loam, 0 to 1 percent slopes, occasionally flooded	Hepler	WLO
46004	Osage silty clay loam, 0 to 1 percent slopes, occasionally flooded	Osage	WCB
46005	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	Verdigris	LyO
70006	Creldon silt loam, 1 to 3 percent slopes	Creldon	LyP
70012	Hoberg silt loam, 2 to 5 percent slopes	Hoberg	LyP
70045	Keeno gravelly silt loam, 3 to 8 percent slopes	Keeno	GrP
70056	Crackerneck extremely gravelly silt loam, 8 to 15 percent slopes	Crackerneck	GrU
70057	Crackerneck extremely gravelly silt loam, 15 to 35 percent slopes	Crackerneck	GrU
70058	Crackerneck very gravelly silt loam, 3 to 8 percent slopes	Crackerneck	GrU
70059	Goss extremely gravelly silt loam, 15 to 35 percent slopes, rocky	Goss	GrU
70060	Hoberg-Eldorado-Pomme silt loams, 1 to 3 percent slopes	Hoberg	LyP
		Eldorado	GrU
		Pomme	LyU
70061	Pomme silt loam, karst, 1 to 3 percent slopes	Pomme	LyU
70062	Pomme-Rueter complex, 1 to 3 percent slopes	Pomme	LyU
		Rueter	GrU
70063	Rueter extremely gravelly silt loam, 8 to 15 percent slopes, very stony	Rueter	GrU
70064	Rueter very gravelly silt loam, 1 to 3 percent slopes	Rueter	GrU
70065	Rueter very gravelly silt loam, 3 to 8 percent slopes	Rueter	GrU
70066	Winnipeg silt loam, 1 to 3 percent slopes	Winnipeg	LyU
71751	Bearthicket silt loam, 0 to 1 percent slopes, occasionally flooded	Bearthicket	LyO
73031	Gerald silt loam, 0 to 2 percent slopes	Gerald	WtP
75376	Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded	Cedargap	GrO
99000	Pits and Quarries	Pits	---
		Quarries	---
99001	Water	Water	---
99002	Borrow areas	Borrow areas	---
99003	Miscellaneous water	Miscellaneous water	---
99005	Landfill	Landfill	---
99010	Dumps and Pits complex	Dumps	---
		Pits	---
99011	Kanima very channery loam, 3 to 50 percent slopes	Kanima	GrU

Table 9.--Forestland Productivity

(Only the soils suitable for production of commercial trees are listed.)

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
40021: Opolis.				
Hepler	Common hackberry	76	---	American sycamore, green ash.
	Eastern cottonwood	90	100	
	Green ash	73	72	
	Northern red oak	67	43	
	Pin oak	80	57	
44002:				
Carl	Bur oak	---	---	Bur oak, pin oak.
	Eastern cottonwood	80	86	
	Pecan	50	---	
	Pin oak	75	57	
44004:				
McCune	Common hackberry	76	---	American sycamore, eastern cottonwood, green ash.
	Eastern cottonwood	90	100	
	Green ash	73	43	
	Northern red oak	67	43	
	Pin oak	80	57	
46002:				
Hepler	Common hackberry	76	---	American sycamore, green ash.
	Eastern cottonwood	90	100	
	Green ash	73	72	
	Northern red oak	67	43	
	Pin oak	80	57	
46004:				
Osage	Bur oak	---	---	Bur oak, pin oak.
	Eastern cottonwood	80	86	
	Pecan	50	---	
	Pin oak	75	57	
70056:				
Crackerneck	Black oak	62	43	Black oak, northern red oak, white oak.
	Northern red oak	62	43	
	Post oak	58	43	
	White oak	60	43	
70057:				
Crackerneck	Black oak	62	43	Black oak, northern red oak, white oak.
	Northern red oak	62	43	
	Post oak	58	43	
	White oak	60	43	
70058:				
Crackerneck	Black oak	62	43	Black oak, northern red oak, white oak.
	Northern red oak	62	43	
	Post oak	58	43	
	White oak	60	43	
70059:				
Goss	Black oak	53	40	Black oak, eastern redcedar.
	Eastern redcedar	45	---	
	Hickory	---	---	
	Post oak	50	---	

Table 9.--Forestland Productivity--Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
70060:				
Hoberg.				
Eldorado.				
Pomme	Northern red oak	65	43	Black walnut, shortleaf pine, white oak.
	White oak	65	43	
70061:				
Pomme	Northern red oak	65	43	Black walnut, northern red oak, white oak.
	White oak	65	43	
70062:				
Pomme	Northern red oak	65	43	Black walnut, northern red oak, white oak.
	White oak	65	43	
Rueter	Black oak	61	43	Black oak, shortleaf pine, white oak.
	Northern red oak	61	43	
	Shortleaf pine	61	86	
	White oak	58	43	
70063:				
Rueter	Black oak	61	43	Black oak, shortleaf pine, white oak.
	Northern red oak	61	43	
	Shortleaf pine	61	86	
	White oak	58	43	
70064:				
Rueter	Black oak	61	43	Black oak, shortleaf pine, white oak.
	Northern red oak	61	43	
	Shortleaf pine	61	86	
	White oak	58	43	
70065:				
Rueter	Black oak	61	43	Black oak, shortleaf pine, white oak.
	Northern red oak	61	43	
	Shortleaf pine	61	86	
	White oak	58	43	
70066:				
Winnipeg	American sycamore	---	---	American sycamore, black walnut, shortleaf pine.
	Black oak	---	---	
	Black walnut	---	---	
	Shortleaf pine	---	---	
	White oak	60	43	
71751:				
Bearthicket	American sycamore	---	---	Black walnut, northern red oak, shortleaf pine, white ash, white oak.
	Black walnut	---	---	
	Common hackberry	---	---	
	Pin oak	96	86	
	Red maple	---	---	
75376:				
Cedargap	Black oak	66	43	Black oak, shortleaf pine, white oak.
	Black walnut	---	---	
	Green ash	---	---	
	White oak	---	---	

Table 10.--Forestland Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.10	Slightly limited seasonal wetness (slightly limited)	0.10	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.10
40011:										
Barco	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
40015:										
Eldorado	Not limited		Slightly limited surface stones (slightly limited)	0.07	Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
40016:										
Eldorado	Slightly limited large stones (slightly limited) small stones (slightly limited)	0.17 0.07	Moderately limited large stones (moderately limited) surface stones (slightly limited) small stones (slightly limited)	0.45 0.13 0.07	Not limited		Slightly limited large stones (slightly limited)	0.17	Not limited	
40017:										
Maplegrove	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.27	Slightly limited seasonal wetness (slightly limited)	0.27	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.27
40018:										
Medoc	Not limited		Not limited		Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50	Moderately limited seasonal wetness (moderately limited)	0.51	Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40019:										
Newtonia	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
Eldorado	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
40020:										
Newtonia	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
Eldorado	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
40021:										
Opolis	Not limited		Moderately limited slope (moderately limited)	0.43	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Moderately limited seasonal wetness (moderately limited)	0.30	Limited slope (limited) low strength (moderately limited) seasonal wetness (moderately limited)	0.68 0.50 0.30
Hepler	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited flooding (moderately limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.60 0.50 0.29
40022:										
Opolis	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Moderately limited seasonal wetness (moderately limited)	0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40023:										
Opolis	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Moderately limited seasonal wetness (moderately limited)	0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30
40024:										
Opolis	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Moderately limited seasonal wetness (moderately limited)	0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30
40026:										
Sylvania	Slightly limited small stones (slightly limited)	0.04	Slightly limited small stones (slightly limited)	0.04	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.25	Slightly limited seasonal wetness (slightly limited)	0.25	Limited slippage potential (limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.90 0.50 0.25
40027:										
Sylvania	Slightly limited small stones (slightly limited)	0.24	Slightly limited small stones (slightly limited)	0.24	Not limited		Slightly limited small stones (slightly limited)	0.01	Limited slippage potential (limited)	0.90
40028:										
Sylvania	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Limited slippage potential (limited) low strength (moderately limited)	0.90 0.50
40029:										
Sylvania	Not limited		Moderately limited slope (moderately limited)	0.43	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.25	Slightly limited seasonal wetness (slightly limited)	0.25	Limited slippage potential (limited) slope (limited) low strength (moderately limited)	0.90 0.68 0.50

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44000:										
Cherokee	Not limited		Not limited		Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50	Moderately limited seasonal wetness (moderately limited)	0.51	Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50
44002:										
Carl	Moderately limited seasonal wetness (moderately limited) stickiness (surface) (moderately limited)	0.60 0.50	Moderately limited seasonal wetness (moderately limited) stickiness (surface) (moderately limited)	0.60 0.50	Limited seasonal wetness (limited) stickiness (surface) (moderately limited) low strength (moderately limited)	0.76 0.50 0.50	Limited seasonal wetness (limited) stickiness (surface) (moderately limited)	0.76 0.50	Limited seasonal wetness (limited) stickiness (surface) (moderately limited) low strength (moderately limited)	0.76 0.50 0.50
44004:										
McCune	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20
46001:										
Verdigris	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Very limited flooding (very limited) low strength (moderately limited)	1.00 0.50
46002:										
Hepler	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited flooding (moderately limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.60 0.50 0.29
46004:										
Osage	Moderately limited seasonal wetness (moderately limited) stickiness (surface) (moderately limited)	0.60 0.50	Moderately limited seasonal wetness (moderately limited) stickiness (surface) (moderately limited)	0.60 0.50	Limited seasonal wetness (limited) stickiness (surface) (moderately limited) low strength (moderately limited)	0.76 0.50 0.50	Limited seasonal wetness (limited) stickiness (surface) (moderately limited)	0.76 0.50	Limited seasonal wetness (limited) flooding (moderately limited) stickiness (surface) (moderately limited)	0.76 0.60 0.50

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46005:										
Verdigris-----	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited flooding (moderately limited) low strength (moderately limited)	0.60 0.50
70006:										
Creldon-------	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.15	Slightly limited seasonal wetness (slightly limited)	0.15	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.15
70012:										
Hoberg--------	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20
70045:										
Keeno---------	Not limited		Slightly limited slope (slightly limited)	0.10	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20
70056:										
Crackerneck---	Limited small stones (limited) very sandy (surface) (moderately limited) large stones (slightly limited)	0.68 0.50 0.17	Limited small stones (limited) very sandy (surface) (moderately limited) large stones (moderately limited)	0.68 0.50 0.45	Moderately limited very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	0.50 0.11	Limited small stones (limited) large stones (slightly limited) seasonal wetness (slightly limited)	0.68 0.17 0.11	Limited slope (limited) very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	0.68 0.50 0.11
70057:										
Crackerneck---	Limited small stones (limited) very sandy (surface) (moderately limited) large stones (slightly limited)	0.68 0.50 0.17	Limited slope (limited) small stones (limited) very sandy (surface) (moderately limited)	0.99 0.68 0.50	Moderately limited slope (moderately limited) very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	0.60 0.50 0.11	Limited small stones (limited) slope (moderately limited) large stones (slightly limited)	0.68 0.60 0.17	Very limited slope (very limited) very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	1.00 0.50 0.11

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70058:										
Crackerneck	Moderately limited small stones (moderately limited)	0.42	Moderately limited small stones (moderately limited)	0.42	Slightly limited seasonal wetness (slightly limited)	0.11	Slightly limited small stones (slightly limited) seasonal wetness (slightly limited)	0.30 0.11	Slightly limited seasonal wetness (slightly limited)	0.11
70059:										
Goss	Limited surface stones (limited) very sandy (surface) (moderately limited) small stones (moderately limited)	0.63 0.50 0.33	Very limited surface stones >15% (very limited) slope (limited) very sandy (surface) (moderately limited)	1.00 0.99 0.50	Limited large surface stones (limited) slope (moderately limited) very sandy (surface) (moderately limited)	0.86 0.60 0.50	Limited large surface stones (limited) slope (moderately limited) large stones (slightly limited)	0.86 0.60 0.17	Very limited slope (very limited) large surface stones (limited) surface stones (limited)	1.00 0.86 0.63
70060:										
Hoberg	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Slightly limited seasonal wetness (slightly limited)	0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20
Eldorado	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
Pomme	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited slippage potential (moderately limited) low strength (moderately limited)	0.50 0.50
70061:										
Pomme	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited slippage potential (moderately limited) low strength (moderately limited)	0.50 0.50

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70062:										
Pomme	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited slippage potential (moderately limited) low strength (moderately limited)	0.50 0.50
Rueter	Moderately limited small stones (moderately limited)	0.38	Moderately limited small stones (moderately limited)	0.38	Not limited		Slightly limited small stones (slightly limited)	0.24	Moderately limited slippage potential (moderately limited)	0.50
70063:										
Rueter	Slightly limited small stones (slightly limited) large stones (slightly limited)	0.20 0.17	Moderately limited large stones (moderately limited) slope (moderately limited) small stones (slightly limited)	0.45 0.43 0.20	Not limited		Slightly limited large stones (slightly limited)	0.17	Limited slope (limited) slippage potential (moderately limited)	0.68 0.50
70064:										
Rueter	Moderately limited small stones (moderately limited)	0.38	Moderately limited small stones (moderately limited)	0.38	Not limited		Slightly limited small stones (slightly limited)	0.24	Moderately limited slippage potential (moderately limited)	0.50
70065:										
Rueter	Moderately limited small stones (moderately limited)	0.38	Moderately limited small stones (moderately limited)	0.38	Not limited		Slightly limited small stones (slightly limited)	0.24	Moderately limited slippage potential (moderately limited)	0.50
70066:										
Winnipeg	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited low strength (moderately limited)	0.50
71751:										
Bearthicket	Not limited		Not limited		Moderately limited low strength (moderately limited)	0.50	Not limited		Moderately limited flooding (moderately limited) low strength (moderately limited)	0.60 0.50

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
73031:										
Gerald	Not limited		Not limited		Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29	Slightly limited seasonal wetness (slightly limited)	0.29	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29
75376:										
Cedargap	Slightly limited small stones (slightly limited)	0.04	Slightly limited small stones (slightly limited)	0.04	Moderately limited low strength (moderately limited)	0.50	Not limited		Very limited flooding (very limited) low strength (moderately limited)	1.00 0.50
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005:										
Landfill	Not limited		Very limited slope (very limited)	1.00	Limited slope (limited)	0.79	Limited slope (limited)	0.79	Very limited slope (very limited)	1.00
99010:										
Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 10.--Forestland Management--Continued

Map symbol and soil name	Hand planting		Mechanical planting		Use of harvesting equipment		Mechanical site preparation (surface)		Roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99011: Kanima	Limited small stones (limited)	0.73	Limited small stones (limited) slope (slightly limited)	0.73 0.10	Not limited		Limited small stones (limited)	0.73	Not limited	

Table 11.--Forestland Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.10	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.10	Not limited	
40011:										
Barco	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
40015:										
Eldorado	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
40016:										
Eldorado	Slightly limited slope/erodibility (slightly limited)	0.19	Slightly limited slope/erodibility (slightly limited)	0.10	Not limited		Not limited		Limited droughty (limited)	0.74
40017:										
Maplegrove	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.27	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.27	Not limited	
40018:										
Medoc	Not limited		Not limited		Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.51	Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50	Moderately limited seasonal wetness (moderately limited)	0.43
40019:										
Newtonia	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40019:										
Eldorado	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
40020:										
Newtonia	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
Eldorado	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
40021:										
Opolis	Very limited slope/erodibility (very limited)	1.00	Slightly limited slope/erodibility (slightly limited)	0.27	Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.30	Limited slope (limited) low strength (moderately limited) seasonal wetness (moderately limited)	0.68 0.50 0.30	Slightly limited seasonal wetness (slightly limited)	0.04
Hepler	Not limited		Not limited		Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.20	Moderately limited flooding (moderately limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.60 0.50 0.20	Moderately limited flooding (moderately limited)	0.60
40022:										
Opolis	Not limited		Not limited		Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Slightly limited seasonal wetness (slightly limited)	0.04
40023:										
Opolis	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Slightly limited seasonal wetness (slightly limited)	0.04

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40024:										
Opolis	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.30	Moderately limited low strength (moderately limited) seasonal wetness (moderately limited)	0.50 0.30	Slightly limited seasonal wetness (slightly limited)	0.04
40026:										
Sylvania	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.25	Limited slippage potential (limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.90 0.50 0.25	Not limited	
40027:										
Sylvania	Moderately limited slope/erodibility (moderately limited)	0.31	Slightly limited slope/erodibility (slightly limited)	0.10	Not limited		Limited slippage potential (limited)	0.90	Slightly limited droughty (slightly limited)	0.25
40028:										
Sylvania	Moderately limited slope/erodibility (moderately limited)	0.31	Slightly limited slope/erodibility (slightly limited)	0.10	Limited low strength (limited)	0.80	Limited slippage potential (limited) low strength (moderately limited)	0.90 0.50	Not limited	
40029:										
Sylvania	Limited slope/erodibility (limited)	0.69	Slightly limited slope/erodibility (slightly limited)	0.22	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.25	Limited slippage potential (limited) slope (limited) low strength (moderately limited)	0.90 0.68 0.50	Not limited	
44000:										
Cherokee	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited) seasonal wetness (moderately limited)	0.80 0.51	Moderately limited seasonal wetness (moderately limited) low strength (moderately limited)	0.51 0.50	Moderately limited seasonal wetness (moderately limited)	0.43

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44002:										
Carl	Not limited		Not limited		Limited low strength (limited) seasonal wetness (limited)	0.80 0.76	Limited seasonal wetness (limited) stickiness (surface) (moderately limited) low strength (moderately limited)	0.76 0.50 0.50	Limited seasonal wetness (limited)	0.76
44004:										
McCune	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.29	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29	Not limited	
46001:										
Verdigris	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited)	0.80	Very limited flooding (very limited) low strength (moderately limited)	1.00 0.50	Limited flooding (limited)	0.90
46002:										
Hepler	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.20	Moderately limited flooding (moderately limited) low strength (moderately limited) seasonal wetness (slightly limited)	0.60 0.50 0.20	Moderately limited flooding (moderately limited)	0.60
46004:										
Osage	Not limited		Not limited		Limited low strength (limited) seasonal wetness (limited)	0.80 0.76	Limited seasonal wetness (limited) flooding (moderately limited) stickiness (surface) (moderately limited)	0.76 0.60 0.50	Limited seasonal wetness (limited) flooding (moderately limited)	0.76 0.60

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46005:										
Verdigris	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited)	0.80	Moderately limited flooding (moderately limited) low strength (moderately limited)	0.60 0.50	Moderately limited flooding (moderately limited)	0.60
70006:										
Creldon	Moderately limited slope/erodibility (moderately limited)	0.33	Slightly limited slope/erodibility (slightly limited)	0.06	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.15	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.15	Not limited	
70012:										
Hoberg	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Not limited	
70045:										
Keeno	Limited slope/erodibility (limited)	0.67	Slightly limited slope/erodibility (slightly limited)	0.12	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.20	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.20	Not limited	
70056:										
Crackerneck	Moderately limited slope/erodibility (moderately limited)	0.42	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited seasonal wetness (slightly limited)	0.11	Limited slope (limited) very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	0.68 0.50 0.11	Very limited droughty (very limited)	1.00
70057:										
Crackerneck	Limited slope/erodibility (limited)	0.96	Moderately limited slope/erodibility (moderately limited)	0.49	Slightly limited seasonal wetness (slightly limited)	0.11	Very limited slope (very limited) very sandy (surface) (moderately limited) seasonal wetness (slightly limited)	1.00 0.50 0.11	Very limited droughty (very limited)	1.00

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70058:										
Crackerneck	Moderately limited slope/erodibility (moderately limited)	0.31	Slightly limited slope/erodibility (slightly limited)	0.10	Slightly limited seasonal wetness (slightly limited)	0.11	Slightly limited seasonal wetness (slightly limited)	0.11	Moderately limited droughty (moderately limited)	0.48
70059:										
Goss	Limited slope/erodibility (limited)	0.96	Moderately limited slope/erodibility (moderately limited)	0.49	Not limited		Very limited slope (very limited)	1.00	Moderately limited droughty (moderately limited)	0.58
							large surface stones (limited)	0.86		
							surface stones (limited)	0.63		
70060:										
Hoberg	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
					seasonal wetness (slightly limited)	0.20	seasonal wetness (slightly limited)	0.20		
Eldorado	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.04	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
Pomme	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited slippage potential (moderately limited)	0.50	Not limited	
							low strength (moderately limited)	0.50		
70061:										
Pomme	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited slippage potential (moderately limited)	0.50	Not limited	
							low strength (moderately limited)	0.50		
70062:										
Pomme	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited slippage potential (moderately limited)	0.50	Not limited	
							low strength (moderately limited)	0.50		

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70062:										
Rueter	Slightly limited slope/erodibility (slightly limited)	0.12	Slightly limited slope/erodibility (slightly limited)	0.04	Not limited		Moderately limited slippage potential (moderately limited)	0.50	Slightly limited droughty (slightly limited)	0.23
70063:										
Rueter	Moderately limited slope/erodibility (moderately limited)	0.42	Slightly limited slope/erodibility (slightly limited)	0.22	Not limited		Limited slope (limited) slippage potential (moderately limited)	0.68 0.50	Limited droughty (limited)	0.96
70064:										
Rueter	Slightly limited slope/erodibility (slightly limited)	0.12	Slightly limited slope/erodibility (slightly limited)	0.04	Not limited		Moderately limited slippage potential (moderately limited)	0.50	Slightly limited droughty (slightly limited)	0.23
70065:										
Rueter	Moderately limited slope/erodibility (moderately limited)	0.31	Slightly limited slope/erodibility (slightly limited)	0.10	Not limited		Moderately limited slippage potential (moderately limited)	0.50	Slightly limited droughty (slightly limited)	0.23
70066:										
Winnipeg	Slightly limited slope/erodibility (slightly limited)	0.22	Slightly limited slope/erodibility (slightly limited)	0.05	Limited low strength (limited)	0.80	Moderately limited low strength (moderately limited)	0.50	Not limited	
71751:										
Bearthicket	Not limited		Not limited		Limited low strength (limited)	0.80	Moderately limited flooding (moderately limited) low strength (moderately limited)	0.60 0.50	Moderately limited flooding (moderately limited)	0.60
73031:										
Gerald	Slightly limited slope/erodibility (slightly limited)	0.11	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited) seasonal wetness (slightly limited)	0.80 0.29	Moderately limited low strength (moderately limited) seasonal wetness (slightly limited)	0.50 0.29	Not limited	
75376:										
Cedargap	Slightly limited slope/erodibility (slightly limited)	0.06	Slightly limited slope/erodibility (slightly limited)	0.02	Limited low strength (limited)	0.80	Very limited flooding (very limited) low strength (moderately limited)	1.00 0.50	Limited flooding (limited)	0.90

Table 11.--Forestland Management--Continued

Map symbol and soil name	Erosion on roads and trails		Off-road or off-trail erosion		Soil rutting		Log landings		Seedling survival	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005:										
Landfill	Not limited		Not limited		Not limited		Very limited slope (very limited)	1.00	Not limited	
99010:										
Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011:										
Kanima	Moderately limited slope/erodibility (moderately limited)	0.38	Slightly limited slope/erodibility (slightly limited)	0.12	Not limited		Not limited		Slightly limited droughty (slightly limited)	0.08

Table 12.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
40000:					
Barden	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40011:					
Barco	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood	Austrian pine, black oak, common hackberry, eastern redcedar, white ash	Shortleaf pine	---
40015:					
Eldorado	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
40016:					
Eldorado	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
40017:					
Maplegrove	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40018:					
Medoc	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
40019:					
Newtonia	Northern spicebush, redosier dogwood, silky dogwood, black chokeberry, mapleleaf viburnum	American hazelnut, American plum, blackhaw, common serviceberry, prairie crabapple, roughleaf dogwood, smooth sumac, southern arrowwood	Washington hawthorn, nannyberry, arborvitae, eastern redcedar, pecan, red pine, white oak	Norway spruce, black walnut, tuliptree, blackgum, common hackberry, green ash, northern red oak	Eastern white pine, eastern cottonwood
Eldorado	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
40020:					
Newtonia	Northern spicebush, redosier dogwood, silky dogwood, black chokeberry, mapleleaf viburnum	American hazelnut, American plum, blackhaw, common serviceberry, prairie crabapple, roughleaf dogwood, smooth sumac, southern arrowwood	Washington hawthorn, nannyberry, arborvitae, eastern redcedar, pecan, red pine, white oak	Norway spruce, black walnut, tuliptree, blackgum, common hackberry, green ash, northern red oak	Eastern white pine, eastern cottonwood
Eldorado	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
40021:					
Opolis	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
Hepler	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
40022: Opolis	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40023: Opolis	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40024: Opolis	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40026: Sylvania	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40027: Sylvania	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40028: Sylvania	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
40029: Sylvania	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
44000:					
Cherokee	Common ninebark, fragrant sumac	Amur maple, gray dogwood, possumhaw	Eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
44002:					
Carl	Buttonbush, common elderberry, common ninebark, gray dogwood, redosier dogwood, silky dogwood	Cockspur hawthorn, hazel alder, nannyberry, roughleaf dogwood	Arborvitae, blackgum, green hawthorn, overcup oak, common hackberry	Green ash, swamp white oak, baldcypress, river birch, sweetgum, willow oak, red maple	Pin oak, eastern cottonwood
44004:					
McCune	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak
46001:					
Verdigris	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak
46002:					
Hepler	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak
46004:					
Osage	Buttonbush, common elderberry, common ninebark, gray dogwood, redosier dogwood, silky dogwood	Cockspur hawthorn, hazel alder, nannyberry, roughleaf dogwood	Arborvitae, blackgum, green hawthorn, overcup oak, common hackberry	Green ash, swamp white oak, baldcypress, river birch, sweetgum, willow oak, red maple	Pin oak, eastern cottonwood
46005:					
Verdigris	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak
70006:					
Creldon	American plum, common lilac, fragrant sumac	Amur maple, Washington hawthorn, gray dogwood	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
70012: Hoberg	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
70045: Keeno	American plum, common lilac, fragrant sumac	Amur maple, Washington hawthorn, gray dogwood	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
70056: Crackerneck	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70057: Crackerneck	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70058: Crackerneck	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70059: Goss	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
70060:					
Hoberg	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
Eldorado	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
Pomme	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
70061:					
Pomme	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
70062:					
Pomme	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---
Rueter	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
70063:					
Rueter	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70064:					
Rueter	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70065:					
Rueter	Common lilac, fragrant sumac	American plum, gray dogwood	Bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	Shortleaf pine	---
70066:					
Winnipeg	Northern spicebush, redosier dogwood, silky dogwood, black chokeberry, mapleleaf viburnum	American hazelnut, American plum, blackhaw, common serviceberry, prairie crabapple, roughleaf dogwood, smooth sumac, southern arrowwood	Washington hawthorn, nannyberry, arborvitae, eastern redcedar, pecan, red pine, white oak	Norway spruce, black walnut, tuliptree, blackgum, common hackberry, green ash, northern red oak	Eastern white pine, eastern cottonwood
71751:					
Bearthicket	American plum, fragrant sumac	Blackhaw, gray dogwood	Washington hawthorn, eastern redcedar, nannyberry	Baldcypress, green ash, sweetgum	Eastern white pine, pin oak
73031:					
Gerald	American plum, common lilac, fragrant sumac	Amur maple, Washington hawthorn, gray dogwood	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---

Table 12.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
75376: Cedargap	American cranberrybush, American plum, common juniper, coralberry, roughleaf dogwood	Washington hawthorn, common serviceberry, eastern redcedar, smooth sumac	Virginia pine, black oak, blackgum, common hackberry, shortleaf pine	---	---

Table 13.--Recreational Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000: Barden	Moderately limited percs slowly (moderately limited)	0.39	Moderately limited percs slowly (moderately limited)	0.39	Moderately limited percs slowly (moderately limited)	0.39	Not limited	
40011: Barco	Not limited		Not limited		Slightly limited depth to bedrock (slightly limited)	0.30	Not limited	
40015: Eldorado	Moderately limited large surface stones (moderately limited)	0.34	Moderately limited large surface stones (moderately limited)	0.34	Slightly limited small stones (slightly limited)	0.01	Moderately limited large surface stones (moderately limited)	0.34
40016: Eldorado	Moderately limited small stones (moderately limited) large surface stones (moderately limited) large stones (slightly limited)	0.42 0.41 0.17	Moderately limited small stones (moderately limited) large surface stones (moderately limited) large stones (slightly limited)	0.42 0.41 0.17	Very limited large stones >25% (very limited) small stones (very limited) slope (limited)	1.00 1.00 0.78	Moderately limited large surface stones (moderately limited) large stones (slightly limited)	0.41 0.17
40017: Maplegrove	Limited wetness (limited) percs slowly (slightly limited)	0.89 0.13	Moderately limited wetness (moderately limited) percs slowly (slightly limited)	0.54 0.13	Limited wetness (limited) percs slowly (slightly limited)	0.89 0.13	Moderately limited wetness (moderately limited)	0.54
40018: Medoc	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.39	Limited wetness (limited) percs slowly (moderately limited)	0.89 0.39	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.39	Limited wetness (limited)	0.89

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40019:								
Newtonia	Not limited		Not limited		Not limited		Not limited	
Eldorado	Not limited		Not limited		Slightly limited small stones (slightly limited)	0.01	Not limited	
40020:								
Newtonia	Not limited		Not limited		Not limited		Not limited	
Eldorado	Not limited		Not limited		Slightly limited small stones (slightly limited)	0.01	Not limited	
40021:								
Opolis	Very limited wetness (very limited) percs slowly (moderately limited) slope (moderately limited)	1.00 0.40 0.37	Limited wetness (limited) percs slowly (moderately limited) slope (moderately limited)	0.63 0.40 0.37	Very limited wetness (very limited) slope (very limited) percs slowly (moderately limited)	1.00 1.00 0.40	Limited wetness (limited)	0.63
Hepler	Very limited flooding (very limited) wetness (limited) percs slowly (slightly limited)	1.00 0.60 0.17	Slightly limited wetness (slightly limited) percs slowly (slightly limited)	0.28 0.17	Limited wetness (limited) flooding (moderately limited) percs slowly (slightly limited)	0.60 0.60 0.17	Slightly limited wetness (slightly limited)	0.28
40022:								
Opolis	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.40	Limited wetness (limited) percs slowly (moderately limited)	0.63 0.40	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.40	Limited wetness (limited)	0.63
40023:								
Opolis	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.40	Limited wetness (limited) percs slowly (moderately limited)	0.63 0.40	Very limited wetness (very limited) percs slowly (moderately limited)	1.00 0.40	Limited wetness (limited)	0.63

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40024:								
Opolis	Very limited		Limited		Very limited		Limited	
	wetness	1.00	wetness	0.63	wetness	1.00	wetness	0.63
	(very limited)		(limited)		(very limited)		(limited)	
	percs slowly	0.40	percs slowly	0.40	percs slowly	0.40		
	(moderately limited)		(moderately limited)		(moderately limited)			
40026:								
Sylvania	Limited		Moderately limited		Very limited		Moderately limited	
	wetness	0.80	wetness	0.45	small stones	1.00	wetness	0.45
	(limited)		(moderately limited)		(very limited)		(moderately limited)	
	small stones	0.33	small stones	0.33	wetness	0.80		
	(moderately limited)		(moderately limited)		(limited)			
	percs slowly	0.13	percs slowly	0.13	percs slowly	0.13		
	(slightly limited)		(slightly limited)		(slightly limited)			
40027:								
Sylvania	Very limited		Very limited		Very limited		Slightly limited	
	small stones	1.00	small stones	1.00	small stones	1.00	small stones	0.01
	(limited)		(limited)		(very limited)		(slightly limited)	
	percs slowly	0.13	percs slowly	0.13	slope	0.78		
	(slightly limited)		(slightly limited)		(limited)			
					percs slowly	0.13		
					(slightly limited)			
40028:								
Sylvania	Slightly limited		Slightly limited		Limited		Not limited	
	percs slowly	0.13	percs slowly	0.13	slope	0.78		
	(slightly limited)		(slightly limited)		(limited)			
					small stones	0.30		
					(moderately limited)			
					percs slowly	0.13		
					(slightly limited)			
40029:								
Sylvania	Limited		Moderately limited		Very limited		Moderately limited	
	wetness	0.80	wetness	0.45	slope	1.00	wetness	0.45
	(limited)		(moderately limited)		(very limited)		(moderately limited)	
	slope	0.37	slope	0.37	wetness	0.80		
	(moderately limited)		(moderately limited)		(limited)			
	percs slowly	0.13	percs slowly	0.13	percs slowly	0.13		
	(slightly limited)		(slightly limited)		(slightly limited)			

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44000:								
Cherokee	Very limited wetness (very limited) percs slowly (moderately limited)	 1.00 0.40 	Limited wetness (limited) percs slowly (moderately limited)	 0.89 0.40 	Very limited wetness (very limited) percs slowly (moderately limited)	 1.00 0.40 	Limited wetness (limited)	 0.89
44002:								
Carl	Very limited percs slowly (very limited) wetness (very limited) flooding (rare) (limited)	 1.00 1.00 0.90 	Very limited percs slowly (very limited) wetness (very limited) too clayey (moderately limited)	 1.00 1.00 0.60 	Very limited percs slowly (very limited) wetness (very limited) too clayey (moderately limited)	 1.00 1.00 0.60 	Very limited wetness (very limited) too clayey (moderately limited)	 1.00 0.60
44004:								
McCune	Limited wetness (limited) percs slowly (moderately limited)	 0.60 0.39 	Moderately limited percs slowly (moderately limited) wetness (slightly limited)	 0.39 0.28 	Limited wetness (limited) percs slowly (moderately limited)	 0.60 0.39 	Slightly limited wetness (slightly limited)	 0.28
46001:								
Verdigris	Very limited flooding (very limited)	 1.00 	Moderately limited flooding (moderately limited)	 0.60 	Very limited flooding (very limited)	 1.00 	Moderately limited flooding (moderately limited)	 0.60
46002:								
Hepler	Very limited flooding (very limited) wetness (limited) percs slowly (slightly limited)	 1.00 0.60 0.17 	Slightly limited wetness (slightly limited) percs slowly (slightly limited)	 0.28 0.17 	Limited wetness (limited) flooding (moderately limited) percs slowly (slightly limited)	 0.60 0.60 0.17 	Slightly limited wetness (slightly limited)	 0.28
46004:								
Osage	Very limited flooding (very limited) percs slowly (very limited) wetness (very limited)	 1.00 1.00 1.00 	Very limited percs slowly (very limited) wetness (very limited) too clayey (moderately limited)	 1.00 1.00 0.60 	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	 1.00 1.00 0.60 	Very limited wetness (very limited) too clayey (moderately limited)	 1.00 0.60

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46005:								
Verdigris	Very limited flooding (very limited)	1.00	Not limited		Moderately limited flooding (moderately limited)	0.60	Not limited	
70006:								
Creldon	Moderately limited wetness (moderately limited) percs slowly (slightly limited)	0.38 0.13	Slightly limited wetness (slightly limited) percs slowly (slightly limited)	0.13 0.13	Moderately limited wetness (moderately limited) percs slowly (slightly limited) slope (slightly limited)	0.38 0.13 0.10	Slightly limited wetness (slightly limited)	0.13
70012:								
Hoberg	Limited wetness (limited)	0.60	Slightly limited wetness (slightly limited)	0.28	Limited wetness (limited) small stones (slightly limited)	0.60 0.01	Slightly limited wetness (slightly limited)	0.28
70045:								
Keeno	Limited wetness (limited)	0.60	Slightly limited wetness (slightly limited)	0.28	Limited slope (limited) wetness (limited) large stones (slightly limited)	0.98 0.60 0.30	Slightly limited wetness (slightly limited)	0.28
70056:								
Crackerneck	Very limited small stones (very limited) slope (moderately limited) percs slowly (slightly limited)	1.00 0.37 0.26	Very limited small stones (very limited) slope (moderately limited) percs slowly (slightly limited)	1.00 0.37 0.26	Very limited small stones (very limited) slope (very limited) large stones >25% (very limited)	1.00 1.00 1.00	Limited small stones (limited) large stones (slightly limited) wetness (slightly limited)	0.68 0.17 0.04

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70057:								
Crackerneck	Very limited slope (very limited) small stones (very limited) percs slowly (slightly limited)	 1.00 1.00 0.26 	Very limited slope (very limited) small stones (very limited) percs slowly (slightly limited)	 1.00 1.00 0.26 	Very limited small stones (very limited) slope (very limited) large stones >25% (very limited)	 1.00 1.00 1.00 	Limited slope (limited) small stones (limited) large stones (slightly limited)	 0.92 0.68 0.17
70058:								
Crackerneck	Very limited small stones (very limited) percs slowly (slightly limited) wetness (slightly limited)	 1.00 0.26 0.15 	Very limited small stones (very limited) percs slowly (slightly limited) wetness (slightly limited)	 1.00 0.26 0.04 	Very limited small stones (very limited) slope (limited) percs slowly (slightly limited)	 1.00 0.78 0.26 	Slightly limited small stones (slightly limited) wetness (slightly limited)	 0.30 0.04
70059:								
Goss	Very limited slope (very limited) small stones (very limited) large surface stones (very limited)	 1.00 1.00 1.00 	Very limited slope (very limited) large surface stones (very limited) small stones (very limited)	 1.00 1.00 1.00 	Very limited slope (very limited) large stones >25% (very limited) small stones (very limited)	 1.00 1.00 1.00 	Very limited large surface stones (very limited) slope (limited) large stones (slightly limited)	 1.00 0.92 0.17
70060:								
Hoberg	Limited wetness (limited) percs slowly (moderately limited)	 0.60 0.39 	Moderately limited percs slowly (moderately limited) wetness (slightly limited)	 0.39 0.28 	Limited wetness (limited) percs slowly (moderately limited)	 0.60 0.39 	Slightly limited wetness (slightly limited)	 0.28
Eldorado	Not limited		Not limited		Slightly limited small stones (slightly limited)	 0.01 	Not limited	
Pomme	Not limited		Not limited		Slightly limited small stones (slightly limited)	 0.01 	Not limited	

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70061:								
Pomme	Not limited		Not limited		Slightly limited small stones (slightly limited)	0.01	Not limited	
70062:								
Pomme	Not limited		Not limited		Slightly limited small stones (slightly limited)	0.01	Not limited	
Rueter	Very limited small stones (very limited)	1.00	Very limited small stones (very limited)	1.00	Very limited small stones (very limited) large stones (slightly limited)	1.00 0.30	Slightly limited small stones (slightly limited)	0.24
70063:								
Rueter	Limited small stones (limited) slope (moderately limited) large stones (slightly limited)	0.96 0.37 0.17	Limited small stones (limited) slope (moderately limited) large stones (slightly limited)	0.96 0.37 0.17	Very limited small stones (very limited) slope (very limited) large stones >25% (very limited)	1.00 1.00 1.00	Slightly limited large stones (slightly limited)	0.17
70064:								
Rueter	Very limited small stones (very limited)	1.00	Very limited small stones (very limited)	1.00	Very limited small stones (very limited) large stones (slightly limited)	1.00 0.30	Slightly limited small stones (slightly limited)	0.24
70065:								
Rueter	Very limited small stones (very limited)	1.00	Very limited small stones (very limited)	1.00	Very limited small stones (very limited) slope (limited) large stones (slightly limited)	1.00 0.78 0.30	Slightly limited small stones (slightly limited)	0.24
70066:								
Winnipeg	Not limited		Not limited		Not limited		Not limited	

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
71751:								
Bearthicket	Very limited flooding (very limited)	1.00	Not limited		Moderately limited flooding (moderately limited)	0.60	Not limited	
73031:								
Gerald	Very limited percs slowly (very limited); wetness (limited)	1.00; 0.97	Very limited percs slowly (very limited); wetness (limited)	1.00; 0.60	Very limited percs slowly (very limited); wetness (limited)	1.00; 0.97	Limited wetness (limited)	0.60
75376:								
Cedargap	Very limited flooding (very limited); small stones (moderately limited)	1.00; 0.33	Moderately limited flooding (moderately limited); small stones (moderately limited)	0.60; 0.33	Very limited flooding (very limited); small stones (very limited)	1.00; 1.00	Moderately limited flooding (moderately limited)	0.60
99000:								
Pits	Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated	
99001:								
Water	Not rated		Not rated		Not rated		Not rated	
99002:								
Borrow areas	Not rated		Not rated		Not rated		Not rated	
99003:								
Miscellaneous water	Not rated		Not rated		Not rated		Not rated	
99005:								
Landfill	Very limited slope (very limited); percs slowly (very limited)	1.00; 1.00	Very limited slope (very limited); percs slowly (very limited)	1.00; 1.00	Very limited percs slowly (very limited); slope (very limited)	1.00; 1.00	Very limited slope (very limited); erodes easily (very limited)	1.00; 1.00
99010:								
Dumps	Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated	

Table 13.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99011: Kanima	Very limited small stones (very limited)	1.00	Very limited small stones (very limited)	1.00	Very limited small stones (very limited) slope (limited)	1.00 0.98	Limited small stones (limited)	0.73

Table 14.--Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Moderately limited moderate erodibility (moderately limited) percs slowly (moderately limited) wetness (slightly limited)	 0.50 0.39 0.28	Moderately limited moderate erodibility (moderately limited) percs slowly (moderately limited) wetness (slightly limited)	 0.50 0.39 0.28	Slightly limited wetness (slightly limited)	 0.28	Slightly limited wetness (slightly limited)	 0.28	Moderately limited wetness (moderately limited)	 0.45
40011:										
Barco	Limited droughty (limited) moderate erodibility (moderately limited) depth to bedrock (slightly limited)	 0.98 0.50 0.30	Moderately limited moderate erodibility (moderately limited) depth to bedrock (slightly limited)	 0.50 0.30	Not limited		Slightly limited depth to bedrock (slightly limited)	 0.30	Slightly limited depth to bedrock (slightly limited)	 0.30
40015:										
Eldorado	Limited droughty (very limited)	 0.99	Not limited		Not limited		Not limited		Not limited	
40016:										
Eldorado	Very limited droughty (very limited) moderate erodibility (moderately limited) large stones (moderately limited)	 1.00 0.50 0.45	Limited droughty (limited) moderate erodibility (moderately limited) large stones (moderately limited)	 0.83 0.50 0.45	Limited droughty (limited) large stones (slightly limited) small stones (slightly limited)	 0.83 0.17 0.07	Limited droughty (limited) large stones (slightly limited)	 0.83 0.17	Limited droughty (limited) large stones (slightly limited)	 0.83 0.17
40017:										
Maplegrove	Moderately limited wetness (moderately limited) moderate erodibility (moderately limited) percs slowly (slightly limited)	 0.57 0.50 0.13	Moderately limited wetness (moderately limited) moderate erodibility (moderately limited) percs slowly (slightly limited)	 0.57 0.50 0.13	Moderately limited wetness (moderately limited)	 0.57	Moderately limited wetness (moderately limited)	 0.57	Limited wetness (limited)	 0.91

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Limited wetness (limited) percs slowly (moderately limited)	 0.89 0.39	Limited wetness (limited) percs slowly (moderately limited)	 0.89 0.39	Limited wetness (limited)	 0.89 	Limited wetness (limited)	 0.89 	Very limited wetness (very limited)	 1.00
40019:										
Newtonia	Not limited		Not limited		Not limited		Not limited		Not limited	
Eldorado	Limited droughty (very limited)	 0.99 	Not limited		Not limited		Not limited		Not limited	
40020:										
Newtonia	Not limited		Not limited		Not limited		Not limited		Not limited	
Eldorado	Limited droughty (very limited)	 0.99 	Not limited		Not limited		Not limited		Not limited	
40021:										
Opolis	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40	Limited wetness (limited)	 0.63 	Limited wetness (limited)	 0.63 	Very limited wetness (very limited)	 1.00
Hepler	Moderately limited flooding (moderately limited) moderate erodibility (moderately limited) wetness (moderately limited)	 0.60 0.50 0.60	Moderately limited flooding (moderately limited) moderate erodibility (moderately limited) wetness (moderately limited)	 0.60 0.50 0.60	Moderately limited wetness (moderately limited)	 0.60 	Moderately limited wetness (moderately limited)	 0.60 	Limited wetness (limited)	 0.99
40022:										
Opolis	Limited wetness (limited) percs slowly (moderately limited)	 0.63 0.40	Limited wetness (limited) percs slowly (moderately limited)	 0.63 0.40	Limited wetness (limited)	 0.63 	Limited wetness (limited)	 0.63 	Very limited wetness (very limited)	 1.00

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40023:										
Opolis	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40 	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40 	Limited wetness (limited)	 0.63 	Limited wetness (limited)	 0.63 	Very limited wetness (very limited)	 1.00
40024:										
Opolis	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40 	Limited wetness (limited) moderate erodibility (moderately limited) percs slowly (moderately limited)	 0.63 0.50 0.40 	Limited wetness (limited)	 0.63 	Limited wetness (limited)	 0.63 	Very limited wetness (very limited)	 1.00
40026:										
Sylvania	Moderately limited wetness (moderately limited) moderate erodibility (moderately limited) small stones (moderately limited)	 0.53 0.50 0.33 	Moderately limited wetness (moderately limited) moderate erodibility (moderately limited) small stones (moderately limited)	 0.53 0.50 0.33 	Moderately limited wetness (moderately limited) small stones (slightly limited)	 0.53 0.04 	Moderately limited wetness (moderately limited)	 0.53 	Limited wetness (limited)	 0.79
40027:										
Sylvania	Limited small stones (limited) high erodibility (limited) droughty (limited)	 1.00 0.80 0.66 	Limited small stones (limited) high erodibility (limited) percs slowly (slightly limited)	 1.00 0.80 0.13 	Slightly limited small stones (slightly limited) wetness (slightly limited)	 0.24 0.04 	Slightly limited wetness (slightly limited) small stones (slightly limited)	 0.04 0.01 	Moderately limited wetness (moderately limited)	 0.32
40028:										
Sylvania	Limited high erodibility (limited) percs slowly (slightly limited)	 0.80 0.13 	Limited high erodibility (limited) percs slowly (slightly limited)	 0.80 0.13 	Not limited		Not limited		Slightly limited wetness (slightly limited)	 0.20

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40029:										
Sylvania------	Limited high erodibility (limited) wetness (moderately limited) percs slowly (slightly limited)	 0.80 0.53 0.13	Limited high erodibility (limited) wetness (moderately limited) percs slowly (slightly limited)	 0.80 0.53 0.13	Moderately limited wetness (moderately limited)	 0.53	Moderately limited wetness (moderately limited)	 0.53	Limited wetness (limited)	 0.79
44000:										
Cherokee------	Limited wetness (limited) percs slowly (moderately limited)	 0.89 0.40	Limited wetness (limited) percs slowly (moderately limited)	 0.89 0.40	Limited wetness (limited)	 0.89	Limited wetness (limited)	 0.89	Very limited wetness (very limited)	 1.00
44002:										
Carl----------	Very limited percs slowly (very limited) wetness (very limited) too clayey (slightly limited)	 1.00 1.00 0.16	Very limited percs slowly (very limited) wetness (very limited) too clayey (slightly limited)	 1.00 1.00 0.16	Very limited wetness (very limited) too clayey (slightly limited)	 1.00 0.16	Very limited wetness (very limited) too clayey (slightly limited)	 1.00 0.16	Very limited wetness (very limited)	 1.00
44004:										
McCune--------	Moderately limited wetness (moderately limited) percs slowly (moderately limited)	 0.60 0.39	Moderately limited wetness (moderately limited) percs slowly (moderately limited)	 0.60 0.39	Moderately limited wetness (moderately limited)	 0.60	Moderately limited wetness (moderately limited)	 0.60	Limited wetness (limited)	 0.99
46001:										
Verdigris-----	Limited flooding (limited)	 0.90	Limited flooding (limited)	 0.90	Not limited		Not limited		Not limited	
46002:										
Hepler--------	Moderately limited flooding (moderately limited) wetness (moderately limited) percs slowly (slightly limited)	 0.60 0.60 0.17	Moderately limited flooding (moderately limited) wetness (moderately limited) percs slowly (slightly limited)	 0.60 0.60 0.17	Moderately limited wetness (moderately limited)	 0.60	Moderately limited wetness (moderately limited)	 0.60	Limited wetness (limited)	 0.99

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46004:										
Osage	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	1.00 1.00 0.60	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	1.00 1.00 0.60	Very limited wetness (very limited) too clayey (slightly limited)	1.00 0.03	Very limited wetness (very limited) too clayey (slightly limited)	1.00 0.03	Very limited wetness (very limited)	1.00
46005:										
Verdigris	Moderately limited flooding (moderately limited)	0.60	Moderately limited flooding (moderately limited)	0.60	Not limited		Not limited		Not limited	
70006:										
Creldon	Limited droughty (limited) moderate erodibility (moderately limited) wetness (moderately limited)	0.74 0.50 0.36	Moderately limited moderate erodibility (moderately limited) wetness (moderately limited) percs slowly (slightly limited)	0.50 0.36 0.13	Moderately limited wetness (moderately limited)	0.36	Moderately limited wetness (moderately limited)	0.36	Moderately limited wetness (moderately limited)	0.51
70012:										
Hoberg	Limited droughty (limited) moderate erodibility (moderately limited) wetness (moderately limited)	0.63 0.50 0.44	Moderately limited moderate erodibility (moderately limited) wetness (moderately limited)	0.50 0.44	Moderately limited wetness (moderately limited)	0.44	Moderately limited wetness (moderately limited)	0.44	Moderately limited wetness (moderately limited)	0.59
70045:										
Keeno	Very limited droughty (very limited) moderate erodibility (moderately limited) wetness (moderately limited)	1.00 0.50 0.44	Very limited droughty (very limited) moderate erodibility (moderately limited) wetness (moderately limited)	1.00 0.50 0.44	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.44	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.44	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.59

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70056:										
Crackerneck	Very limited droughty (very limited) small stones (very limited) moderate erodibility (moderately limited)	 1.00 1.00 0.50 	Very limited small stones (very limited) droughty (very limited) moderate erodibility (moderately limited)	 1.00 1.00 0.50 	Very limited droughty (very limited) small stones (limited) wetness (moderately limited)	 1.00 0.68 0.31 	Very limited droughty (very limited) small stones (limited) wetness (moderately limited)	 1.00 0.68 0.31 	Very limited droughty (very limited) wetness (moderately limited) large stones (slightly limited)	 1.00 0.46 0.17
70057:										
Crackerneck	Very limited droughty (very limited) small stones (very limited) high erodibility (limited)	 1.00 1.00 0.80 	Very limited small stones (very limited) droughty (very limited) high erodibility (limited)	 1.00 1.00 0.80 	Very limited droughty (very limited) small stones (limited) wetness (moderately limited)	 1.00 0.68 0.31 	Very limited droughty (very limited) small stones (limited) wetness (moderately limited)	 1.00 0.68 0.31 	Very limited droughty (very limited) wetness (moderately limited) large stones (slightly limited)	 1.00 0.46 0.17
70058:										
Crackerneck	Very limited droughty (very limited) small stones (very limited) wetness (moderately limited)	 1.00 1.00 0.31 	Very limited small stones (very limited) droughty (limited) wetness (moderately limited)	 1.00 0.88 0.31 	Limited droughty (limited) small stones (moderately limited) wetness (moderately limited)	 0.88 0.42 0.31 	Limited droughty (limited) wetness (moderately limited) small stones (slightly limited)	 0.88 0.31 0.30 	Limited droughty (limited) wetness (moderately limited)	 0.88 0.46
70059:										
Goss	Very limited droughty (very limited) small stones (very limited) high erodibility (limited)	 1.00 1.00 0.80 	Very limited small stones (very limited) high erodibility (limited) droughty (limited)	 1.00 0.80 0.61 	Limited droughty (limited) small stones (moderately limited) large stones (slightly limited)	 0.61 0.33 0.17 	Limited droughty (limited) large stones (slightly limited) small stones (slightly limited)	 0.61 0.17 0.15 	Limited droughty (limited) large stones (slightly limited)	 0.61 0.17
70060:										
Hoberg	Very limited droughty (very limited) moderate erodibility (moderately limited) wetness (moderately limited)	 1.00 0.50 0.44 	Moderately limited moderate erodibility (moderately limited) wetness (moderately limited) percs slowly (moderately limited)	 0.50 0.44 0.39 	Moderately limited wetness (moderately limited) droughty (slightly limited)	 0.44 0.23 	Moderately limited wetness (moderately limited) droughty (slightly limited)	 0.44 0.23 	Moderately limited wetness (moderately limited) droughty (slightly limited)	 0.59 0.23

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70060:										
Eldorado	Limited droughty (very limited) moderate erodibility (moderately limited)	 0.99 0.50	Moderately limited moderate erodibility (moderately limited)	 0.50	Not limited		Not limited		Not limited	
Pomme	Moderately limited moderate erodibility (moderately limited) droughty (moderately limited)	 0.50 0.34	Moderately limited moderate erodibility (moderately limited)	 0.50	Not limited		Not limited		Not limited	
70061:										
Pomme	Moderately limited droughty (moderately limited)	 0.34	Not limited		Not limited		Not limited		Not limited	
70062:										
Pomme	Moderately limited droughty (moderately limited)	 0.34	Not limited		Not limited		Not limited		Not limited	
Rueter	Very limited droughty (very limited) small stones (very limited)	 1.00 1.00	Very limited small stones (very limited) droughty (limited)	 1.00 0.79	Limited droughty (limited) small stones (moderately limited)	 0.79 0.38	Limited droughty (limited) small stones (slightly limited)	 0.79 0.24	Limited droughty (limited)	 0.79
70063:										
Rueter	Very limited droughty (very limited) small stones (limited) high erodibility (limited)	 1.00 0.96 0.80	Limited droughty (limited) small stones (limited) high erodibility (limited)	 0.99 0.96 0.80	Limited droughty (limited) small stones (slightly limited) large stones (slightly limited)	 0.99 0.20 0.17	Limited droughty (limited) large stones (slightly limited)	 0.99 0.17	Limited droughty (limited) large stones (slightly limited)	 0.99 0.17
70064:										
Rueter	Very limited droughty (very limited) small stones (very limited) moderate erodibility (moderately limited)	 1.00 1.00 0.50	Very limited small stones (very limited) droughty (limited) moderate erodibility (moderately limited)	 1.00 0.79 0.50	Limited droughty (limited) small stones (moderately limited)	 0.79 0.38	Limited droughty (limited) small stones (slightly limited)	 0.79 0.24	Limited droughty (limited)	 0.79

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70065:										
Rueter	Very limited droughty (very limited) small stones (very limited) high erodibility (limited)	 1.00 1.00 0.80 	Very limited small stones (very limited) high erodibility (limited) droughty (limited)	 1.00 0.80 0.79 	Limited droughty (limited) small stones (moderately limited)	 0.79 0.38 	Limited droughty (limited) small stones (slightly limited)	 0.79 0.24 	Limited droughty (limited)	 0.79
70066:										
Winnipeg	Not limited		Not limited		Not limited		Not limited		Not limited	
71751:										
Bearthicket	Moderately limited flooding (moderately limited)	 0.60 	Moderately limited flooding (moderately limited)	 0.60 	Not limited		Not limited		Not limited	
73031:										
Gerald	Very limited percs slowly (very limited) wetness (moderately limited) moderate erodibility (moderately limited)	 1.00 0.60 0.50 	Very limited percs slowly (very limited) wetness (moderately limited) moderate erodibility (moderately limited)	 1.00 0.60 0.50 	Moderately limited wetness (moderately limited)	 0.60 	Moderately limited wetness (moderately limited)	 0.60 	Limited wetness (limited)	 0.99
75376:										
Cedargap	Limited flooding (limited) droughty (limited) small stones (moderately limited)	 0.90 0.74 0.33 	Limited flooding (limited) small stones (moderately limited)	 0.90 0.33 	Slightly limited small stones (slightly limited)	 0.04 	Not limited		Not limited	
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99003: Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005: Landfill	Very limited percs slowly (very limited) slope (limited)	 1.00 0.79	Very limited percs slowly (very limited) slope (limited)	 1.00 0.79	Not limited		Not limited		Not limited	
99010: Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011: Kanima	Very limited droughty (very limited) small stones (very limited) moderate erodibility (moderately limited)	 1.00 1.00 0.50	Very limited small stones (very limited) moderate erodibility (moderately limited) droughty (slightly limited)	 1.00 0.09	Limited small stones (limited) droughty (slightly limited)	 0.73 0.09	Limited small stones (limited) droughty (slightly limited)	 0.73 0.09	Slightly limited droughty (slightly limited)	 0.09

Table 15.--Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Moderately limited wetness (moderately limited)	0.45	Limited infrequent flooding (limited) deep to water (limited)	0.80 0.60	Not limited		Limited deep to water (limited)	0.60	Not limited	
40011:										
Barco	Slightly limited depth to bedrock (slightly limited)	0.30	Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
40015:										
Eldorado	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
40016:										
Eldorado	Limited droughty (limited) large stones (slightly limited)	0.83 0.17	Very limited deep to water (very limited) infrequent flooding (limited) large stones (slightly limited)	1.00 0.80 0.17	Very limited deep to water (very limited) droughty (limited) large stones (slightly limited)	1.00 0.83 0.17	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) slope (limited) seepage (moderately limited)	1.00 0.66 0.45
40017:										
Maplegrove	Limited wetness (limited)	0.91	Limited infrequent flooding (limited) deep to water (moderately limited)	0.80 0.33	Not limited		Moderately limited deep to water (moderately limited)	0.33	Slightly limited seepage (slightly limited)	0.18

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.09	Not limited		Slightly limited deep to water (slightly limited)	0.09	Not limited	
40019:										
Newtonia	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
Eldorado	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
40020:										
Newtonia	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
Eldorado	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
40021:										
Opolis	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.28	Not limited		Slightly limited deep to water (slightly limited)	0.28	Very limited slope (very limited)	1.00
Hepler	Limited wetness (limited)	0.99	Moderately limited infrequent flooding (moderately limited) deep to water (slightly limited)	0.50 0.30	Not limited		Slightly limited deep to water (slightly limited)	0.30	Slightly limited seepage (slightly limited)	0.15

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40022:										
Opolis--------	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.28	Not limited		Slightly limited deep to water (slightly limited)	0.28	Not limited	
40023:										
Opolis--------	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.28	Not limited		Slightly limited deep to water (slightly limited)	0.28	Not limited	
40024:										
Opolis--------	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.28	Not limited		Slightly limited deep to water (slightly limited)	0.28	Not limited	
40026:										
Sylvania------	Limited wetness (limited)	0.79	Limited infrequent flooding (limited) deep to water (moderately limited)	0.80 0.37	Not limited		Moderately limited deep to water (moderately limited)	0.37	Slightly limited seepage (slightly limited)	0.18
40027:										
Sylvania------	Moderately limited wetness (moderately limited)	0.32	Limited deep to water (limited) infrequent flooding (limited) small stones (slightly limited)	0.96 0.80 0.01	Slightly limited small stones (slightly limited)	0.01	Limited deep to water (limited)	0.96	Limited slope (limited) seepage (slightly limited)	0.66 0.18
40028:										
Sylvania------	Slightly limited wetness (slightly limited)	0.20	Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Slightly limited deep to water (slightly limited)	0.11	Very limited deep to water (very limited)	1.00	Limited slope (limited) seepage (slightly limited) deep to water (slightly limited)	0.66 0.18 0.11

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40029:										
Sylvania	Limited wetness (limited)	0.79	Limited infrequent flooding (limited); deep to water (moderately limited)	0.80; 0.37	Not limited		Moderately limited deep to water (moderately limited)	0.37	Very limited slope (very limited); seepage (slightly limited)	1.00; 0.18
44000:										
Cherokee	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited); deep to water (slightly limited)	0.80; 0.09	Not limited		Slightly limited deep to water (slightly limited)	0.09	Not limited	
44002:										
Carl	Very limited wetness (very limited)	1.00	Limited infrequent flooding (limited)	0.80	Not limited		Not limited		Not limited	
44004:										
McCune	Limited wetness (limited)	0.99	Limited infrequent flooding (limited); deep to water (slightly limited)	0.80; 0.30	Not limited		Slightly limited deep to water (slightly limited)	0.30	Not limited	
46001:										
Verdigris	Not limited		Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited); seepage (moderately limited)	1.00; 0.45
46002:										
Hepler	Moderately limited wetness (moderately limited)	0.59	Moderately limited infrequent flooding (moderately limited); deep to water (moderately limited)	0.50; 0.45	Not limited		Moderately limited deep to water (moderately limited)	0.45	Slightly limited seepage (slightly limited)	0.15
46004:										
Osage	Very limited wetness (very limited)	1.00	Moderately limited infrequent flooding (moderately limited)	0.50	Not limited		Not limited		Not limited	

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46005:										
Verdigris	Not limited		Very limited deep to water (very limited) infrequent flooding (moderately limited)	1.00 0.50	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
70006:										
Creldon	Moderately limited wetness (moderately limited)	0.51	Limited infrequent flooding (limited) deep to water (moderately limited)	0.80 0.53	Not limited		Moderately limited deep to water (moderately limited)	0.53	Slightly limited seepage (slightly limited) slope (slightly limited)	0.18 0.08
70012:										
Hoberg	Moderately limited wetness (moderately limited)	0.59	Limited infrequent flooding (limited) deep to water (moderately limited)	0.80 0.45	Not limited		Moderately limited deep to water (moderately limited)	0.45	Moderately limited seepage (moderately limited)	0.45
70045:										
Keeno	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.59	Limited infrequent flooding (limited) deep to water (moderately limited)	0.80 0.45	Very limited droughty (very limited)	1.00	Moderately limited deep to water (moderately limited)	0.45	Limited slope (limited) seepage (moderately limited)	0.91 0.45
70056:										
Crackerneck	Very limited droughty (very limited) wetness (moderately limited) large stones (slightly limited)	1.00 0.46 0.17	Limited small stones (limited) deep to water (moderately limited) large stones (slightly limited)	0.68 0.58 0.17	Very limited droughty (very limited) small stones (limited) large stones (slightly limited)	1.00 0.68 0.17	Moderately limited deep to water (moderately limited)	0.58	Very limited slope (very limited) seepage (slightly limited)	1.00 0.07
70057:										
Crackerneck	Very limited droughty (very limited) wetness (moderately limited) large stones (slightly limited)	1.00 0.46 0.17	Limited small stones (limited) deep to water (moderately limited) large stones (slightly limited)	0.68 0.58 0.17	Very limited droughty (very limited) small stones (limited) large stones (slightly limited)	1.00 0.68 0.17	Moderately limited deep to water (moderately limited)	0.58	Very limited slope (very limited) seepage (slightly limited)	1.00 0.07

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70058:										
Crackerneck	Limited droughty (limited) wetness (moderately limited)	 0.88 0.46	Moderately limited deep to water (moderately limited) small stones (slightly limited)	 0.58 0.30	Limited droughty (limited) small stones (slightly limited)	 0.88 0.30	Moderately limited deep to water (moderately limited)	 0.58	Limited slope (limited) seepage (slightly limited)	 0.66 0.07
70059:										
Goss	Limited droughty (limited) large stones (slightly limited)	 0.61 0.17	Very limited deep to water (very limited) infrequent flooding (limited) large stones (slightly limited)	 1.00 0.80 0.17	Very limited deep to water (very limited) droughty (limited) large stones (slightly limited)	 1.00 0.61 0.17	Very limited deep to water (very limited)	 1.00	Very limited slope (very limited) deep to water (very limited) seepage (moderately limited)	 1.00 1.00 0.45
70060:										
Hoberg	Moderately limited wetness (moderately limited) droughty (slightly limited)	 0.59 0.23	Limited infrequent flooding (limited) deep to water (moderately limited)	 0.80 0.45	Slightly limited droughty (slightly limited)	 0.23	Moderately limited deep to water (moderately limited)	 0.45	Not limited	
Eldorado	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	 1.00 0.80	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (moderately limited)	 1.00 0.45
Pomme	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	 1.00 0.80	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (moderately limited)	 1.00 0.45
70061:										
Pomme	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	 1.00 0.80	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (moderately limited)	 1.00 0.45

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70062:										
Pomme	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	 1.00 0.80	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (moderately limited)	 1.00 0.45
Rueter	Limited droughty (limited)	 0.79	Very limited deep to water (very limited) infrequent flooding (limited) small stones (slightly limited)	 1.00 0.80 0.24	Very limited deep to water (very limited) droughty (limited) small stones (slightly limited)	 1.00 0.79 0.24	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (limited)	 1.00 0.79
70063:										
Rueter	Limited droughty (limited) large stones (slightly limited)	 0.99 0.17	Very limited deep to water (very limited) infrequent flooding (limited) large stones (slightly limited)	 1.00 0.80 0.17	Very limited deep to water (very limited) droughty (limited) large stones (slightly limited)	 1.00 0.99 0.17	Very limited deep to water (very limited)	 1.00	Very limited slope (very limited) deep to water (very limited) seepage (limited)	 1.00 1.00 0.79
70064:										
Rueter	Limited droughty (limited)	 0.79	Very limited deep to water (very limited) infrequent flooding (limited) small stones (slightly limited)	 1.00 0.80 0.24	Very limited deep to water (very limited) droughty (limited) small stones (slightly limited)	 1.00 0.79 0.24	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (limited)	 1.00 0.79
70065:										
Rueter	Limited droughty (limited)	 0.79	Very limited deep to water (very limited) infrequent flooding (limited) small stones (slightly limited)	 1.00 0.80 0.24	Very limited deep to water (very limited) droughty (limited) small stones (slightly limited)	 1.00 0.79 0.24	Very limited deep to water (very limited)	 1.00	Very limited deep to water (very limited) seepage (limited) slope (limited)	 1.00 0.79 0.66

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70066:										
Winnipeg	Not limited		Very limited deep to water (very limited) infrequent flooding (limited)	1.00 0.80	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
71751:										
Bearthicket	Not limited		Very limited deep to water (very limited) infrequent flooding (moderately limited)	1.00 0.50	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
73031:										
Gerald	Limited wetness (limited)	0.99	Limited infrequent flooding (limited) deep to water (slightly limited)	0.80 0.30	Not limited		Slightly limited deep to water (slightly limited)	0.30	Not limited	
75376:										
Cedargap	Not limited		Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) seepage (moderately limited)	1.00 0.45
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 15.--Wildlife Habitat--Continued

Map symbol and soil name	Upland mixed deciduous-conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99005:										
Landfill	Not limited		Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited)	1.00	Very limited slope (very limited) deep to water (very limited)	1.00 1.00
99010:										
Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011:										
Kanima	Slightly limited droughty (slightly limited)	0.09	Very limited deep to water (very limited) infrequent flooding (limited) small stones (limited)	1.00 0.80 0.73	Very limited deep to water (very limited) small stones (limited) droughty (slightly limited)	1.00 0.73 0.09	Very limited deep to water (very limited)	1.00	Very limited deep to water (very limited) slope (limited) seepage (moderately limited)	1.00 0.91 0.45

Table 16.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Very limited shrink-swell (very limited)	1.00	Very limited shrink-swell (very limited) wetness (very limited)	1.00 1.00	Very limited shrink-swell (very limited)	1.00	Very limited low strength (very limited) shrink-swell (very limited)	1.00 1.00	Not limited	
40011:										
Barco	Moderately limited hard bedrock (moderately limited)	0.45	Very limited hard bedrock <40" (very limited)	1.00	Moderately limited depth to bedrock (moderately limited)	0.45	Very limited low strength (very limited) depth to bedrock (moderately limited)	1.00 0.45	Slightly limited depth to bedrock (slightly limited)	0.30
40015:										
Eldorado	Limited large stones (limited)	0.96	Limited large stones (limited) shrink-swell (slightly limited)	0.96 0.05	Limited large stones (limited)	0.96	Limited large stones (limited)	0.96	Not limited	
40016:										
Eldorado	Very limited large stones (very limited)	1.00	Very limited large stones (very limited) shrink-swell (slightly limited)	1.00 0.04	Very limited large stones (very limited) slope (moderately limited)	1.00 0.45	Very limited large stones (very limited)	1.00	Limited large stones (limited) droughty (limited) small stones (moderately limited)	0.99 0.83 0.42
40017:										
Maplegrove	Moderately limited wetness (moderately limited) shrink-swell (moderately limited)	0.54 0.45	Very limited wetness (very limited) shrink-swell (slightly limited)	1.00 0.10	Moderately limited wetness (moderately limited) shrink-swell (moderately limited)	0.54 0.45	Very limited low strength (very limited) wetness (moderately limited) shrink-swell (moderately limited)	1.00 0.54 0.45	Moderately limited wetness (moderately limited)	0.54

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.89 	Very limited wetness (very limited) shrink-swell (limited)	 1.00 0.78 	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.89 	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.89 	Limited wetness (limited)	 0.89
40019:										
Newtonia	Not limited		Slightly limited shrink-swell (slightly limited)	 0.12 	Not limited		Not limited		Not limited	
Eldorado	Limited large stones (limited)	 0.96 	Limited large stones (limited) shrink-swell (slightly limited)	 0.96 0.05 	Limited large stones (limited)	 0.96 	Limited large stones (limited)	 0.96 	Not limited	
40020:										
Newtonia	Moderately limited shrink-swell (moderately limited)	 0.45 	Slightly limited shrink-swell (slightly limited)	 0.20 	Moderately limited shrink-swell (moderately limited)	 0.45 	Moderately limited shrink-swell (moderately limited)	 0.45 	Not limited	
Eldorado	Limited large stones (limited)	 0.96 	Limited large stones (limited) shrink-swell (slightly limited)	 0.96 0.05 	Limited large stones (limited)	 0.96 	Limited large stones (limited)	 0.96 	Not limited	
40021:										
Opolis	Very limited shrink-swell (very limited) slope (limited) wetness (limited)	 1.00 0.68 0.63 	Very limited wetness (very limited) slope (limited) shrink-swell (limited)	 1.00 0.68 0.64 	Very limited slope (very limited) shrink-swell (very limited) wetness (limited)	 1.00 1.00 0.63 	Very limited low strength (very limited) shrink-swell (very limited) wetness (limited)	 1.00 1.00 0.63 	Limited wetness (limited) slope (moderately limited)	 0.63 0.37
Hepler	Very limited flooding (very limited) wetness (limited)	 1.00 0.60 	Very limited flooding (very limited) wetness (very limited)	 1.00 1.00 	Very limited flooding (very limited) wetness (limited)	 1.00 0.60 	Very limited flooding (very limited) wetness (limited)	 1.00 0.60 	Moderately limited flooding (moderately limited) wetness (limited)	 0.60 0.60

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40022:										
Opolis	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.63	Very limited wetness (very limited) shrink-swell (limited)	 1.00 0.64	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.63	Very limited low strength (very limited) shrink-swell (very limited) wetness (limited)	 1.00 1.00 0.63	Limited wetness (limited)	 0.63
40023:										
Opolis	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.63	Very limited wetness (very limited) shrink-swell (limited)	 1.00 0.64	Very limited shrink-swell (very limited) wetness (limited)	 1.00 0.63	Very limited low strength (very limited) shrink-swell (very limited) wetness (limited)	 1.00 1.00 0.63	Limited wetness (limited)	 0.63
40024:										
Opolis	Limited wetness (limited) shrink-swell (moderately limited)	 0.63 0.45	Very limited wetness (very limited) shrink-swell (moderately limited)	 1.00 0.53	Limited wetness (limited) shrink-swell (moderately limited)	 0.63 0.45	Very limited low strength (very limited) wetness (limited) shrink-swell (moderately limited)	 1.00 0.63 0.45	Limited wetness (limited)	 0.63
40026:										
Sylvania	Moderately limited wetness (moderately limited) shrink-swell (moderately limited)	 0.45 0.45	Very limited wetness (very limited) shrink-swell (slightly limited)	 1.00 0.25	Moderately limited wetness (moderately limited) shrink-swell (moderately limited)	 0.45 0.45	Moderately limited wetness (moderately limited) shrink-swell (moderately limited)	 0.45 0.45	Moderately limited wetness (moderately limited) small stones (moderately limited) too acid (slightly limited)	 0.45 0.33 0.18
40027:										
Sylvania	Moderately limited shrink-swell (moderately limited)	 0.45	Limited wetness (limited) shrink-swell (moderately limited)	 0.97 0.41	Moderately limited slope (moderately limited) shrink-swell (moderately limited)	 0.45 0.45	Moderately limited shrink-swell (moderately limited)	 0.45	Very limited small stones (limited) too acid (slightly limited)	 1.00 0.18

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40028:										
Sylvania	Moderately limited shrink-swell (moderately limited)	0.45	Limited wetness (limited) shrink-swell (moderately limited)	0.87 0.40	Moderately limited slope (moderately limited) shrink-swell (moderately limited)	0.45 0.45	Moderately limited shrink-swell (moderately limited)	0.45	Slightly limited too acid (slightly limited)	0.12
40029:										
Sylvania	Limited slope (limited) wetness (moderately limited) shrink-swell (moderately limited)	0.68 0.45 0.45	Very limited wetness (very limited) slope (limited) shrink-swell (moderately limited)	1.00 0.68 0.45	Very limited slope (very limited) wetness (moderately limited) shrink-swell (moderately limited)	1.00 0.45 0.45	Moderately limited wetness (moderately limited) shrink-swell (moderately limited) slope (moderately limited)	0.45 0.45 0.37	Moderately limited wetness (moderately limited) slope (moderately limited) too acid (slightly limited)	0.45 0.37 0.12
44000:										
Cherokee	Very limited shrink-swell (very limited) wetness (limited)	1.00 0.89	Very limited wetness (very limited) shrink-swell (limited)	1.00 0.70	Very limited shrink-swell (very limited) wetness (limited)	1.00 0.89	Very limited shrink-swell (very limited) wetness (limited)	1.00 0.89	Limited wetness (limited)	0.89
44002:										
Carl	Very limited shrink-swell (very limited) flooding (very limited) wetness (very limited)	1.00 1.00 1.00	Very limited shrink-swell (very limited) flooding (very limited) wetness (very limited)	1.00 1.00 1.00	Very limited flooding (very limited) shrink-swell (very limited) wetness (very limited)	1.00 1.00 1.00	Very limited shrink-swell (very limited) wetness (very limited) flooding (rare) (limited)	1.00 1.00 0.90	Very limited wetness (very limited) too clayey (moderately limited)	1.00 0.60
44004:										
McCune	Limited shrink-swell (limited) wetness (limited)	0.45 0.60	Very limited wetness (very limited) shrink-swell (slightly limited)	1.00 0.23	Limited shrink-swell (moderately limited) wetness (limited)	0.45 0.60	Moderately limited shrink-swell (moderately limited) wetness (slightly limited)	0.45 0.28	Slightly limited wetness (slightly limited) too acid (slightly limited)	0.28 0.06
46001:										
Verdigris	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46002:										
Hepler	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Moderately limited flooding (moderately limited)	0.60
	wetness (limited)	0.60	wetness (very limited)	1.00	wetness (limited)	0.60	wetness (limited)	0.60	wetness (limited)	0.60
46004:										
Osage	Very limited shrink-swell (very limited)	1.00	Very limited shrink-swell (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited shrink-swell (very limited)	1.00	Very limited wetness (very limited)	1.00
	flooding (very limited)	1.00	flooding (very limited)	1.00	shrink-swell (very limited)	1.00	flooding (very limited)	1.00	flooding (moderately limited)	0.60
	wetness (very limited)	1.00	wetness (very limited)	1.00	wetness (very limited)	1.00	wetness (very limited)	1.00	too clayey (moderately limited)	0.60
46005:										
Verdigris	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Moderately limited flooding (moderately limited)	0.60
70006:										
Creldon	Moderately limited shrink-swell (moderately limited)	0.45	Very limited wetness (very limited)	1.00	Moderately limited shrink-swell (moderately limited)	0.45	Very limited low strength (very limited)	1.00	Slightly limited wetness (slightly limited)	0.13
	wetness (slightly limited)	0.13	shrink-swell (moderately limited)	0.45	wetness (slightly limited)	0.13	shrink-swell (moderately limited)	0.45		
							wetness (slightly limited)	0.13		
70012:										
Hoberg	Slightly limited wetness (slightly limited)	0.28	Very limited wetness (very limited)	1.00	Slightly limited wetness (slightly limited)	0.28	Very limited low strength (very limited)	1.00	Slightly limited wetness (slightly limited)	0.28
							wetness (slightly limited)	0.28		
70045:										
Keeno	Slightly limited wetness (slightly limited)	0.28	Very limited wetness (very limited)	1.00	Limited slope (limited)	0.68	Slightly limited wetness (slightly limited)	0.28	Very limited droughty (very limited)	1.00
	large stones (slightly limited)	0.01	large stones (slightly limited)	0.01	wetness (slightly limited)	0.28	large stones (slightly limited)	0.01	large stones (moderately limited)	0.30
					large stones (slightly limited)	0.01			wetness (slightly limited)	0.28

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70056:										
Crackerneck	Limited		Very limited		Very limited		Moderately limited		Very limited	
	slope	0.68	wetness	1.00	slope	1.00	large stones	0.58	small stones	1.00
	(limited)		(very limited)		(very limited)		(moderately limited)		(very limited)	
	large stones	0.58	slope	0.68	large stones	0.58	shrink-swell	0.45	droughty	1.00
	(moderately limited)		(limited)		(moderately limited)		(moderately limited)		(very limited)	
	shrink-swell	0.45	large stones	0.58	shrink-swell	0.45	slope	0.37	large stones	0.99
	(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)		(limited)	
70057:										
Crackerneck	Very limited		Very limited		Very limited		Very limited		Very limited	
	slope	1.00	wetness	1.00	slope	1.00	slope	1.00	slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	large stones	0.58	slope	1.00	large stones	0.58	large stones	0.58	small stones	1.00
	(moderately limited)		(very limited)		(moderately limited)		(moderately limited)		(very limited)	
	shrink-swell	0.45	large stones	0.58	shrink-swell	0.45	shrink-swell	0.45	droughty	1.00
	(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)		(very limited)	
70058:										
Crackerneck	Slightly limited		Very limited		Moderately limited		Slightly limited		Very limited	
	large stones	0.18	wetness	1.00	slope	0.45	large stones	0.18	small stones	1.00
	(slightly limited)		(very limited)		(moderately limited)		(slightly limited)		(very limited)	
	wetness	0.04	large stones	0.18	large stones	0.18	wetness	0.04	droughty	0.88
	(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)		(limited)	
			shrink-swell	0.12	wetness	0.04			too acid	0.24
			(slightly limited)		(slightly limited)				(slightly limited)	
70059:										
Goss	Very limited		Very limited		Very limited		Very limited		Very limited	
	slope	1.00	slope	1.00	slope	1.00	slope	1.00	slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	shrink-swell	0.45	large stones	0.25	shrink-swell	0.45	shrink-swell	0.45	small stones	1.00
	(moderately limited)		(slightly limited)		(moderately limited)		(moderately limited)		(very limited)	
	large stones	0.25	shrink-swell	0.20	large stones	0.25	large stones	0.25	large stones	0.99
	(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)		(limited)	
70060:										
Hoberg	Slightly limited		Very limited		Slightly limited		Slightly limited		Slightly limited	
	wetness	0.28	wetness	1.00	wetness	0.28	wetness	0.28	wetness	0.28
	(slightly limited)		(very limited)		(slightly limited)		(slightly limited)		(slightly limited)	
									droughty	0.23
									(slightly limited)	

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70060:										
Eldorado	Limited large stones (limited)	0.96	Limited large stones (limited) shrink-swell (slightly limited)	0.96 0.05	Limited large stones (limited)	0.96	Limited large stones (limited)	0.96	Not limited	
Pomme	Not limited		Not limited		Not limited		Not limited		Not limited	
70061:										
Pomme	Not limited		Not limited		Not limited		Not limited		Not limited	
70062:										
Pomme	Not limited		Not limited		Not limited		Not limited		Not limited	
Rueter	Moderately limited large stones (moderately limited)	0.52	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	0.52 0.18	Moderately limited large stones (moderately limited)	0.52	Moderately limited large stones (moderately limited)	0.52	Very limited small stones (very limited) droughty (limited) large stones (moderately limited)	1.00 0.79 0.30
70063:										
Rueter	Limited large stones (limited) slope (limited)	0.80 0.68	Limited large stones (limited) slope (limited) shrink-swell (slightly limited)	0.80 0.68 0.25	Very limited slope (very limited) large stones (limited)	1.00 0.80	Limited large stones (limited) slope (moderately limited)	0.80 0.37	Limited large stones (limited) droughty (limited) small stones (limited)	0.99 0.99 0.96
70064:										
Rueter	Moderately limited large stones (moderately limited)	0.52	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	0.52 0.18	Moderately limited large stones (moderately limited)	0.52	Moderately limited large stones (moderately limited)	0.52	Very limited small stones (very limited) droughty (limited) large stones (moderately limited)	1.00 0.79 0.30

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70065:										
Rueter	Moderately limited large stones (moderately limited)	0.52	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	0.52 0.18	Moderately limited large stones (moderately limited) slope (moderately limited)	0.52 0.45	Moderately limited large stones (moderately limited)	0.52	Very limited small stones (very limited) droughty (limited) large stones (moderately limited)	1.00 0.79 0.30
70066:										
Winnipeg	Not limited		Not limited		Not limited		Very limited low strength (very limited)	1.00	Not limited	
71751:										
Bearthicket	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited) low strength (very limited)	1.00 1.00	Moderately limited flooding (moderately limited)	0.60
73031:										
Gerald	Limited wetness (limited)	0.60	Very limited wetness (very limited)	1.00	Limited wetness (limited)	0.60	Very limited low strength (very limited) wetness (limited)	1.00 0.60	Limited wetness (limited)	0.60
75376:										
Cedargap	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited) small stones (moderately limited)	1.00 0.33
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99003: Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005: Landfill	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited low strength (very limited) slope (very limited)	1.00 1.00	Very limited slope (very limited)	1.00
99010: Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011: Kanima	Not limited		Not limited		Limited slope (limited)	0.68	Not limited		Very limited small stones (very limited) droughty (slightly limited) too acid (slightly limited)	1.00 0.09 0.06

Table 17.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.93	Very limited wetness (very limited)	 1.00 	Limited wetness (limited) too clayey (moderately limited)	 0.79 0.54	Limited wetness (limited)	 0.60 	Moderately limited wetness (moderately limited) too clayey (slightly limited)	 0.40 0.27
40011:										
Barco	Very limited depth to bedrock (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited depth to bedrock (very limited) seepage (moderately limited)	 1.00 0.50	Very limited depth to bedrock (very limited) too acid (slightly limited)	 1.00 0.30	Very limited depth to bedrock (very limited)	 1.00 	Very limited depth to bedrock (very limited) too acid (slightly limited)	 1.00 0.30
40015:										
Eldorado	Limited large stones (limited) percs slowly (slightly limited)	 0.96 0.25	Limited large stones (limited) seepage (moderately limited)	 0.95 0.50	Very limited too clayey (very limited) large stones (limited)	 1.00 0.93	Not limited		Very limited too clayey (very limited) large stones (limited)	 1.00 0.86
40016:										
Eldorado	Very limited large stones (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited large stones (very limited) slope (limited) seepage (moderately limited)	 1.00 0.66 0.50	Very limited too clayey (very limited) large stones (very limited)	 1.00 0.99	Not limited		Very limited too clayey (very limited) large stones (limited) hard to pack (limited)	 1.00 0.99 0.70
40017:										
Maplegrove	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.71	Very limited wetness (very limited) seepage (moderately limited)	 1.00 0.50	Very limited wetness (very limited) too clayey (very limited)	 1.00 1.00	Limited wetness (limited)	 0.95 	Very limited too clayey (very limited) wetness (moderately limited)	 1.00 0.58

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.94	Very limited wetness (very limited)	 1.00	Very limited wetness (very limited) too clayey (limited) too acid (slightly limited)	 1.00 0.82 0.18	Very limited wetness (very limited)	 1.00	Limited wetness (limited) too clayey (limited) too acid (slightly limited)	 0.89 0.64 0.18
40019:										
Newtonia	Slightly limited percs slowly (slightly limited)	 0.25	Moderately limited seepage (moderately limited)	 0.50	Moderately limited too clayey (moderately limited)	 0.60	Not limited		Limited hard to pack (limited) too clayey (moderately limited)	 0.70 0.30
Eldorado	Limited large stones (limited) percs slowly (slightly limited)	 0.96 0.25	Limited large stones (limited) seepage (moderately limited)	 0.95 0.50	Very limited too clayey (very limited) large stones (limited)	 1.00 0.93	Not limited		Very limited too clayey (very limited) large stones (limited)	 1.00 0.86
40020:										
Newtonia	Slightly limited percs slowly (slightly limited)	 0.25	Moderately limited seepage (moderately limited)	 0.50	Moderately limited too clayey (moderately limited)	 0.60	Not limited		Limited hard to pack (limited) too clayey (moderately limited)	 0.70 0.30
Eldorado	Limited large stones (limited) percs slowly (slightly limited)	 0.96 0.25	Limited large stones (limited) seepage (moderately limited)	 0.95 0.50	Very limited too clayey (very limited) large stones (limited)	 1.00 0.93	Not limited		Very limited too clayey (very limited) large stones (limited)	 1.00 0.86
40021:										
Opolis	Very limited wetness (very limited) percs slowly (limited) slope (moderately limited)	 1.00 0.94 0.37	Very limited wetness (very limited) slope (very limited)	 1.00 1.00	Very limited wetness (very limited) too clayey (limited) slope (moderately limited)	 1.00 0.78 0.37	Very limited wetness (very limited) slope (moderately limited)	 1.00 0.37	Limited wetness (limited) too clayey (moderately limited) slope (moderately limited)	 0.63 0.57 0.37

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40021:										
Hepler	Very limited flooding (very limited) wetness (very limited) percs slowly (limited)	 1.00 1.00 0.74	Very limited flooding (very limited) wetness (very limited)	 1.00 1.00	Very limited flooding (very limited) wetness (limited) too clayey (moderately limited)	 1.00 0.99 0.48	Very limited flooding (very limited) wetness (limited)	 1.00 0.80	Moderately limited wetness (moderately limited) too clayey (slightly limited) too acid (slightly limited)	 0.50 0.24 0.12
40022:										
Opolis	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.94	Very limited wetness (very limited)	 1.00	Very limited wetness (very limited) too clayey (limited)	 1.00 0.78	Very limited wetness (very limited)	 1.00	Limited wetness (limited) too clayey (moderately limited)	 0.63 0.57
40023:										
Opolis	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.94	Very limited wetness (very limited)	 1.00	Very limited wetness (very limited) too clayey (limited)	 1.00 0.78	Very limited wetness (very limited)	 1.00	Limited wetness (limited) too clayey (moderately limited)	 0.63 0.57
40024:										
Opolis	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.94	Very limited wetness (very limited)	 1.00	Very limited wetness (very limited) too clayey (limited)	 1.00 0.66	Very limited wetness (very limited)	 1.00	Limited wetness (limited) too clayey (moderately limited)	 0.63 0.39
40026:										
Sylvania	Very limited wetness (very limited) percs slowly (limited) depth to bedrock (moderately limited)	 1.00 0.71 0.54	Very limited wetness (very limited) depth to bedrock (moderately limited) seepage (moderately limited)	 1.00 0.54 0.50	Very limited depth to bedrock (very limited) wetness (very limited) too clayey (limited)	 1.00 1.00 0.98	Limited wetness (limited) depth to bedrock (moderately limited)	 0.90 0.39	Limited too clayey (limited) hard to pack (limited) wetness (moderately limited)	 0.95 0.70 0.55

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40027:										
Sylvania	Very limited wetness (very limited) percs slowly (limited) depth to bedrock (moderately limited)	 1.00 0.71 0.38 	Very limited wetness (very limited) slope (limited) depth to bedrock (moderately limited)	 1.00 0.66 0.38 	Very limited depth to bedrock (very limited) too clayey (limited) wetness (limited)	 1.00 0.98 0.63 	Moderately limited wetness (moderately limited) depth to bedrock (slightly limited)	 0.34 0.17 	Limited too clayey (limited) hard to pack (limited) too acid (moderately limited)	 0.95 0.70 0.48
40028:										
Sylvania	Limited wetness (limited) depth to bedrock (limited) percs slowly (limited)	 0.85 0.82 0.71 	Very limited wetness (very limited) depth to bedrock (limited) slope (limited)	 1.00 0.82 0.66 	Very limited depth to bedrock (very limited) too clayey (limited) wetness (moderately limited)	 1.00 0.98 0.49 	Limited depth to bedrock (limited) wetness (slightly limited)	 0.66 0.19 	Limited too clayey (limited) hard to pack (limited) depth to bedrock (limited)	 0.95 0.70 0.66
40029:										
Sylvania	Very limited wetness (very limited) percs slowly (limited) depth to bedrock (moderately limited)	 1.00 0.71 0.42 	Very limited slope (very limited) wetness (very limited) depth to bedrock (moderately limited)	 1.00 1.00 0.42 	Very limited depth to bedrock (very limited) wetness (very limited) too clayey (limited)	 1.00 1.00 0.98 	Limited wetness (limited) slope (moderately limited) depth to bedrock (slightly limited)	 0.90 0.37 0.25 	Limited too clayey (limited) hard to pack (limited) wetness (moderately limited)	 0.95 0.70 0.55
44000:										
Cherokee	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.94 	Very limited wetness (very limited)	 1.00 	Very limited wetness (very limited) too clayey (limited) too acid (moderately limited)	 1.00 0.78 0.42 	Very limited wetness (very limited)	 1.00 	Limited wetness (limited) too clayey (moderately limited) too acid (moderately limited)	 0.89 0.57 0.42
44002:										
Carl	Very limited wetness (very limited) percs slowly (very limited) flooding (rare) (moderately limited)	 1.00 1.00 0.60 	Very limited wetness (very limited)	 1.00 	Very limited wetness (very limited) too clayey (limited) flooding (rare) (moderately limited)	 1.00 0.74 0.60 	Very limited wetness (very limited) flooding (rare) (moderately limited)	 1.00 0.60 	Very limited wetness (very limited) hard to pack (limited) too clayey (moderately limited)	 1.00 0.70 0.51

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44004:										
McCune	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.93	Very limited wetness (very limited)	 1.00	Limited wetness (limited) too acid (slightly limited) too clayey (slightly limited)	 0.99 0.24 0.04	Limited wetness (limited)	 0.80	Moderately limited wetness (moderately limited) too acid (slightly limited)	 0.50 0.24
46001:										
Verdigris	Very limited flooding (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited flooding (very limited) seepage (moderately limited)	 1.00 0.50	Very limited flooding (very limited) too acid (slightly limited)	 1.00 0.06	Very limited flooding (very limited)	 1.00	Slightly limited too acid (slightly limited)	 0.06
46002:										
Hepler	Very limited flooding (very limited) wetness (very limited) percs slowly (limited)	 1.00 1.00 0.74	Very limited flooding (very limited) wetness (very limited)	 1.00 1.00	Very limited flooding (very limited) wetness (limited) too clayey (moderately limited)	 1.00 0.99 0.48	Very limited flooding (very limited) wetness (limited)	 1.00 0.80	Moderately limited wetness (moderately limited) too clayey (slightly limited) too acid (slightly limited)	 0.50 0.24 0.12
46004:										
Osage	Very limited wetness (very limited) flooding (very limited) percs slowly (very limited)	 1.00 1.00 1.00	Very limited flooding (very limited) wetness (very limited)	 1.00 1.00	Very limited wetness (very limited) flooding (very limited) too clayey (limited)	 1.00 1.00 0.80	Very limited flooding (very limited) wetness (very limited)	 1.00 1.00	Very limited wetness (very limited) hard to pack (limited) too clayey (moderately limited)	 1.00 0.70 0.60
46005:										
Verdigris	Very limited flooding (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited flooding (very limited) seepage (moderately limited)	 1.00 0.50	Very limited flooding (very limited) too acid (slightly limited)	 1.00 0.06	Very limited flooding (very limited)	 1.00	Slightly limited too acid (slightly limited)	 0.06

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70006:										
Creldon	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.71	Very limited wetness (very limited) seepage (moderately limited) slope (slightly limited)	 1.00 0.50 0.08	Very limited too clayey (very limited) wetness (limited)	 1.00 0.89	Limited wetness (limited)	 0.69	Very limited too clayey (very limited) wetness (moderately limited)	 1.00 0.45
70012:										
Hoberg	Very limited wetness (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited wetness (very limited) seepage (moderately limited)	 1.00 0.50	Limited wetness (limited) too clayey (limited) large stones (slightly limited)	 0.99 0.78 0.05	Limited wetness (limited)	 0.80	Moderately limited too clayey (moderately limited) wetness (moderately limited)	 0.57 0.50
70045:										
Keeno	Very limited wetness (very limited) large stones (slightly limited)	 1.00 0.00	Very limited wetness (very limited) seepage (very limited) slope (limited)	 1.00 1.00 0.91	Limited wetness (limited) too clayey (limited) large stones (slightly limited)	 0.99 0.82 0.06	Limited wetness (limited) seepage (limited)	 0.80 0.75	Limited small stones (limited) too clayey (limited) wetness (moderately limited)	 0.87 0.63 0.50
70056:										
Crackerneck	Very limited wetness (very limited) percs slowly (limited) large stones (moderately limited)	 1.00 0.82 0.58	Very limited slope (very limited) wetness (very limited) large stones (limited)	 1.00 1.00 0.70	Very limited too acid (very limited) too clayey (limited) wetness (limited)	 1.00 0.90 0.82	Limited wetness (limited) slope (moderately limited)	 0.63 0.37	Very limited too acid (very limited) small stones (limited) too clayey (limited)	 1.00 0.92 0.79
70057:										
Crackerneck	Very limited slope (very limited) wetness (very limited) percs slowly (limited)	 1.00 1.00 0.82	Very limited slope (very limited) wetness (very limited) large stones (limited)	 1.00 1.00 0.70	Very limited slope (very limited) too acid (very limited) too clayey (limited)	 1.00 1.00 0.90	Very limited slope (very limited) wetness (limited)	 1.00 0.63	Very limited slope (very limited) too acid (very limited) small stones (limited)	 1.00 1.00 0.92

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70058:										
Crackerneck	Very limited wetness (very limited) percs slowly (limited) large stones (slightly limited)	 1.00 0.82 0.18 	Very limited wetness (very limited) slope (limited) seepage (moderately limited)	 1.00 0.66 0.50 	Very limited too acid (very limited) too clayey (limited) wetness (limited)	 1.00 0.90 0.82 	Limited wetness (limited)	 0.63 	Very limited too acid (very limited) small stones (limited) too clayey (limited)	 1.00 0.95 0.79
70059:										
Goss	Very limited slope (very limited) large stones (slightly limited) percs slowly (slightly limited)	 1.00 0.25 0.25 	Very limited slope (very limited) seepage (very limited) large stones (limited)	 1.00 1.00 0.66 	Very limited slope (very limited) too clayey (very limited) too acid (moderately limited)	 1.00 1.00 0.42 	Very limited slope (very limited) seepage (limited)	 1.00 0.75 	Very limited slope (very limited) too clayey (very limited) small stones (limited)	 1.00 1.00 0.95
70060:										
Hoberg	Very limited wetness (very limited) percs slowly (limited)	 1.00 0.93 	Very limited wetness (very limited) seepage (moderately limited)	 1.00 0.50 	Limited wetness (limited) too clayey (limited) too acid (slightly limited)	 0.99 0.86 0.18 	Limited wetness (limited)	 0.80 	Limited too clayey (limited) wetness (moderately limited) too acid (slightly limited)	 0.72 0.50 0.18
Eldorado	Limited large stones (limited) percs slowly (slightly limited)	 0.96 0.25 	Limited large stones (limited) seepage (moderately limited)	 0.95 0.50 	Very limited too clayey (very limited) large stones (limited)	 1.00 0.93 	Not limited		Very limited too clayey (very limited) large stones (limited)	 1.00 0.86
Pomme	Slightly limited percs slowly (slightly limited)	 0.25 	Moderately limited seepage (moderately limited)	 0.50 	Limited too clayey (limited) too acid (slightly limited)	 0.86 0.18 	Not limited		Very limited small stones >35% (very limited) too clayey (limited) too acid (slightly limited)	 1.00 0.72 0.18

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70061:										
Pomme	Slightly limited percs slowly (slightly limited)	0.25	Moderately limited seepage (moderately limited)	0.50	Limited too clayey (limited) too acid (slightly limited)	0.86 0.18	Not limited		Very limited small stones >35% (very limited) too clayey (limited) too acid (slightly limited)	1.00 0.72 0.18
70062:										
Pomme	Slightly limited percs slowly (slightly limited)	0.25	Moderately limited seepage (moderately limited)	0.50	Limited too clayey (limited) too acid (slightly limited)	0.86 0.18	Not limited		Very limited small stones >35% (very limited) too clayey (limited) too acid (slightly limited)	1.00 0.72 0.18
Rueter	Moderately limited large stones (moderately limited) percs slowly (slightly limited)	0.52 0.25	Very limited seepage (very limited) large stones (slightly limited)	1.00 0.24	Very limited too clayey (very limited) large stones (limited)	1.00 0.70	Limited seepage (limited)	0.75	Very limited too clayey (very limited) small stones (limited) seepage (moderately limited)	1.00 0.78 0.50
70063:										
Rueter	Limited large stones (limited) slope (moderately limited) percs slowly (slightly limited)	0.80 0.37 0.25	Very limited slope (very limited) seepage (very limited) large stones (very limited)	1.00 1.00 1.00	Very limited too clayey (very limited) large stones (limited) slope (moderately limited)	1.00 0.83 0.37	Limited seepage (limited) slope (moderately limited)	0.75 0.37	Very limited too clayey (very limited) small stones (limited) large stones (limited)	1.00 0.71 0.67
70064:										
Rueter	Moderately limited large stones (moderately limited) percs slowly (slightly limited)	0.52 0.25	Very limited seepage (very limited) large stones (slightly limited)	1.00 0.24	Very limited too clayey (very limited) large stones (limited)	1.00 0.70	Limited seepage (limited)	0.75	Very limited too clayey (very limited) small stones (limited) seepage (moderately limited)	1.00 0.78 0.50

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70065:										
Rueter	Moderately limited large stones (moderately limited) percs slowly (slightly limited)	 0.52 0.25	Very limited seepage (very limited) slope (limited) large stones (slightly limited)	 1.00 0.66 0.24	Very limited too clayey (very limited) large stones (limited)	 1.00 0.70	Limited seepage (limited)	 0.75	Very limited too clayey (very limited) small stones (limited) seepage (moderately limited)	 1.00 0.78 0.50
70066:										
Winnipeg	Limited percs slowly (limited)	 0.71	Moderately limited seepage (moderately limited)	 0.50	Moderately limited too clayey (moderately limited)	 0.48	Not limited		Slightly limited too clayey (slightly limited)	 0.24
71751:										
Bearthicket	Very limited flooding (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited flooding (very limited) seepage (moderately limited)	 1.00 0.50	Very limited flooding (very limited)	 1.00	Very limited flooding (very limited)	 1.00	Not limited	
73031:										
Gerald	Very limited wetness (very limited) percs slowly (very limited)	 1.00 1.00	Very limited wetness (very limited) seepage (moderately limited)	 1.00 0.50	Very limited wetness (very limited) too clayey (very limited)	 1.00 1.00	Limited wetness (limited)	 0.99	Very limited too clayey (very limited) wetness (moderately limited)	 1.00 0.60
75376:										
Cedargap	Very limited flooding (very limited) percs slowly (slightly limited)	 1.00 0.25	Very limited flooding (very limited) seepage (moderately limited)	 1.00 0.50	Very limited flooding (very limited) too clayey (slightly limited)	 1.00 0.11	Very limited flooding (very limited)	 1.00	Limited small stones (limited)	 1.00
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99003: Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005: Landfill	Very limited slope (very limited)	1.00	Very limited slope (very limited) seepage (very limited)	1.00 1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00
99010: Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011: Kanima	Slightly limited percs slowly (slightly limited)	0.25	Limited slope (limited) seepage (moderately limited)	0.91 0.50	Limited too acid (limited)	0.60	Not limited		Very limited small stones >35% (very limited) too acid (limited)	1.00 0.60

Table 18.--Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Limited percs slowly (limited) wetness (slightly limited)	 0.99 0.28	Limited percs slowly (limited) wetness (slightly limited)	 0.99 0.28	Limited percs slowly (limited) wetness (slightly limited)	 0.99 0.28	Limited percs slowly (limited) wetness (slightly limited)	 0.99 0.28	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
40011:										
Barco	Slightly limited depth to bedrock (slightly limited)	 0.30	Slightly limited depth to bedrock (slightly limited)	 0.30	Slightly limited depth to bedrock (slightly limited)	 0.30	Very limited depth to bedrock (very limited)	 1.00	Very limited percs slowly (very limited) depth to bedrock (very limited) too acid (slightly limited)	 1.00 1.00 0.01
40015:										
Eldorado	Moderately limited large surface stones (moderately limited)	 0.34	Moderately limited large surface stones (moderately limited)	 0.34	Moderately limited large surface stones (moderately limited)	 0.34	Moderately limited large surface stones (moderately limited)	 0.34	Very limited percs slowly (very limited) too stony (very limited) too cobbly (limited)	 1.00 0.99 0.81
40016:										
Eldorado	Limited droughty (limited) large stones (moderately limited) large surface stones (moderately limited)	 0.83 0.45 0.41	Limited droughty (limited) large stones (moderately limited) large surface stones (moderately limited)	 0.83 0.45 0.41	Limited droughty (limited) large stones (moderately limited) large surface stones (moderately limited)	 0.83 0.45 0.41	Moderately limited large stones (moderately limited) large surface stones (moderately limited) slope (slightly limited)	 0.45 0.41 0.20	Very limited percs slowly (very limited) too cobbly (very limited) slope (limited)	 1.00 1.00 0.66
40017:										
Maplegrove	Moderately limited percs slowly (moderately limited) wetness (moderately limited)	 0.60 0.57	Moderately limited percs slowly (moderately limited) wetness (moderately limited)	 0.60 0.57	Moderately limited percs slowly (moderately limited) wetness (moderately limited)	 0.60 0.57	Moderately limited percs slowly (moderately limited) wetness (moderately limited)	 0.60 0.57	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Limited percs slowly (limited) wetness (limited)	 0.98 0.89	Limited percs slowly (limited) wetness (limited)	 0.98 0.89	Limited percs slowly (limited) wetness (limited)	 0.98 0.89	Limited percs slowly (limited) wetness (limited)	 0.98 0.89	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
40019:										
Newtonia	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	 1.00
Eldorado	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited) too stony (very limited) too cobbly (limited)	 1.00 0.99 0.81
40020:										
Newtonia	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	 1.00
Eldorado	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited) too stony (very limited) too cobbly (limited)	 1.00 0.99 0.81
40021:										
Opolis	Very limited percs slowly (very limited) slope (limited) wetness (limited)	 1.00 0.68 0.63	Very limited percs slowly (very limited) slope (limited) wetness (limited)	 1.00 0.68 0.63	Very limited percs slowly (very limited) slope (limited) wetness (limited)	 1.00 0.89 0.63	Very limited percs slowly (very limited) slope (limited) wetness (limited)	 1.00 0.89 0.63	Very limited percs slowly (very limited) wetness (very limited) slope (very limited)	 1.00 1.00 1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40021:										
Hepler	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60 	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60 	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60 	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60 	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	 1.00 1.00 0.60
40022:										
Opolis	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
40023:										
Opolis	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
40024:										
Opolis	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (limited)	 1.00 0.63 	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
40026:										
Sylvania	Moderately limited wetness (moderately limited) too acid (slightly limited)	 0.53 0.18 	Moderately limited wetness (moderately limited) too acid (slightly limited)	 0.53 0.18 	Moderately limited wetness (moderately limited) too acid (slightly limited)	 0.53 0.18 	Moderately limited wetness (moderately limited) depth to bedrock (moderately limited) too acid (slightly limited)	 0.53 0.39 0.18 	Very limited percs slowly (very limited) depth to bedrock (very limited) wetness (very limited)	 1.00 1.00 1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40027:										
Sylvania------	Slightly limited		Slightly limited		Slightly limited		Slightly limited		Very limited	
	too acid	0.18	too acid	0.18	slope	0.20	slope	0.20	percs slowly	1.00
	(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)		(very limited)	
	wetness	0.04	wetness	0.04	too acid	0.18	too acid	0.18	depth to bedrock	1.00
	(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)		(very limited)	
					wetness	0.04	depth to bedrock	0.17	wetness	1.00
					(slightly limited)		(slightly limited)		(very limited)	
40028:										
Sylvania------	Slightly limited		Slightly limited		Slightly limited		Limited		Very limited	
	too acid	0.12	too acid	0.12	slope	0.20	depth to bedrock	0.66	percs slowly	1.00
	(slightly limited)		(slightly limited)		(slightly limited)		(limited)		(very limited)	
					too acid	0.12	slope	0.20	depth to bedrock	1.00
					(slightly limited)		(slightly limited)		(very limited)	
							too acid	0.12	wetness	1.00
							(slightly limited)		(very limited)	
40029:										
Sylvania------	Limited		Limited		Limited		Limited		Very limited	
	slope	0.68	slope	0.68	slope	0.89	slope	0.89	percs slowly	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
	percs slowly	0.60	percs slowly	0.60	percs slowly	0.60	percs slowly	0.60	slope	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
	wetness	0.53	wetness	0.53	wetness	0.53	wetness	0.53	depth to bedrock	1.00
	(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)		(very limited)	
44000:										
Cherokee------	Very limited		Very limited		Very limited		Very limited		Very limited	
	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	wetness	0.89	wetness	0.89	wetness	0.89	wetness	0.89	wetness	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
									too acid	0.14
									(slightly limited)	
44002:										
Carl----------	Very limited		Very limited		Very limited		Very limited		Very limited	
	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00	percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	wetness	1.00	wetness	1.00	wetness	1.00	wetness	1.00	wetness	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	flooding	0.30	flooding	0.30	flooding	0.30	flooding	0.30		
	(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44004:										
McCune	Limited percs slowly (limited) wetness (moderately limited) too acid (slightly limited)	 0.98 0.44 0.06	Limited percs slowly (limited) wetness (moderately limited) too acid (slightly limited)	 0.98 0.44 0.06	Limited percs slowly (limited) wetness (moderately limited) too acid (slightly limited)	 0.98 0.44 0.06	Limited percs slowly (limited) wetness (moderately limited) too acid (slightly limited)	 0.98 0.44 0.06	Very limited percs slowly (very limited) wetness (very limited)	 1.00 1.00
46001:										
Verdigris	Very limited flooding (very limited)	 1.00	Very limited flooding (very limited)	 1.00	Very limited flooding (very limited)	 1.00	Very limited flooding (very limited)	 1.00	Very limited percs slowly (very limited) flooding (very limited)	 1.00 1.00
46002:										
Hepler	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60	Limited flooding (limited) percs slowly (limited) wetness (moderately limited)	 0.90 0.60 0.60	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	 1.00 1.00 0.60
46004:										
Osage	Very limited percs slowly (very limited) wetness (very limited) flooding (limited)	 1.00 1.00 0.90	Very limited percs slowly (very limited) wetness (very limited) flooding (limited)	 1.00 1.00 0.90	Very limited percs slowly (very limited) wetness (very limited) flooding (limited)	 1.00 1.00 0.90	Very limited percs slowly (very limited) wetness (very limited) flooding (limited)	 1.00 1.00 0.90	Very limited percs slowly (very limited) wetness (very limited) flooding (moderately limited)	 1.00 1.00 0.60
46005:										
Verdigris	Limited flooding (limited)	 0.90	Limited flooding (limited)	 0.90	Limited flooding (limited)	 0.90	Limited flooding (limited)	 0.90	Very limited percs slowly (very limited) flooding (moderately limited)	 1.00 0.60

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70006:										
Creldon	Moderately limited wetness (moderately limited)	0.36	Moderately limited wetness (moderately limited)	0.36	Moderately limited wetness (moderately limited)	0.36	Moderately limited wetness (moderately limited)	0.36	Very limited percs slowly (very limited) wetness (very limited) slope (slightly limited)	1.00 1.00 0.08
70012:										
Hoberg	Moderately limited wetness (moderately limited)	0.44	Moderately limited wetness (moderately limited)	0.44	Moderately limited wetness (moderately limited)	0.44	Moderately limited wetness (moderately limited)	0.44	Very limited percs slowly (very limited) wetness (very limited)	1.00 1.00
70045:										
Keeno	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.44	Very limited droughty (very limited) wetness (moderately limited)	1.00 0.44	Very limited droughty (very limited) wetness (moderately limited) slope (moderately limited)	1.00 0.44 0.30	Moderately limited wetness (moderately limited) slope (moderately limited)	0.44 0.30	Very limited wetness (very limited) slope (limited) percs slowly (moderately limited)	1.00 0.91 0.32
70056:										
Crackerneck	Very limited droughty (very limited) slope (limited) percs slowly (limited)	1.00 0.68 0.60	Very limited droughty (very limited) slope (limited) percs slowly (limited)	1.00 0.68 0.60	Very limited droughty (very limited) slope (limited) percs slowly (limited)	1.00 0.89 0.60	Limited slope (limited) percs slowly (limited) large stones (moderately limited)	0.89 0.60 0.45	Very limited percs slowly (very limited) slope (very limited) wetness (very limited)	1.00 1.00 1.00
70057:										
Crackerneck	Very limited slope (very limited) droughty (very limited) percs slowly (limited)	1.00 1.00 0.60	Very limited slope (very limited) droughty (very limited) percs slowly (limited)	1.00 1.00 0.60	Very limited slope (very limited) droughty (very limited) percs slowly (limited)	1.00 1.00 0.60	Very limited slope (very limited) percs slowly (limited) large stones (moderately limited)	1.00 0.60 0.45	Very limited percs slowly (very limited) slope (very limited) wetness (very limited)	1.00 1.00 1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70058:										
Crackerneck	Limited droughty (limited) percs slowly (limited) wetness (moderately limited)	 0.88 0.60 0.31 	Limited droughty (limited) percs slowly (limited) wetness (moderately limited)	 0.88 0.60 0.31 	Limited droughty (limited) percs slowly (limited) wetness (moderately limited)	 0.88 0.60 0.31 	Limited percs slowly (limited) wetness (moderately limited) too acid (slightly limited)	 0.60 0.31 0.24 	Very limited percs slowly (very limited) wetness (very limited) too cobbly (limited)	 1.00 1.00 0.99
70059:										
Goss	Very limited slope (very limited) large surface stones (very limited) droughty (limited)	 1.00 1.00 0.61 	Very limited large surface stones (very limited) slope (very limited) droughty (limited)	 1.00 1.00 0.61 	Very limited slope (very limited) large surface stones (very limited) droughty (limited)	 1.00 1.00 0.61 	Very limited slope (very limited) large surface stones (very limited) large stones (moderately limited)	 1.00 1.00 0.45 	Very limited percs slowly (very limited) slope (very limited) large surface stones (very limited)	 1.00 1.00 1.00
70060:										
Hoberg	Limited percs slowly (limited) wetness (moderately limited) droughty (slightly limited)	 0.99 0.44 0.23 	Limited percs slowly (limited) wetness (moderately limited) droughty (slightly limited)	 0.99 0.44 0.23 	Limited percs slowly (limited) wetness (moderately limited) droughty (slightly limited)	 0.99 0.44 0.23 	Limited percs slowly (limited) wetness (moderately limited)	 0.99 0.44 	Very limited percs slowly (very limited) wetness (very limited) too acid (slightly limited)	 1.00 1.00 0.01
Eldorado	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited) too stony (very limited) too cobbly (limited)	 1.00 0.99 0.81
Pomme	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	 1.00
70061:										
Pomme	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	 1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70062:										
Pomme	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	1.00
Rueter	Limited droughty (limited)	0.79	Limited droughty (limited)	0.79	Limited droughty (limited)	0.79	Not limited		Very limited too cobbly (very limited) percs slowly (moderately limited)	1.00 0.32
70063:										
Rueter	Limited droughty (limited) slope (limited) large stones (moderately limited)	0.99 0.68 0.45	Limited droughty (limited) slope (limited) large stones (moderately limited)	0.99 0.68 0.45	Limited droughty (limited) slope (limited) large stones (moderately limited)	0.99 0.89 0.45	Limited slope (limited) large stones (moderately limited)	0.89 0.45	Very limited slope (very limited) too cobbly (very limited) percs slowly (moderately limited)	1.00 1.00 0.32
70064:										
Rueter	Limited droughty (limited)	0.79	Limited droughty (limited)	0.79	Limited droughty (limited)	0.79	Not limited		Very limited too cobbly (very limited) percs slowly (moderately limited)	1.00 0.32
70065:										
Rueter	Limited droughty (limited)	0.79	Limited droughty (limited)	0.79	Limited droughty (limited) slope (slightly limited)	0.79 0.20	Slightly limited slope (slightly limited)	0.20	Very limited too cobbly (very limited) slope (limited) percs slowly (moderately limited)	1.00 0.66 0.32
70066:										
Winnipeg	Not limited		Not limited		Not limited		Not limited		Very limited percs slowly (very limited)	1.00

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
71751:										
Bearthicket---	Limited flooding (limited)	0.90	Limited flooding (limited)	0.90	Limited flooding (limited)	0.90	Limited flooding (limited)	0.90	Very limited percs slowly (very limited)	1.00
									flooding (moderately limited)	0.60
73031:										
Gerald--------	Limited percs slowly (limited)	0.99	Limited percs slowly (limited)	0.99	Limited percs slowly (limited)	0.99	Limited percs slowly (limited)	0.99	Very limited percs slowly (very limited)	1.00
	wetness (moderately limited)	0.60	wetness (moderately limited)	0.60	wetness (moderately limited)	0.60	wetness (moderately limited)	0.60	wetness (very limited)	1.00
75376:										
Cedargap------	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited flooding (very limited)	1.00	Very limited percs slowly (very limited)	1.00
									flooding (very limited)	1.00
99000:										
Pits----------	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries------	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water---------	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas--	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water--------	Not rated		Not rated		Not rated		Not rated		Not rated	
99005:										
Landfill------	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00
99010:										
Dumps---------	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits----------	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food-processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99011: Kanima	Slightly limited droughty (slightly limited) too acid (slightly limited)	 0.09 0.06 	Slightly limited droughty (slightly limited) too acid (slightly limited)	 0.09 0.06 	Moderately limited slope (moderately limited) droughty (slightly limited) too acid (slightly limited)	 0.30 0.09 0.06	Moderately limited slope (moderately limited) too acid (slightly limited)	 0.30 0.06 	Very limited percs slowly (very limited) slope (limited) too acid (slightly limited)	 1.00 0.91 0.21

Table 19.--Construction Materials and Excavating

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden	Very limited low strength (very limited) shrink-swell (very limited) wetness (slightly limited)	 1.00 1.00 0.12	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Limited too clayey (limited) wetness (slightly limited)	 0.99 0.12	Very limited wetness (very limited) cutbanks cave (slightly limited) too clayey (slightly limited)	 1.00 0.29 0.27
40011:										
Barco	Very limited depth to bedrock (very limited) low strength (very limited)	 1.00 1.00	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Limited depth to bedrock (very limited)	 0.99	Very limited hard bedrock <40" (very limited) cutbanks cave (slightly limited)	 1.00 0.29
40015:										
Eldorado	Limited large stones (limited) low strength (slightly limited) shrink-swell (slightly limited)	 0.96 0.22 0.05	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	 1.00 1.00 0.30	Improbable excess fines (bottom layer) excess fines (thickest layer) small stones (thickest layer)	 1.00 1.00 0.30	Very limited small stones (very limited) large surface stones (moderately limited) too clayey (slightly limited)	 1.00 0.34 0.17	Very limited too clayey (very limited) large stones (limited) cutbanks cave (slightly limited)	 1.00 0.96 0.29
40016:										
Eldorado	Very limited large stones (very limited) low strength (very limited) shrink-swell (slightly limited)	 1.00 1.00 0.04	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	 1.00 1.00 0.30	Possible excess fines (bottom layer) possible source (thickest layer) small stones (thickest layer)	 1.00 0.33 0.30	Very limited small stones (very limited) large stones >25% (very limited) large surface stones (moderately limited)	 1.00 1.00 0.41	Very limited large stones (very limited) too clayey (very limited) cutbanks cave (slightly limited)	 1.00 1.00 0.29
40017:										
Maplegrove	Very limited low strength (very limited) wetness (limited) shrink-swell (slightly limited)	 1.00 0.80 0.10	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Very limited area reclaim (very limited) too clayey (very limited) dense layer (limited)	 1.00 1.00 0.93	Very limited wetness (very limited) cutbanks cave (very limited) too clayey (very limited)	 1.00 1.00 1.00

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40018:										
Medoc	Limited		Improbable		Improbable		Very limited		Very limited	
	wetness	0.99	excess fines	1.00	excess fines	1.00	too clayey	1.00	wetness	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	shrink-swell	0.78	excess fines	1.00	excess fines	1.00	wetness	0.99	too clayey	0.64
	(limited)		(bottom layer)		(thickest layer)		(limited)		(limited)	
							too acid	0.30	cutbanks cave	0.29
							(slightly limited)		(slightly limited)	
40019:										
Newtonia	Slightly limited		Improbable		Improbable		Not limited		Moderately limited	
	shrink-swell	0.12	excess fines	1.00	excess fines	1.00			too clayey	0.30
	(slightly limited)		(thickest layer)		(bottom layer)				(moderately limited)	
			excess fines	1.00	excess fines	1.00			cutbanks cave	0.29
			(bottom layer)		(thickest layer)				(slightly limited)	
Eldorado	Limited		Improbable		Improbable		Very limited		Very limited	
	large stones	0.96	excess fines	1.00	excess fines	1.00	small stones	1.00	too clayey	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	low strength	0.22	excess fines	1.00	excess fines	1.00	too clayey	0.17	large stones	0.96
	(slightly limited)		(bottom layer)		(thickest layer)		(slightly limited)		(limited)	
	shrink-swell	0.05	small stones	0.30	small stones	0.30	area reclaim	0.08	cutbanks cave	0.29
	(slightly limited)		(thickest layer)		(thickest layer)		(slightly limited)		(slightly limited)	
40020:										
Newtonia	Slightly limited		Improbable		Improbable		Moderately limited		Moderately limited	
	shrink-swell	0.20	excess fines	1.00	excess fines	1.00	too clayey	0.33	too clayey	0.30
	(slightly limited)		(thickest layer)		(bottom layer)		(moderately limited)		(moderately limited)	
			excess fines	1.00	excess fines	1.00			cutbanks cave	0.29
			(bottom layer)		(thickest layer)				(slightly limited)	
Eldorado	Limited		Improbable		Improbable		Very limited		Very limited	
	large stones	0.96	excess fines	1.00	excess fines	1.00	small stones	1.00	too clayey	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	low strength	0.22	excess fines	1.00	excess fines	1.00	too clayey	0.17	large stones	0.96
	(slightly limited)		(bottom layer)		(thickest layer)		(slightly limited)		(limited)	
	shrink-swell	0.05	small stones	0.30	small stones	0.30	area reclaim	0.08	cutbanks cave	0.29
	(slightly limited)		(thickest layer)		(thickest layer)		(slightly limited)		(slightly limited)	

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40021:										
Opolis	Very limited low strength (very limited) wetness (limited) shrink-swell (limited)	 1.00 0.88 0.64	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Very limited too clayey (very limited) wetness (limited) slope (moderately limited)	 1.00 0.88 0.37	Very limited wetness (very limited) too clayey (moderately limited) slope (moderately limited)	 1.00 0.57 0.37
Hepler	Limited wetness (limited)	 0.86	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Limited wetness (limited) too clayey (slightly limited) too acid (slightly limited)	 0.86 0.17 0.12	Very limited wetness (very limited) flooding (moderately limited) cutbanks cave (slightly limited)	 1.00 0.60 0.29
40022:										
Opolis	Very limited low strength (very limited) wetness (limited) shrink-swell (limited)	 1.00 0.88 0.64	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Very limited too clayey (very limited) wetness (limited) too acid (slightly limited)	 1.00 0.88 0.06	Very limited wetness (very limited) too clayey (moderately limited) cutbanks cave (slightly limited)	 1.00 0.57 0.29
40023:										
Opolis	Very limited low strength (very limited) wetness (limited) shrink-swell (limited)	 1.00 0.88 0.64	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Very limited too clayey (very limited) wetness (limited) too acid (slightly limited)	 1.00 0.88 0.06	Very limited wetness (very limited) too clayey (moderately limited) cutbanks cave (slightly limited)	 1.00 0.57 0.29
40024:										
Opolis	Very limited low strength (very limited) wetness (limited) shrink-swell (moderately limited)	 1.00 0.88 0.53	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00	Limited wetness (limited) too clayey (moderately limited)	 0.88 0.33	Very limited wetness (very limited) too clayey (moderately limited) cutbanks cave (slightly limited)	 1.00 0.39 0.29

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40026:										
Sylvania	Limited		Improbable		Improbable		Very limited		Very limited	
	wetness	0.71	excess fines (thickest layer)	1.00	excess fines (bottom layer)	1.00	too clayey (very limited)	1.00	cutbanks cave (very limited)	1.00
	(limited)									
	depth to bedrock (moderately limited)	0.39	excess fines (bottom layer)	1.00	excess fines (thickest layer)	1.00	wetness (limited)	0.71	wetness (very limited)	1.00
	shrink-swell (slightly limited)	0.25					too acid (moderately limited)	0.48	too clayey (limited)	0.95
40027:										
Sylvania	Moderately limited		Improbable		Improbable		Very limited		Limited	
	shrink-swell (moderately limited)	0.41	excess fines (thickest layer)	1.00	excess fines (bottom layer)	1.00	too clayey (very limited)	1.00	wetness (limited)	0.97
	depth to bedrock (slightly limited)	0.17	excess fines (bottom layer)	1.00	excess fines (thickest layer)	1.00	too acid (moderately limited)	0.48	too clayey (limited)	0.95
	wetness (slightly limited)	0.00					wetness (slightly limited)	0.00	cutbanks cave (slightly limited)	0.29
40028:										
Sylvania	Limited		Improbable		Improbable		Very limited		Limited	
	depth to bedrock (limited)	0.66	excess fines (thickest layer)	1.00	excess fines (bottom layer)	1.00	too clayey (very limited)	1.00	too clayey (limited)	0.95
	shrink-swell (moderately limited)	0.40	excess fines (bottom layer)	1.00	excess fines (thickest layer)	1.00	too acid (moderately limited)	0.48	wetness (limited)	0.87
							depth to bedrock (slightly limited)	0.26	cutbanks cave (slightly limited)	0.29
40029:										
Sylvania	Limited		Improbable		Improbable		Very limited		Very limited	
	wetness (limited)	0.71	excess fines (thickest layer)	1.00	excess fines (bottom layer)	1.00	too clayey (very limited)	1.00	wetness (very limited)	1.00
	shrink-swell (moderately limited)	0.45	excess fines (bottom layer)	1.00	excess fines (thickest layer)	1.00	wetness (limited)	0.71	too clayey (limited)	0.95
	depth to bedrock (slightly limited)	0.25					too acid (moderately limited)	0.48	slope (moderately limited)	0.37
44000:										
Cherokee	Limited		Improbable		Improbable		Very limited		Very limited	
	wetness (limited)	0.99	excess fines (thickest layer)	1.00	excess fines (bottom layer)	1.00	too clayey (very limited)	1.00	wetness (very limited)	1.00
	shrink-swell (limited)	0.70	excess fines (bottom layer)	1.00	excess fines (thickest layer)	1.00	wetness (limited)	0.99	too clayey (moderately limited)	0.57
							too acid (moderately limited)	0.54	cutbanks cave (slightly limited)	0.29

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44002:										
Carl	Very limited shrink-swell (very limited) wetness (very limited)	 1.00 1.00 	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Very limited wetness (very limited) too clayey (very limited)	 1.00 1.00 	Very limited wetness (very limited) cutbanks cave (very limited) too clayey (moderately limited)	 1.00 1.00 0.51
44004:										
McCune	Limited wetness (limited) shrink-swell (slightly limited)	 0.86 0.23 	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00 	Limited wetness (limited) too clayey (moderately limited) too acid (slightly limited)	 0.86 0.33 0.24 	Very limited wetness (very limited) cutbanks cave (slightly limited)	 1.00 0.29
46001:										
Verdigris	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00 	Slightly limited too clayey (slightly limited)	 0.25 	Moderately limited flooding (moderately limited) cutbanks cave (slightly limited)	 0.60 0.29
46002:										
Hepler	Limited wetness (limited)	 0.86 	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00 	Limited wetness (limited) too clayey (slightly limited) too acid (slightly limited)	 0.86 0.17 0.12 	Very limited wetness (very limited) flooding (moderately limited) cutbanks cave (slightly limited)	 1.00 0.60 0.29
46004:										
Osage	Very limited shrink-swell (very limited) wetness (very limited)	 1.00 1.00 	Improbable excess fines (thickest layer) excess fines (bottom layer)	 1.00 1.00 	Improbable excess fines (bottom layer) excess fines (thickest layer)	 1.00 1.00 	Very limited wetness (very limited) too clayey (very limited)	 1.00 1.00 	Very limited wetness (very limited) cutbanks cave (very limited) flooding (moderately limited)	 1.00 1.00 0.60

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46005:										
Verdigris-----	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	1.00 1.00	Slightly limited too clayey (slightly limited)	0.25	Moderately limited flooding (moderately limited) cutbanks cave (slightly limited)	0.60 0.29
70006:										
Creldon-------	Very limited low strength (very limited) shrink-swell (moderately limited) wetness (slightly limited)	1.00 0.45 0.26	Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible excess fines (thickest layer) excess fines (bottom layer)	1.00 0.99	Very limited too clayey (very limited) dense layer (limited) wetness (slightly limited)	1.00 0.93 0.26	Very limited cutbanks cave (very limited) wetness (very limited) too clayey (very limited)	1.00 1.00 1.00
70012:										
Hoberg--------	Very limited low strength (very limited) wetness (moderately limited)	1.00 0.48	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (bottom layer)	1.00 1.00 0.66	Possible excess fines (thickest layer) small stones (bottom layer) possible source (bottom layer)	1.00 0.66 0.42	Limited dense layer (limited) wetness (moderately limited) small stones (slightly limited)	0.95 0.48 0.12	Very limited wetness (very limited) dense layer (limited) too clayey (moderately limited)	1.00 0.95 0.57
70045:										
Keeno---------	Moderately limited wetness (moderately limited) large stones (slightly limited)	0.48 0.00	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (bottom layer)	1.00 1.00 0.10	Possible possible source (bottom layer) possible source (thickest layer) small stones (bottom layer)	0.42 0.42 0.10	Very limited small stones (very limited) dense layer <20" (very limited) too clayey (limited)	1.00 1.00 0.67	Very limited cutbanks cave (very limited) wetness (very limited) dense layer <20" (very limited)	1.00 1.00 1.00
70056:										
Crackerneck---	Moderately limited large stones (moderately limited) shrink-swell (slightly limited) wetness (slightly limited)	0.58 0.22 0.15	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	1.00 1.00 0.83	Possible excess fines (bottom layer) small stones (thickest layer) small stones (bottom layer)	0.99 0.83 0.83	Very limited small stones (very limited) too clayey (very limited) area reclaim (very limited)	1.00 1.00 1.00	Very limited cutbanks cave (very limited) wetness (very limited) too clayey (limited)	1.00 1.00 0.79

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70057:										
Crackerneck---	Limited		Improbable		Possible		Very limited		Very limited	
	slope	0.92	excess fines	1.00	excess fines	0.99	slope	1.00	slope	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	large stones	0.58	excess fines	1.00	small stones	0.83	small stones	1.00	cutbanks cave	1.00
	(moderately limited)		(bottom layer)		(thickest layer)		(very limited)		(very limited)	
	shrink-swell	0.22	small stones	0.83	small stones	0.83	too clayey	1.00	wetness	1.00
	(slightly limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
70058:										
Crackerneck---	Slightly limited		Improbable		Possible		Very limited		Very limited	
	large stones	0.18	excess fines	1.00	excess fines	1.00	small stones	1.00	cutbanks cave	1.00
	(slightly limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	wetness	0.15	excess fines	1.00	small stones	0.83	area reclaim	1.00	wetness	1.00
	(slightly limited)		(bottom layer)		(thickest layer)		(very limited)		(very limited)	
	shrink-swell	0.12	small stones	0.83	possible source	0.25	too acid	0.36	too clayey	0.79
	(slightly limited)		(thickest layer)		(thickest layer)		(moderately limited)		(limited)	
70059:										
Goss----------	Very limited		Improbable		Possible		Very limited		Very limited	
	low strength	1.00	excess fines	1.00	excess fines	0.60	slope	1.00	slope	1.00
	(very limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	slope	0.92	excess fines	1.00	excess fines	0.60	small stones	1.00	cutbanks cave	1.00
	(limited)		(bottom layer)		(thickest layer)		(very limited)		(very limited)	
	large stones	0.25					area reclaim	1.00	too clayey	1.00
	(slightly limited)						(very limited)		(very limited)	
70060:										
Hoberg--------	Moderately limited		Improbable		Improbable		Very limited		Very limited	
	wetness	0.48	excess fines	1.00	excess fines	1.00	small stones	1.00	cutbanks cave	1.00
	(moderately limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
			excess fines	1.00	excess fines	1.00	dense layer	0.99	wetness	1.00
			(bottom layer)		(thickest layer)		(limited)		(very limited)	
							too clayey	0.50	dense layer	0.99
							(moderately limited)		(limited)	
Eldorado------	Limited		Improbable		Improbable		Very limited		Very limited	
	large stones	0.96	excess fines	1.00	excess fines	1.00	small stones	1.00	too clayey	1.00
	(limited)		(thickest layer)		(bottom layer)		(very limited)		(very limited)	
	low strength	0.22	excess fines	1.00	excess fines	1.00	too clayey	0.17	large stones	0.96
	(slightly limited)		(bottom layer)		(thickest layer)		(slightly limited)		(limited)	
	shrink-swell	0.05	small stones	0.30	small stones	0.30	area reclaim	0.08	cutbanks cave	0.29
	(slightly limited)		(thickest layer)		(thickest layer)		(slightly limited)		(slightly limited)	

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70060:										
Pomme	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible possible source (bottom layer) possible source (thickest layer)	0.43 0.43	Very limited small stones (very limited) area reclaim (very limited) too clayey (slightly limited)	1.00 1.00 0.25	Very limited cutbanks cave (very limited) too clayey (limited)	1.00 0.72
70061:										
Pomme	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible possible source (bottom layer) possible source (thickest layer)	0.43 0.43	Very limited small stones (very limited) area reclaim (very limited) too clayey (slightly limited)	1.00 1.00 0.25	Very limited cutbanks cave (very limited) too clayey (limited)	1.00 0.72
70062:										
Pomme	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible possible source (bottom layer) possible source (thickest layer)	0.43 0.43	Very limited small stones (very limited) area reclaim (very limited) too clayey (slightly limited)	1.00 1.00 0.25	Very limited cutbanks cave (very limited) too clayey (limited)	1.00 0.72
Rueter	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	 0.52 0.18	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	 1.00 1.00 0.83	Possible small stones (thickest layer) small stones (bottom layer) possible source (thickest layer)	 0.83 0.66 0.37	Very limited area reclaim (very limited) small stones (very limited) large stones (slightly limited)	 1.00 1.00 0.30	Very limited cutbanks cave (very limited) too clayey (very limited) large stones (moderately limited)	 1.00 1.00 0.52
70063:										
Rueter	Limited large stones (limited) shrink-swell (slightly limited)	 0.80 0.25	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	 1.00 1.00 0.66	Possible small stones (thickest layer) small stones (bottom layer) possible source (thickest layer)	 0.66 0.66 0.37	Very limited area reclaim (very limited) small stones (very limited) large stones >25% (very limited)	 1.00 1.00 1.00	Very limited cutbanks cave (very limited) too clayey (very limited) large stones (limited)	 1.00 1.00 0.80

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70064:										
Rueter	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	0.52 0.18	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	1.00 1.00 0.83	Possible small stones (thickest layer) small stones (bottom layer) possible source (thickest layer)	0.83 0.66 0.37	Very limited area reclaim (very limited) small stones (very limited) large stones (slightly limited)	1.00 1.00 0.30	Very limited cutbanks cave (very limited) too clayey (very limited) large stones (moderately limited)	1.00 1.00 0.52
70065:										
Rueter	Moderately limited large stones (moderately limited) shrink-swell (slightly limited)	0.52 0.18	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	1.00 1.00 0.83	Possible small stones (thickest layer) small stones (bottom layer) possible source (thickest layer)	0.83 0.66 0.37	Very limited area reclaim (very limited) small stones (very limited) large stones (slightly limited)	1.00 1.00 0.30	Very limited cutbanks cave (very limited) too clayey (very limited) large stones (moderately limited)	1.00 1.00 0.52
70066:										
Winnipeg	Very limited low strength (very limited)	1.00	Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible excess fines (thickest layer) excess fines (bottom layer)	1.00 0.75	Moderately limited too clayey (moderately limited)	0.42	Very limited cutbanks cave (very limited) too clayey (slightly limited)	1.00 0.24
71751:										
Bearthicket	Very limited low strength (very limited)	1.00	Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible excess fines (thickest layer) excess fines (bottom layer)	1.00 0.60	Slightly limited too clayey (slightly limited)	0.17	Very limited cutbanks cave (very limited) flooding (moderately limited)	1.00 0.60
73031:										
Gerald	Very limited low strength (very limited) wetness (limited)	1.00 0.86	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (bottom layer)	1.00 1.00 0.10	Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (bottom layer)	1.00 1.00 0.10	Very limited too clayey (very limited) wetness (limited)	1.00 0.86	Very limited wetness (very limited) cutbanks cave (very limited) too clayey (very limited)	1.00 1.00 1.00

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
75376:										
Cedargap	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	1.00 1.00 0.30	Possible excess fines (thickest layer) excess fines (bottom layer) small stones (thickest layer)	0.84 0.55 0.30	Very limited small stones (very limited) area reclaim (very limited) too clayey (moderately limited)	1.00 1.00 0.50	Very limited cutbanks cave (very limited) flooding (moderately limited)	1.00 0.60
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005:										
Landfill	Very limited slope (very limited) low strength (very limited)	1.00 1.00	Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Improbable excess fines (bottom layer) excess fines (thickest layer)	1.00 1.00	Very limited slope (very limited)	1.00	Very limited slope (very limited)	1.00
99010:										
Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011:										
Kanima	Not limited		Improbable excess fines (thickest layer) excess fines (bottom layer)	1.00 1.00	Possible excess fines (bottom layer) excess fines (thickest layer)	0.79 0.60	Very limited small stones (very limited) area reclaim (very limited) too acid (limited)	1.00 1.00 0.60	Slightly limited cutbanks cave (slightly limited)	0.29

Table 20.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40000:										
Barden--------	Not limited		Moderately limited percs slowly (moderately limited)	0.39	Moderately limited percs slowly (moderately limited)	0.39	Slightly limited wetness (slightly limited)	0.28	Slightly limited wetness (slightly limited)	0.28
40011:										
Barco---------	Limited depth to bedrock (limited) seepage (moderately limited)	0.85 0.50	Slightly limited depth to bedrock (slightly limited)	0.30	Slightly limited depth to bedrock (slightly limited)	0.30	Very limited depth to bedrock (very limited)	1.00	Limited depth to bedrock (limited)	0.85
40015:										
Eldorado------	Moderately limited seepage (moderately limited)	0.50	Very limited large stones (very limited) large surface stones (moderately limited)	1.00 0.34	Limited large stones (limited) large surface stones (moderately limited)	0.96 0.34	Very limited large stones (very limited) large surface stones (moderately limited)	1.00 0.34	Very limited large stones (very limited) large surface stones (moderately limited)	1.00 0.34
40016:										
Eldorado------	Moderately limited seepage (moderately limited) slope (slightly limited)	0.50 0.20	Very limited large stones (very limited) slope (limited) large surface stones (moderately limited)	1.00 0.78 0.41	Very limited large stones (very limited) droughty (limited) slope (limited)	1.00 0.83 0.78	Very limited large stones (very limited) large surface stones (moderately limited) slope (slightly limited)	1.00 0.41 0.20	Very limited large stones (very limited) droughty (limited) large surface stones (moderately limited)	1.00 0.83 0.41
40017:										
Maplegrove----	Moderately limited seepage (moderately limited)	0.50	Slightly limited large stones (slightly limited percs slowly (slightly limited)	0.30 0.13	Slightly limited percs slowly (slightly limited)	0.13	Moderately limited wetness (moderately limited)	0.57	Moderately limited wetness (moderately limited)	0.57
40018:										
Medoc---------	Not limited		Moderately limited percs slowly (moderately limited)	0.39	Moderately limited percs slowly (moderately limited)	0.39	Limited wetness (limited)	0.89	Limited wetness (limited)	0.89

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40019:										
Newtonia	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
Eldorado	Moderately limited seepage (moderately limited)	0.50	Very limited large stones (very limited)	1.00	Limited large stones (limited)	0.96	Very limited large stones (very limited)	1.00	Very limited large stones (very limited)	1.00
40020:										
Newtonia	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
Eldorado	Moderately limited seepage (moderately limited)	0.50	Very limited large stones (very limited)	1.00	Limited large stones (limited)	0.96	Very limited large stones (very limited)	1.00	Very limited large stones (very limited)	1.00
40021:										
Opolis	Limited slope (limited)	0.89	Very limited slope (very limited) percs slowly (moderately limited)	1.00 0.40	Very limited slope (very limited) percs slowly (moderately limited)	1.00 0.40	Limited slope (limited) wetness (limited)	0.89 0.63	Limited slope (limited) wetness (limited)	0.89 0.63
Hepler	Not limited		Moderately limited flooding (moderately limited) percs slowly (slightly limited)	0.60 0.17	Moderately limited flooding (moderately limited) percs slowly (slightly limited)	0.60 0.17	Moderately limited wetness (moderately limited)	0.60	Moderately limited wetness (moderately limited)	0.60
40022:										
Opolis	Not limited		Moderately limited percs slowly (moderately limited)	0.40	Moderately limited percs slowly (moderately limited)	0.40	Limited wetness (limited)	0.63	Limited wetness (limited)	0.63
40023:										
Opolis	Not limited		Moderately limited percs slowly (moderately limited)	0.40	Moderately limited percs slowly (moderately limited)	0.40	Limited wetness (limited)	0.63	Limited wetness (limited)	0.63
40024:										
Opolis	Not limited		Moderately limited percs slowly (moderately limited)	0.40	Moderately limited percs slowly (moderately limited)	0.40	Limited wetness (limited)	0.63	Limited wetness (limited)	0.63

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40026:										
Sylvania------	Moderately limited		Slightly limited		Slightly limited		Moderately limited		Moderately limited	
	seepage	0.50	percs slowly	0.13	percs slowly	0.13	wetness	0.53	wetness	0.53
	(moderately limited)		(slightly limited)		(slightly limited)		(moderately limited)		(moderately limited)	
	depth to bedrock	0.50					depth to bedrock	0.39	depth to bedrock	0.50
	(moderately limited)						(moderately limited)		(moderately limited)	
40027:										
Sylvania------	Moderately limited		Limited		Limited		Slightly limited		Moderately limited	
	depth to bedrock	0.37	slope	0.78	slope	0.78	slope	0.20	depth to bedrock	0.37
	(moderately limited)		(limited)		(limited)		(slightly limited)		(moderately limited)	
	seepage	0.32	percs slowly	0.13	percs slowly	0.13	depth to bedrock	0.17	slope	0.20
	(moderately limited)		(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)	
	slope	0.20					wetness	0.04	wetness	0.04
	(slightly limited)						(slightly limited)		(slightly limited)	
40028:										
Sylvania------	Limited		Limited		Limited		Limited		Limited	
	depth to bedrock	0.65	slope	0.78	slope	0.78	depth to bedrock	0.66	depth to bedrock	0.65
	(limited)		(limited)		(limited)		(limited)		(limited)	
	seepage	0.32	percs slowly	0.13	percs slowly	0.13	slope	0.20	slope	0.20
	(moderately limited)		(slightly limited)		(slightly limited)		(slightly limited)		(slightly limited)	
	slope	0.20								
	(slightly limited)									
40029:										
Sylvania------	Limited		Very limited		Very limited		Limited		Limited	
	slope	0.89	slope	1.00	slope	1.00	slope	0.89	slope	0.89
	(limited)		(very limited)		(very limited)		(limited)		(limited)	
	depth to bedrock	0.40	percs slowly	0.13	percs slowly	0.13	wetness	0.53	wetness	0.53
	(moderately limited)		(slightly limited)		(slightly limited)		(moderately limited)		(moderately limited)	
							depth to bedrock	0.25	depth to bedrock	0.40
							(slightly limited)		(moderately limited)	
44000:										
Cherokee------	Not limited		Moderately limited		Moderately limited		Limited		Limited	
			percs slowly	0.40	percs slowly	0.40	wetness	0.89	wetness	0.89
			(moderately limited)		(moderately limited)		(limited)		(limited)	
44002:										
Carl----------	Not limited		Very limited		Very limited		Very limited		Very limited	
			percs slowly	1.00	percs slowly	1.00	wetness	1.00	wetness	1.00
			(very limited)		(very limited)		(very limited)		(very limited)	
					slow intake	0.60				
					(moderately limited)					

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44004:										
McCune	Not limited		Moderately limited percs slowly (moderately limited)	0.39	Moderately limited percs slowly (moderately limited)	0.39	Moderately limited wetness (moderately limited)	0.60	Moderately limited wetness (moderately limited)	0.60
46001:										
Verdigris	Moderately limited seepage (moderately limited)	0.50	Limited flooding (limited)	0.90	Limited flooding (limited)	0.90	Not limited		Not limited	
46002:										
Hepler	Not limited		Moderately limited flooding (moderately limited) percs slowly (slightly limited)	0.60 0.17	Moderately limited flooding (moderately limited) percs slowly (slightly limited)	0.60 0.17	Moderately limited wetness (moderately limited)	0.60	Moderately limited wetness (moderately limited)	0.60
46004:										
Osage	Not limited		Very limited percs slowly (very limited) flooding (moderately limited)	1.00 0.60	Very limited percs slowly (very limited) flooding (moderately limited) slow intake (moderately limited)	1.00 0.60 0.60	Very limited wetness (very limited)	1.00	Very limited wetness (very limited)	1.00
46005:										
Verdigris	Moderately limited seepage (moderately limited)	0.50	Moderately limited flooding (moderately limited)	0.60	Moderately limited flooding (moderately limited)	0.60	Not limited		Not limited	
70006:										
Creldon	Moderately limited seepage (moderately limited)	0.50	Slightly limited percs slowly (slightly limited) slope (slightly limited)	0.13 0.10	Slightly limited percs slowly (slightly limited) slope (slightly limited)	0.13 0.10	Moderately limited wetness (moderately limited)	0.36	Limited rooting depth (limited) wetness (moderately limited)	0.80 0.36
70012:										
Hoberg	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Moderately limited wetness (moderately limited)	0.44	Limited rooting depth (limited) wetness (moderately limited)	0.80 0.44

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70045:										
Keeno	Very limited seepage (very limited) slope (moderately limited)	 1.00 0.30 	Limited slope (limited) large stones (limited	 0.98 0.65 	Very limited droughty (very limited) slope (limited) large stones (slightly limited)	 1.00 0.98 0.01 	Very limited large stones (very limited) wetness (moderately limited) slope (moderately limited)	 1.00 0.44 0.30 	Very limited droughty (very limited) large stones (very limited) rooting depth (limited)	 1.00 1.00 0.80
70056:										
Crackerneck	Limited slope (limited) seepage (moderately limited)	 0.89 0.50 	Very limited slope (very limited) large stones (very limited) percs slowly (slightly limited)	 1.00 1.00 0.26 	Very limited slope (very limited) droughty (very limited) large stones (moderately limited)	 1.00 1.00 0.58 	Very limited large stones (very limited) slope (limited) wetness (moderately limited)	 1.00 0.89 0.31 	Very limited large stones (very limited) droughty (very limited) slope (limited)	 1.00 1.00 0.89
70057:										
Crackerneck	Very limited slope (very limited) seepage (moderately limited)	 1.00 0.50 	Very limited slope (very limited) large stones (very limited) percs slowly (slightly limited)	 1.00 1.00 0.26 	Very limited slope (very limited) droughty (very limited) large stones (moderately limited)	 1.00 1.00 0.58 	Very limited slope (very limited) large stones (very limited) wetness (moderately limited)	 1.00 1.00 0.31 	Very limited slope (very limited) large stones (very limited) droughty (very limited)	 1.00 1.00 1.00
70058:										
Crackerneck	Moderately limited seepage (moderately limited) slope (slightly limited)	 0.50 0.20 	Limited large stones (limited slope (limited) percs slowly (slightly limited)	 0.99 0.78 0.26 	Limited droughty (limited) slope (limited) percs slowly (slightly limited)	 0.88 0.78 0.26 	Very limited large stones (very limited) wetness (moderately limited) slope (slightly limited)	 1.00 0.31 0.20 	Very limited large stones (very limited) droughty (limited) wetness (moderately limited)	 1.00 0.88 0.31
70059:										
Goss	Very limited slope (very limited) seepage (very limited)	 1.00 1.00 	Very limited slope (very limited) large surface stones (very limited) large stones (limited	 1.00 1.00 0.75 	Very limited slope (very limited) large surface stones (very limited) droughty (limited)	 1.00 1.00 0.61 	Very limited slope (very limited) large surface stones (very limited) large stones (very limited)	 1.00 1.00 1.00 	Very limited slope (very limited) large stones (very limited) large surface stones (very limited)	 1.00 1.00 1.00

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70060:										
Hoberg	Moderately limited seepage (moderately limited)	0.50	Moderately limited large stones (moderately limited) percs slowly (moderately limited)	0.51 0.39	Moderately limited percs slowly (moderately limited) droughty (slightly limited)	0.39 0.23	Moderately limited wetness (moderately limited) large stones (slightly limited)	0.44 0.04	Limited rooting depth (limited) wetness (moderately limited) droughty (slightly limited)	0.80 0.44 0.23
Eldorado	Moderately limited seepage (moderately limited)	0.50	Very limited large stones (very limited)	1.00	Limited large stones (limited)	0.96	Very limited large stones (very limited)	1.00	Very limited large stones (very limited)	1.00
Pomme	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
70061:										
Pomme	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
70062:										
Pomme	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
Rueter	Very limited seepage (very limited)	1.00	Very limited large stones (very limited)	1.00	Limited droughty (limited) large stones (moderately limited)	0.79 0.52	Very limited large stones (very limited)	1.00	Very limited large stones (very limited) droughty (limited)	1.00 0.79
70063:										
Rueter	Very limited seepage (very limited) slope (limited)	1.00 0.89	Very limited slope (very limited) large stones (very limited)	1.00 1.00	Very limited slope (very limited) droughty (limited) large stones (limited)	1.00 0.99 0.80	Very limited large stones (very limited) slope (limited)	1.00 0.89	Very limited large stones (very limited) droughty (limited) slope (limited)	1.00 0.99 0.89

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
70064:										
Rueter	Very limited seepage (very limited)	1.00	Very limited large stones (very limited)	1.00	Limited droughty (limited) large stones (moderately limited)	0.79 0.52	Very limited large stones (very limited)	1.00	Very limited large stones (very limited) droughty (limited)	1.00 0.79
70065:										
Rueter	Very limited seepage (very limited) slope (slightly limited)	1.00 0.20	Very limited large stones (very limited) slope (limited)	1.00 0.78	Limited droughty (limited) slope (limited) large stones (moderately limited)	0.79 0.78 0.52	Very limited large stones (very limited) slope (slightly limited)	1.00 0.20	Very limited large stones (very limited) droughty (limited) slope (slightly limited)	1.00 0.79 0.20
70066:										
Winnipeg	Moderately limited seepage (moderately limited)	0.50	Not limited		Not limited		Not limited		Not limited	
71751:										
Bearthicket	Moderately limited seepage (moderately limited)	0.50	Moderately limited flooding (moderately limited)	0.60	Moderately limited flooding (moderately limited)	0.60	Not limited		Not limited	
73031:										
Gerald	Moderately limited seepage (moderately limited)	0.50	Very limited percs slowly (very limited)	1.00	Very limited percs slowly (very limited)	1.00	Moderately limited wetness (moderately limited)	0.60	Moderately limited wetness (moderately limited)	0.60
75376:										
Cedargap	Moderately limited seepage (moderately limited)	0.50	Limited flooding (limited)	0.90	Limited flooding (limited)	0.90	Not limited		Not limited	
99000:										
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
Quarries	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water	Not rated		Not rated		Not rated		Not rated		Not rated	
99002:										
Borrow areas	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
99003: Miscellaneous water	Not rated		Not rated		Not rated		Not rated		Not rated	
99005: Landfill	Very limited slope (very limited) seepage (very limited)	1.00 1.00	Very limited slope (very limited) percs slowly (very limited)	1.00 1.00	Very limited percs slowly (very limited) slope (very limited)	1.00 1.00	Very limited slope (very limited) erodes easily (moderately limited)	1.00 0.60	Very limited slope (very limited) erodes easily (moderately limited)	1.00 0.60
99010: Dumps	Not rated		Not rated		Not rated		Not rated		Not rated	
Pits	Not rated		Not rated		Not rated		Not rated		Not rated	
99011: Kanima	Moderately limited seepage (moderately limited) slope (moderately limited)	0.50 0.30	Limited slope (limited)	0.98	Limited slope (limited) droughty (slightly limited)	0.98 0.09	Moderately limited slope (moderately limited)	0.30	Moderately limited slope (moderately limited) droughty (slightly limited)	0.30 0.09

Table 21.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated. For an explanation of the abbreviations in the USDA texture column, see "Texture, soil" in the Glossary.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
40000:												
Barden	0-10	SIL	CL	A-4, A-6	0	0	100	100	90-100	75-85	25-35	8-15
	10-47	SIC, SICL, CL	CL, CH	A-7	0	0	100	100	90-100	80-95	40-60	25-40
	47-80	SICL, CL, SCL	CL	A-6, A-7	0	0	100	70-100	45-100	40-90	30-45	15-25
40011:												
Barco	0-11	L	CL, SC	A-4, A-6	0	0	100	100	85-95	45-75	22-35	8-14
	11-17	L	CL, SC	A-4, A-6	0	0	100	100	85-95	45-75	22-35	8-14
	17-22	L, SCL, CL	CL, SC	A-6	0	0-5	85-100	85-100	75-100	45-80	25-40	11-22
	22-30	FSL	GW-GC	A-2-4	0	0	15-30	10-25	10-20	5-15	17-30	NP-11
	30-60	WB	---	---	---	---	---	---	---	---	---	---
40015:												
Eldorado	0-7	SIL	CL, ML	A-4	0-7	0-8	80-100	75-100	70-95	68-90	16-30	3-11
	7-20	CBV-SIL, STV-SIL, ST-SIL	GC	A-4	5-30	5-40	51-95	45-90	40-85	40-80	21-30	6-11
	20-33	CBX-SIL, CBV-SIL, CBX-SICL, CBV-SICL	GC	A-2, A-6	10-40	30-45	20-75	15-70	15-65	15-60	21-43	6-18
	33-80	CBV-C, CB-C, GRV-C, GR-C	GC	A-7	0-30	15-55	51-100	45-100	40-95	40-95	45-86	18-42
40016:												
Eldorado	0-6	GRV-SIL	GC	A-6, A-4	0	10-40	55-75	45-65	45-65	40-60	15-30	3-11
	6-15	CBX-SIL, CBV-SIL	GC	A-2-6, A-2-4	0-1	55-65	35-55	30-50	30-50	30-45	20-30	6-11
	15-34	CBX-SIL, CBV-SIL, CBX-SICL, CBV-SICL	GC	A-2-6, A-2-7	0-25	55-65	10-50	5-45	5-45	5-40	20-45	6-18
	34-64	CBV-C, CB-C, GR-C, GRV-C	GC, CH	A-7	0-30	15-55	51-100	45-100	40-95	40-95	43-86	18-42
	64	UWB	---	---	---	---	---	---	---	---	---	---
40017:												
Maplegrove	0-11	SIL	CL-ML	A-4	0	0	100	95-100	90-95	85-90	18-23	4-7
	11-27	SICL, SIC	CH	A-7	0	0-2	80-100	70-100	70-100	65-95	40-67	20-41
	27-46	GR-SICL, SICL	CL	A-6, A-7	0	0-25	70-100	65-100	60-95	60-90	32-48	12-25
	46-80	GRV-C, GRX-C	GC	A-7, A-2-7	0-23	0-25	20-70	10-65	10-60	10-60	55-88	31-56

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
40018:												
Medoc	0-9	SIL	CL-ML, ML	A-4	0	0	100	100	95-100	83-95	14-21	2-6
	9-13	SIL	CL-ML, ML	A-4	0	0	100	100	90-100	80-95	16-25	3-8
	13-32	C, SIC	CH	A-7-6	0	0	100	100	95-100	90-100	52-73	29-46
	32-75	SICL	CL	A-6, A-7-6	0	0	100	100	85-100	80-100	37-48	17-25
	75-80	SICL	CL	A-7-6	0	0	100	100	100	95-100	43-48	21-25
40019:												
Newtonia	0-15	SIL	CL	A-4, A-6	0	0	100	100	95-100	65-100	20-30	5-14
	15-29	SIL, SICL	CL	A-4, A-6	0	0	100	90-100	85-100	80-100	30-44	9-22
	29-80	SICL, SIC, C	CH, CL	A-6, A-7	0	0	90-100	85-100	80-100	70-100	39-60	15-34
Eldorado	0-7	SIL	CL, ML	A-4	0-7	0-8	80-100	75-100	70-100	70-90	16-30	3-11
	7-20	CBV-SIL, STV-SIL, ST-SIL	GC	A-4	5-30	5-40	51-95	45-90	40-85	40-80	21-30	6-11
	20-33	CBX-SIL, CBV-SIL, CBX-SICL, CBV-SICL	GC	A-2, A-6	10-40	30-45	20-75	15-70	15-65	15-60	21-43	6-18
	33-80	CBV-C, CB-C, GRV-C, GR-C	GC	A-7	0-30	15-55	51-100	45-100	40-95	40-95	43-85	18-42
40020:												
Newtonia	0-8	SIL	CL	A-4, A-6	0	0	100	100	95-100	65-100	20-30	5-15
	8-24	SIL, SICL	CL	A-4, A-6	0	0	100	90-100	85-100	80-100	30-44	9-22
	24-80	SICL, SIC, C	CH, CL	A-6, A-7	0	0	90-100	85-100	80-100	70-100	39-60	15-34
Eldorado	0-7	SIL	CL, ML	A-4	0-7	0-8	80-100	75-100	70-100	70-90	16-30	3-11
	7-20	CBV-SIL, STV-SIL, ST-SIL	GC	A-4	5-30	5-40	51-95	45-90	40-85	40-80	21-30	6-11
	20-33	CBX-SIL, CBV-SIL, CBX-SICL, CBV-SICL	GC	A-2, A-6	10-40	30-45	20-75	15-70	15-65	15-60	21-43	6-18
	33-80	CBV-C, CB-C, GRV-C, GR-C	GC	A-7	0-30	15-55	51-100	45-100	40-95	40-95	43-85	18-42
40021:												
Opolis	0-8	SIL	CL-ML	A-4	0	0	100	97-100	90-100	80-95	15-21	2-6
	8-15	SIL	CL-ML	A-4	0	0	100	90-100	90-100	80-90	15-29	2-10
	15-30	SIC, C	CH, CL	A-7-6	0	0	100	90-100	85-100	85-100	45-73	23-46
	30-70	SICL	CL	A-6	0	0	100	90-100	85-100	80-90	34-48	15-25
	70-80	SIC	CL, CH	A-7-6, A-6	0	0	100	100	90-100	85-100	39-57	18-30
Hepler	0-8	SIL	CL-ML	A-4	0	0	100	100	90-100	85-100	20-23	5-7
	8-18	SIL	CL-ML	A-4	0	0	100	100	90-100	85-100	18-21	4-6
	18-48	SICL, SIL	CL	A-6, A-4	0	0	100	100	90-100	85-100	20-38	5-15
	48-80	SICL, SIC	CL	A-7-6, A-6	0	0	100	100	95-100	85-100	34-47	15-20

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
40022:												
Opolis----------	0-8	SIL	CL-ML	A-4	0	0	100	97-100	90-100	80-95	15-21	2-6
	8-15	SIL	CL-ML	A-4	0	0	100	90-100	90-100	80-90	15-29	2-10
	15-30	SIC, C	CH, CL	A-7-6	0	0	100	90-100	85-100	85-100	45-73	23-46
	30-70	SICL	CL	A-6	0	0	100	90-100	85-100	80-90	34-48	15-25
	70-80	SIC	CL, CH	A-7-6, A-6	0	0	100	100	90-100	85-100	39-57	18-30
40023:												
Opolis----------	0-8	SIL	CL-ML	A-4	0	0	100	97-100	90-100	80-95	15-21	2-6
	8-15	SIL	CL-ML	A-4	0	0	100	90-100	90-100	80-90	15-29	2-10
	15-30	SIC, C	CH, CL	A-7-6	0	0	100	90-100	85-100	85-100	45-73	23-46
	30-70	SICL	CL	A-6	0	0	100	90-100	85-100	80-90	34-48	15-25
	70-80	SIC	CL, CH	A-7-6, A-6	0	0	100	100	90-100	85-100	39-57	18-30
40024:												
Opolis----------	0-6	L	ML, CL-ML, CL	A-4	0	0	100	97-100	85-100	60-75	16-25	3-8
	6-14	SIC, C	CH, CL	A-7-6	0	0	100	85-100	85-100	75-95	47-60	25-35
	14-35	SICL, CL	CL	A-6	0	0	100	90-100	85-100	60-90	37-40	17-19
	35-72	CL	CL	A-7-6, A-6	0	0	100	100	90-100	70-80	37-43	17-21
40026:												
Sylvania--------	0-6	GR-SIL	CL-ML, CL	A-4	0	0-2	65-95	60-90	55-85	50-75	20-30	5-12
	6-20	GR-SIL, GRV-SIL	GC	A-2-6, A-4, A-2-4	0	0-2	30-65	25-60	25-60	20-50	20-30	5-12
	20-23	GRV-SIC, GRX-SIC	GC	A-2-7	0	0-2	10-55	5-50	5-45	5-45	47-50	20-23
	23-52	C, SIC	CL, CH	A-7	0	0-2	90-100	85-100	85-100	80-95	43-74	18-35
	52-80	WB			---	---	---	---	---	---	---	---
40027:												
Sylvania--------	0-5	GRV-SIL	GC	A-4, A-2-4	0	0-2	35-60	30-50	28-45	25-40	20-30	5-12
	5-12	GR-SIL, GRX-SIL, GRV-SIL	GC	A-2-6, A-2-4	0	0-2	15-65	10-60	10-55	10-50	20-30	5-12
	12-19	GRV-SIC, GRX-SIC	GC	A-7-6, A-2-7	0	0-2	10-55	10-50	10-45	10-45	47-50	20-23
	19-57	C, SIC	CL, CH	A-7	0	0-2	90-100	85-100	80-100	80-95	43-74	18-35
	57-80	WB			---	---	---	---	---	---	---	---
40028:												
Sylvania--------	0-7	L	CL, CL-ML	A-4	0	0-8	75-100	75-100	70-90	50-65	20-35	2-15
	7-12	CL	CL, CL-ML	A-4	0	0-10	75-100	75-100	70-95	55-75	20-35	2-15
	12-44	C, SIC	CL, CH	A-7	0	0-2	90-100	85-100	85-100	80-95	43-74	18-35
	44-60	WB			---	---	---	---	---	---	---	---

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
40029:												
Sylvania	0-8	L	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-95	50-90	20-35	2-15
	8-30	C, SIC	CL, CH	A-7	0	0-2	90-100	85-100	85-100	80-95	43-74	18-35
	30-56	C, SIC	CL, CH	A-7-6	0	0	100	100	55-100	55-95	45-70	25-45
	56-80	WB			---	---	---	---	---	---	---	---
44000:												
Cherokee	0-11	SIL	CL-ML, ML	A-4	0	0	100	100	95-100	80-90	16-23	3-7
	11-16	SIL	CL, CL-ML	A-4	0	0	100	100	95-100	80-90	18-25	4-8
	16-35	SIC	CH		0	0	100	100	95-100	90-100	50-71	29-44
	35-60	SICL	CL		0	0	100	100	95-100	80-90	39-48	18-25
	60-100	SICL	CL	A-6, A-7	0	0	100	100	95-100	80-85	37-48	17-25
44002:												
Carl	0-15	SICL	CH, CL	A-7-6	0	0	100	100	100	95	44-55	23-33
	15-27	SIC, SICL	CH	A-7-6	0	0	95-100	85-100	85-100	80-95	50-75	28-49
	27-68	C, SIC	CH	A-7-6	0	0	95-100	85-100	85-100	80-95	55-82	33-54
	68-80	GR-C, GRV-C	GC	A-2-7, A-7-6	0-7	0-38	30-80	25-75	20-65	20-60	55-82	33-54
44004:												
McCune	0-11	SIL	CL-ML, CL	A-4	0	0	100	100	95-100	85-90	18-29	4-10
	11-22	SIL	ML, CL-ML	A-4	0	0	100	100	95-100	85-90	15-29	2-10
	22-80	L, SICL	CL, CL-ML	A-6, A-4, A-7-6	0	0	100	100	95-100	70-90	23-43	7-18
46001:												
Verdigris	0-3	SIL	CL	A-6	0	0	100	100	90-100	80-100	21-30	6-11
	3-39	SICL, SIL	CL	A-6, A-4	0	0	100	100	95-100	95-100	29-34	9-15
	39-80	SICL, SIL	CL-ML, CL	A-6, A-4	0	0	100	100	95-100	80-95	21-34	6-15
46002:												
Hepler	0-8	SIL	CL-ML	A-4	0	0	100	100	90-100	85-100	20-23	5-7
	8-18	SIL	CL-ML	A-4	0	0	100	100	90-100	85-100	18-21	4-6
	18-48	SICL, SIL	CL	A-4, A-6	0	0	100	100	90-100	85-100	20-38	5-15
	48-80	SICL, SIC	CL	A-7-6, A-6	0	0	100	100	95-100	85-100	34-47	15-20
46004:												
Osage	0-7	SICL	CH, CL	A-7-6	0	0	100	95-100	95-100	95-100	42-54	22-31
	7-10	SIC	CH	A-7-6	0	0	100	95-100	95-100	95-100	55-64	33-39
	10-43	SIC	CH	A-7-6	0	0	100	90-100	90-100	85-100	55-75	33-49
	43-80	SICL	CH	A-7-6	0	0	100	100	100	90-95	50-55	28-33
46005:												
Verdigris	0-7	SIL	CL	A-6	0	0	100	100	90-100	80-100	30-36	11-15
	7-29	SICL, SIL	CL	A-6	0	0	100	100	95-100	95-100	29-34	10-15
	29-80	SICL, SIL	CL-ML, CL	A-6, A-4	0	0	100	100	95-100	80-95	21-34	6-15

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70006:												
Creldon	0-8	SIL	CL, CL-ML, ML	A-4, A-6	0	0	90-100	90-100	85-100	70-90	20-40	2-15
	8-27	SICL, SIC, C	CL	A-7	0	0	90-100	85-100	80-100	75-85	35-50	15-25
	27-37	GR-SICL, GRV-SIL	GC	A-2, A-6, A-7	0	0-5	35-65	30-60	30-60	20-50	30-45	10-25
	37-60	GRV-C, CBX-C, GR-C, C	CH, GC, SC	A-2, A-7	0	0-55	45-95	40-90	35-90	30-80	55-80	30-60
70012:												
Hoberg	0-12	SIL	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-95	60-90	25-35	7-15
	12-26	SIL, SICL, GR-SICL, GR-SIL	CL, GC, SC	A-6	0	0-10	60-95	50-90	45-85	40-80	30-40	10-20
	26-42	GRV-SICL, GRV-SIL, GR-SIL, CBX-SICL, CBX-SIL	CL, GC, SC	A-2-6, A-6	0	0-45	35-85	30-75	20-70	20-65	30-40	10-20
	42-60	GRV-C, GRV-SIC, CBX-C, CBX-SIC	CH, GC, MH, SC	A-2-7, A-7	0	0-45	35-65	30-60	30-60	25-55	50-75	25-40
70045:												
Keeno	0-6	GR-SIL	CL, CL-ML, GC	A-2-4, A-4	0	0-15	55-90	50-85	30-80	30-65	15-30	5-10
	6-19	GRX-SICL, GRV-SICL	GC	A-2-6, A-6	0	0-35	25-55	20-50	20-45	20-45	30-40	10-20
	19-29	GRX-SICL, GRX-SIL, GR-SIL	CL, GC, SC	A-2-6, A-6	0	10-60	30-70	25-65	20-65	20-55	30-40	10-20
	29-60	GRX-SIC, GRV-SIC, GRX-C, GRV-C	CH, CL, GC, SC	A-2-7, A-7	0	0-40	30-75	25-70	25-55	20-55	40-65	20-45
70056:												
Crackerneck	0-9	GRX-SIL	GC-GM	A-1	0	0-45	15-30	10-25	9-22	8-20	17-23	1-5
	9-23	GRX-SIL, GRV-SIL	GC, GC-GM	A-2-4	0-20	25-40	20-35	15-30	15-25	12-25	23-28	5-10
	23-42	GRX-C, CBX-C	GC	A-2-7	0-15	0-50	10-50	5-45	5-40	4-40	50-57	22-26
	42-70	GRX-C, GRV-C, CBV-C, CBX-C	GC, GC-GM, GM, SC	A-2-7	0	0-75	15-70	10-65	9-60	8-55	47-70	20-33
70057:												
Crackerneck	0-9	GRX-SIL	GC-GM	A-1	0	0-45	15-30	10-25	9-20	8-20	17-23	1-5
	9-23	GRX-SIL, GRV-SIL	GC, GC-GM	A-2-4	0-20	25-40	20-35	15-30	15-25	15-25	23-28	5-10
	23-42	GRX-C, CBX-C	GC	A-2-7	0-15	0-50	10-50	5-45	5-40	4-40	50-57	22-26
	42-70	GRX-C, GRV-C, CBV-C, CBX-C	GC, GC-GM, GM, SC	A-2-7	0	0-75	15-70	10-65	9-60	8-55	47-70	20-33

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70058:												
Crackerneck-----	0-4	GRV-SIL	GC-GM	A-4, A-2-4	0	0	30-55	25-50	22-45	20-40	17-23	1-5
	4-7	GRV-SIL	GC-GM	A-4, A-2-4	0	0	30-55	25-50	22-45	20-40	17-23	1-5
	7-29	GRX-SIL, GRV-SIL	GC, GC-GM	A-2-4	0-20	25-40	20-35	15-30	15-25	12-25	23-28	5-10
	29-42	GRX-C, CBX-C	GC	A-2-7	0-15	0-50	10-50	5-45	5-40	4-40	50-57	22-26
	42-65	GRX-C, GRV-C, CBV-C, CBX-C	GC, GC-GM, GM, SC	A-2-7	0	0-75	15-70	10-65	9-60	8-55	47-70	20-33
	65	UWB	---	---	---	---	---	---	---	---	---	---
70059:												
Goss-----------	0-7	GRX-SIL	GC, GC-GM, GM	A-2	0	0-55	15-50	10-45	10-25	5-20	20-30	2-10
	7-16	GRV-SIL	GC, GC-GM, GM	A-4, A-2	0	0-45	30-50	25-50	25-50	20-40	20-30	2-10
	16-24	GRX-SIL, GRV-SIL	GC, GC-GM, GM	A-2, A-6	0-10	0-55	15-50	10-50	10-50	5-40	20-37	2-16
	24-40	GRV-C, GRX-SICL, GRX-SIC	GC, SC	A-2-7, A-7	0-15	0-40	20-70	15-65	10-50	10-45	45-51	15-40
	40-80	GRV-C, GRX-C	GC	A-2-7, A-7	0-15	0-40	20-70	15-65	10-50	10-45	50-70	25-40
70060:												
Hoberg----------	0-7	SIL	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-95	65-90	25-35	7-15
	7-20	SIL, SICL, GR-SICL, CBV-SICL	CL, GC, SC	A-6	0	0-10	60-95	50-90	45-85	40-80	30-40	11-20
	20-47	GRV-SICL, GRV-SIL, GR-SIL, GRX-SICL	CL, GC, SC	A-2-6, A-6	0	0-40	40-85	30-75	20-70	20-65	30-40	11-20
	47-72	GRV-C, GRV-SIC, GRX-C	CH, GC, MH, SC	A-2-7, A-7	0	0-25	40-85	30-80	30-80	25-75	50-75	25-40
Eldorado--------	0-7	SIL	CL, ML	A-4	0-7	0-8	80-100	75-100	70-100	70-90	16-30	3-11
	7-20	CBV-SIL, STV-SIL, ST-SIL	GC	A-4	5-30	5-40	51-95	45-90	40-85	40-80	21-30	6-11
	20-33	CBX-SIL, CBV-SIL, CBX-SICL, CBV-SICL	GC	A-2, A-6	10-40	30-45	20-75	15-70	15-65	15-60	21-45	6-18
	33-80	CBV-C, CB-C, GRV-C, GR-C	GC	A-7	0-30	15-55	51-100	45-100	40-95	40-95	45-85	18-42
Pomme-----------	0-7	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-95	75-90	23-34	7-15
	7-19	GR-SIL, GR-SICL	CL	A-4, A-6, A-7-6	0	0-10	65-100	60-100	55-90	55-90	30-45	8-21
	19-57	GRV-SIL, GRV-SICL, GRX-SICL, GRX-SIL	GC	A-2, A-6, A-7-6	0	0-25	17-55	10-50	10-45	8-45	37-48	16-25
	57-85	GRX-C, GRV-C	GC	A-2-7, A-7-6	0	0-40	17-55	10-50	10-45	8-45	48-65	28-39

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70061:												
Pomme	0-7	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-95	75-90	23-34	7-15
	7-19	GR-SIL, GR-SICL	CL	A-4, A-6, A-7-6	0	0-10	65-100	60-100	55-90	55-90	30-45	8-21
	19-57	GRV-SIL, GRV-SICL, GRX-SICL, GRX-SIL	GC	A-2, A-6, A-7-6	0	0-25	15-55	10-50	10-45	8-45	37-48	16-25
	57-85	GRX-C, GRV-C	GC	A-2-7, A-7-6	0	0-40	15-55	10-50	10-45	8-45	48-65	28-39
70062:												
Pomme	0-7	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-95	75-90	23-35	7-15
	7-19	GR-SIL, GR-SICL	CL	A-4, A-6, A-7-6	0	0-10	65-100	60-100	55-90	54-90	30-45	8-21
	19-57	GRV-SIL, GRV-SICL, GRX-SICL, GRX-SIL	GC	A-2, A-6, A-7-6	0	0-25	15-55	10-50	10-45	8-45	37-48	16-25
	57-85	GRX-C, GRV-C	GC	A-2-7, A-7-6	0	0-40	15-55	10-50	10-45	8-45	48-66	28-39
Rueter	0-13	GRV-SIL	GC, SC, SC-SM	A-2-4, A-2-6	0	0-15	25-60	20-55	20-51	20-50	15-25	NP-15
	13-42	GRX-SIL, GRV-SIL, CBV-SIL, CBX-SIL	GC, SC	A-2-6, A-6	0-10	0-75	25-90	20-85	20-80	15-75	20-30	4-11
	42-80	GRV-C, GRX-C, CBV-C, CBX-C	GC, GP-GC, SC, SP-SC	A-2-7, A-7	0-10	10-80	10-70	5-65	5-65	4-65	55-100	35-65
70063:												
Rueter	0-13	GRX-SIL	GC-GM, SC-SM, GC, SC	A-1-a, A-2-4, A-2-6	0	0-45	21-91	15-85	14-79	13-76	13-25	NP-15
	13-42	GRX-SIL	GP-GC, SC, GC, SP-SC	A-2-6, A-6	0-30	0-75	18-76	10-70	10-64	5-61	18-30	4-11
	42-80	GRV-C	GP-GC, GC, SC, SP-SC	A-2-7, A-7	0-60	0-90	18-100	10-100	10-98	10-96	55-97	35-63
70064:												
Rueter	0-13	GRV-SIL	GP-GC, GC, SC, SC-SM	A-1-a, A-2-6, A-2-4	0-65	0-65	18-76	10-70	9-65	5-62	13-25	NP-15
	13-42	GRX-SIL	GP-GC, GC, SC, SP-SC	A-2-6, A-6	0-30	0-75	18-76	10-70	10-64	5-61	18-30	4-11
	42-80	GRV-C	GC, GP-GC, SP-SC, SC	A-2-7, A-7	0-60	0-90	18-100	10-100	10-98	10-96	55-97	35-63

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70065:												
Rueter----------	0-13	GRV-SIL	GC, SC, SC-SM	A-2-4, A-2-6	0	0-15	25-60	20-55	20-51	20-50	15-25	NP-15
	13-42	GRX-SIL, GRV-SIL, CBV-SIL, CBX-SIL	GC, SC	A-2-6, A-6	0-10	0-75	25-90	20-85	20-80	15-75	18-30	4-11
	42-80	GRV-C, GRX-C, CBV-C, CBX-C	GC, GP-GC, SC, SP-SC	A-2-7, A-7	0-10	10-80	10-70	5-65	5-65	5-65	55-100	35-63
70066:												
Winnipeg--------	0-9	SIL	CL	A-4	0	0	95-100	90-100	85-100	75-95	23-35	7-15
	9-45	SIL, SICL	CL	A-6	0	0	95-100	90-100	85-100	80-100	29-39	11-18
	45-64	SICL, SIC	CL	A-6, A-7-6	0	0	95-100	65-100	60-100	55-100	35-43	15-21
	64-80	GR-SICL, GRV-SICL, GRV-L, GRX-SICL, GRX-L, GR-L	GC, SC	A-6, A-2-4, A-7-6	0	0-40	20-60	15-55	15-45	10-40	29-71	9-44
71751:												
Bearthicket-----	0-11	SIL	CL, CL-ML, ML	A-4	0	0	100	95-100	90-100	75-100	18-30	3-11
	11-64	SICL, SIL	CL, CL-ML	A-4, A-6	0	0	100	90-100	90-100	88-100	21-34	5-15
	64-80	SICL, SIC, GRX-SICL, GRV-SICL, CL, GRX-L, GRX-CL	CL, GC	A-4, A-6, A-2-4, A-2-6	0	0	20-100	10-100	10-85	10-80	25-48	5-25
73031:												
Gerald----------	0-11	SIL	CL, CL-ML	A-4	0	0	95-100	85-100	80-95	75-90	20-30	6-10
	11-16	SIL	CL, CL-ML	A-4	0	0	95-100	85-100	80-95	75-90	20-30	6-10
	16-33	SIC, SICL, GR-SICL	CH, CL	A-7, A-6	0	0-5	80-100	75-100	75-90	70-85	35-55	20-30
	33-49	SICL, GR-SICL, GRV-SICL, GRX-SICL	CL, GM, ML	A-7, A-2, A-6	0	0-40	35-90	30-85	30-80	25-75	40-60	12-30
	49-80	CB-C, GRV-C, GRV-SICL, GRX-SIC, CB-SICL	GC	A-2, A-7	0	15-40	35-85	30-80	30-75	25-70	40-65	15-35
75376:												
Cedargap--------	0-11	GR-SIL	CL, GM, SM	A-1, A-2-4, A-4	0	0-15	55-90	50-85	45-85	20-75	18-30	3-11
	11-37	GRV-CL, GRV-SIL, GRV-L, GRV-SCL	GC, GM, ML, SM	A-1, A-2, A-4	0	0-15	30-90	25-85	25-85	20-65	23-44	3-22
	37-80	GRV-CL, GRX-L, GRV-L, GRV-SCL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-20	0-30	30-90	25-85	25-75	15-45	25-45	5-22

Table 21.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
99000. Pits and Quarries												
99001. Water												
99002. Borrow areas												
99003. Miscellaneous water												
99005. Landfill												
99010: Dumps.												
Pits	0-60	UWB	---	---	---	---	---	---	---	---	---	---
99011:												
Kanima	0-6	CNV-L	GC	A-2-6, A-2-4	0	0	30-55	25-50	25-45	20-35	15-30	2-11
	6-85	CNV-CL, CNV-L	GC, SM	A-4, A-2-6, A-2-7, A-6	0	0	30-55	25-50	5-50	5-49	15-43	2-18

Table 22.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
40000:														
Barden	0-10	5-35	50-70	15-27	1.40-1.50	4.00-14.00	0.21-0.24	0.0-2.9	1.0-3.5	.43	.43	3	6	48
	10-47	5-30	45-60	35-50	1.25-1.40	0.42-1.40	0.11-0.19	6.0-8.9	0.5-2.0	.24	.24			
	47-80	5-55	20-60	27-40	1.30-1.45	1.40-4.00	0.10-0.14	3.0-5.9	0.1-0.5	.37	.37			
40011:														
Barco	0-11	35-55	30-50	10-25	1.20-1.45	4.00-14.00	0.16-0.20	0.0-2.9	1.0-4.0	.32	.32	3	5	56
	11-17	30-50	30-50	10-25	1.20-1.45	4.00-14.00	0.16-0.20	0.0-2.9	1.0-2.0	.32	.32			
	17-22	25-50	25-50	18-35	1.40-1.60	4.00-14.00	0.16-0.18	3.0-5.9	0.5-1.5	.28	.32			
	22-30	50-75	10-40	5-20	1.40-1.60	4.00-14.00	0.03-0.04	0.0-2.9	0.3-1.0	.05	.37			
	30-60	---	---	---	---	1.40-14.00	---	---	---	---	---			
40015:														
Eldorado	0-7	5-15	60-80	10-27	1.30-1.50	4.00-14.00	0.19-0.21	0.0-2.9	2.0-4.0	.32	.37	5	7	38
	7-20	5-18	60-75	18-27	1.30-1.50	4.00-14.00	0.10-0.12	0.0-2.9	2.0-4.0	.15	.43			
	20-33	5-20	50-70	18-40	1.35-1.65	4.00-14.00	0.04-0.06	0.0-2.9	0.3-2.0	.05	.43			
	33-80	1-25	10-35	40-85	1.35-1.65	4.00-14.00	0.08-0.10	3.0-5.9	0.2-0.5	.05	.10			
40016:														
Eldorado	0-6	5-15	60-80	10-27	1.30-1.50	4.00-14.00	0.10-0.12	0.0-2.9	3.0-5.6	.15	.37	5	7	38
	6-15	5-18	60-75	18-27	1.30-1.50	4.00-14.00	0.04-0.06	0.0-2.9	2.0-4.0	.05	.43			
	15-34	5-20	50-70	18-40	1.35-1.65	4.00-14.00	0.04-0.06	0.0-2.9	0.3-2.0	.05	.43			
	34-64	1-25	10-35	40-85	1.35-1.65	4.00-14.00	0.08-0.10	3.0-5.9	0.2-0.5	.05	.10			
	64	---	---	---	---	---	---	---	---	---	---			
40017:														
Maplegrove	0-11	11-22	60-80	12-18	1.20-1.40	4.23-14.11	0.19-0.21	0.0-2.9	1.6-4.2	.49	.49	3	5	56
	11-27	3-13	40-60	27-55	1.30-1.50	1.41-4.23	0.12-0.21	3.0-5.9	0.3-2.1	.28	.28			
	27-46	6-13	45-65	27-40	1.60-1.90	4.23-14.11	0.12-0.21	0.0-2.9	0.2-0.7	.24	.32			
	46-80	2-18	15-40	45-85	1.60-1.85	1.41-4.23	0.03-0.10	3.0-5.9	0.2-0.3	.05	.17			
40018:														
Medoc	0-9	5-25	65-85	10-15	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.2-3.0	.55	.55	3	5	56
	9-13	5-25	60-85	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	0.7-1.6	.55	.55			
	13-32	1-15	35-55	40-60	1.30-1.50	0.42-1.41	0.14-0.17	6.0-8.9	0.9-1.6	.28	.28			
	32-75	10-20	40-60	30-40	1.30-1.45	1.40-4.00	0.15-0.21	3.0-5.9	0.2-0.4	.43	.43			
	75-80	5-10	50-60	30-40	1.30-1.50	0.42-1.40	0.14-0.21	3.0-5.9	0.0-0.2	.43	.43			
40019:														
Newtonia	0-15	8-14	65-80	10-25	1.30-1.55	4.00-14.00	0.15-0.24	0.0-2.9	1.5-5.5	.37	.37	5	5	56
	15-29	4-17	55-70	20-35	1.40-1.70	4.00-14.00	0.16-0.22	0.0-2.9	0.2-1.8	.37	.37			
	29-80	4-25	15-50	30-55	1.35-1.65	4.00-14.00	0.12-0.20	3.0-5.9	0.2-1.5	.32	.32			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
40019:														
Eldorado	0-7	5-15	60-80	10-27	1.30-1.50	4.00-14.00	0.19-0.21	0.0-2.9	2.0-4.0	.32	.37	5	7	38
	7-20	5-18	60-75	17-27	1.30-1.50	4.00-14.00	0.10-0.12	0.0-2.9	2.0-4.0	.15	.43			
	20-33	5-20	50-70	17-40	1.35-1.65	4.00-14.00	0.04-0.06	0.0-2.9	0.3-2.0	.05	.43			
	33-80	1-25	10-35	40-85	1.35-1.65	4.00-14.00	0.08-0.10	3.0-5.9	0.2-0.5	.05	.10			
40020:														
Newtonia	0-8	8-14	65-80	10-25	1.30-1.55	4.00-14.00	0.15-0.24	0.0-2.9	1.5-3.1	.37	.37	5	5	56
	8-24	4-17	55-70	20-35	1.40-1.70	4.00-14.00	0.16-0.22	0.0-2.9	0.2-1.8	.37	.37			
	24-80	4-25	15-50	32-55	1.35-1.65	4.00-14.00	0.12-0.20	3.0-5.9	0.2-1.5	.32	.32			
Eldorado	0-7	5-15	60-80	10-27	1.30-1.50	4.00-14.00	0.19-0.21	0.0-2.9	2.0-4.0	.32	.37	5	7	38
	7-20	5-18	60-75	17-27	1.30-1.50	4.00-14.00	0.10-0.12	0.0-2.9	2.0-4.0	.15	.43			
	20-33	5-20	50-70	17-40	1.35-1.65	4.00-14.00	0.04-0.06	0.0-2.9	0.3-2.0	.05	.43			
	33-80	1-25	10-35	40-85	1.35-1.65	4.00-14.00	0.08-0.10	3.0-5.9	0.2-0.5	.05	.10			
40021:														
Opolis	0-8	5-25	60-80	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.4-4.0	.55	.55	3	5	56
	8-15	5-25	60-80	10-25	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	0.8-1.5	.55	.55			
	15-30	2-20	35-60	30-60	1.30-1.50	0.40-1.41	0.14-0.21	6.0-8.9	0.2-2.5	.28	.28			
	30-70	10-25	45-65	25-40	1.30-1.50	1.40-4.00	0.15-0.21	3.0-5.9	0.1-0.5	.49	.49			
	70-80	10-25	35-50	30-50	1.30-1.50	0.42-1.41	0.14-0.21	3.0-5.9	0.0-0.5	.37	.37			
Hepler	0-8	4-6	75-80	15-20	1.25-1.35	4.00-14.00	0.19-0.21	0.5-2.9	1.0-4.5	.49	.49	5	5	56
	8-18	7-13	70-80	13-17	1.25-1.35	1.40-4.00	0.19-0.21	0.5-2.9	0.5-1.8	.55	.55			
	18-48	4-15	55-80	15-35	1.35-1.45	1.40-4.00	0.19-0.21	0.5-2.9	0.2-1.0	.49	.49			
	48-80	4-5	50-65	30-45	1.35-1.45	1.40-4.00	0.15-0.21	0.5-2.9	0.2-0.8	.37	.37			
40022:														
Opolis	0-8	5-25	60-80	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.4-4.0	.55	.55	3	5	56
	8-15	5-25	60-80	10-25	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	0.8-1.5	.55	.55			
	15-30	2-18	35-60	30-60	1.30-1.50	0.40-1.41	0.14-0.21	6.0-8.9	0.2-2.5	.28	.28			
	30-70	10-25	45-65	25-40	1.30-1.50	1.40-4.00	0.15-0.21	3.0-5.9	0.1-0.5	.49	.49			
	70-80	10-25	35-50	30-50	1.30-1.50	0.42-1.41	0.14-0.21	3.0-5.9	0.0-0.5	.37	.37			
40023:														
Opolis	0-8	10-25	60-80	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.4-4.0	.55	.55	3	5	56
	8-15	10-25	60-80	10-25	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	0.8-1.5	.55	.55			
	15-30	2-18	35-60	30-60	1.30-1.50	0.40-1.41	0.14-0.21	6.0-8.9	0.2-2.5	.28	.28			
	30-70	10-25	45-70	25-40	1.30-1.50	1.40-4.00	0.15-0.21	3.0-5.9	0.1-0.5	.49	.49			
	70-80	10-25	35-50	30-50	1.30-1.50	0.42-1.41	0.14-0.21	3.0-5.9	0.0-0.5	.37	.37			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
40024:														
Opolis	0-6	35-45	35-50	10-20	1.20-1.40	4.00-14.00	0.16-0.18	0.0-2.9	1.2-2.4	.49	.49	3	5	56
	6-14	5-25	35-55	35-50	1.30-1.50	0.40-1.41	0.14-0.21	6.0-8.9	0.5-2.0	.32	.32			
	14-35	10-35	35-60	27-35	1.30-1.50	1.40-4.00	0.19-0.21	3.0-5.9	0.1-0.5	.49	.49			
	35-72	25-35	30-45	27-35	1.30-1.50	0.42-1.41	0.19-0.21	3.0-5.9	0.0-0.5	.37	.37			
	72-80	---	---	---	---	---	---	---	---	---	---			
40026:														
Sylvania	0-6	10-25	55-70	15-27	1.20-1.45	14.00-42.00	0.14-0.21	0.0-2.9	3.6-5.0	.24	.37	3	5	56
	6-20	10-25	55-70	15-27	1.20-1.45	14.00-42.00	0.14-0.21	0.0-2.9	2.5-3.7	.20	.43			
	20-23	7-15	40-50	45-50	1.40-1.60	4.00-14.00	0.04-0.11	3.0-5.9	0.5-3.0	.05	.28			
	23-52	1-20	25-50	40-75	1.30-1.50	1.40-4.00	0.12-0.17	3.0-5.9	0.1-2.3	.20	.20			
	52-80	---	---	---	---	1.40-14.00	---	---	---	---	---			
40027:														
Sylvania	0-5	10-25	55-70	15-27	1.20-1.45	14.00-42.00	0.09-0.14	0.0-2.9	3.6-5.0	.20	.37	3	5	56
	5-12	10-25	55-70	15-27	1.20-1.45	14.00-42.00	0.05-0.16	0.0-2.9	2.5-3.7	.05	.43			
	12-19	7-15	40-50	45-50	1.40-1.60	4.00-14.00	0.04-0.11	3.0-5.9	0.5-3.0	.05	.28			
	19-57	1-20	25-50	40-75	1.30-1.50	1.40-4.00	0.12-0.17	3.0-5.9	0.1-2.3	.20	.20			
	57-80	---	---	---	---	1.40-14.00	---	---	---	---	---			
40028:														
Sylvania	0-7	30-50	30-50	10-25	1.20-1.45	14.00-42.00	0.14-0.18	0.0-2.9	4.0-12	.15	.24	3	5	56
	7-12	20-45	20-50	27-40	1.20-1.45	4.00-14.00	0.16-0.21	0.0-2.9	0.5-3.0	.32	.32			
	12-44	1-20	25-50	40-75	1.30-1.50	1.40-4.00	0.12-0.17	3.0-5.9	0.1-2.3	.20	.20			
	44-60	---	---	---	---	1.40-14.00	---	---	---	---	---			
40029:														
Sylvania	0-8	30-50	30-50	10-25	1.20-1.45	14.00-42.00	0.14-0.18	0.0-2.9	4.0-12	.17	.24	3	5	56
	8-30	1-20	25-50	40-75	1.30-1.50	1.40-4.00	0.12-0.17	3.0-5.9	0.1-2.3	.20	.20			
	30-56	1-15	20-55	40-70	1.30-1.50	1.40-4.00	0.14-0.17	3.0-5.9	0.1-1.0	.20	.20			
	56-80	---	---	---	---	1.40-4.00	---	---	---	---	---			
44000:														
Cherokee	0-11	10-25	60-80	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.0-2.0	.49	.49	3	5	56
	11-16	10-25	60-75	10-20	1.20-1.40	4.00-14.00	0.19-0.21	0.0-2.9	0.5-1.0	.55	.55			
	16-35	5-20	40-50	40-60	1.30-1.50	0.40-1.41	0.15-0.17	6.0-8.9	0.5-1.0	.28	.28			
	35-60	10-20	40-50	30-40	1.30-1.45	1.40-4.00	0.19-0.21	3.0-5.9	0.0-0.5	.32	.32			
	60-99	15-20	40-50	30-40	1.30-1.50	0.40-1.41	0.19-0.21	3.0-5.9	0.0-0.5	.32	.32			
44002:														
Carl	0-13	3-10	40-60	27-40	1.40-1.60	0.42-1.40	0.19-0.21	6.0-8.9	2.3-7.1	.37	.37	5	4	86
	13-27	2-20	40-60	35-60	1.50-1.70	0.01-0.42	0.12-0.17	9.0-12.0	1.4-3.1	.32	.32			
	27-68	1-25	30-55	40-65	1.50-1.70	0.10-0.42	0.12-0.17	9.0-12.0	0.2-3.0	.32	.32			
	68-80	6-45	15-50	40-65	1.50-1.70	0.10-0.42	0.05-0.14	9.0-12.0	0.2-0.5	.10	.28			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
44004:														
McCune	0-11	15-20	60-70	15-25	1.20-1.30	4.23-14.00	0.19-0.21	0.0-2.9	1.0-3.5	.49	.49	5	6	48
	11-22	15-20	60-75	10-25	1.20-1.30	0.42-1.41	0.19-0.21	0.0-2.9	0.5-1.5	.64	.64			
	22-80	10-35	35-60	20-40	1.20-1.30	0.42-1.41	0.16-0.21	3.0-5.9	0.1-1.0	.43	.43			
46001:														
Verdigris	0-3	1-10	65-75	15-27	1.30-1.40	4.00-14.00	0.19-0.21	0.0-2.9	6.5-7.0	.28	.28	5	6	48
	3-39	1-10	65-75	25-30	1.30-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.5-3.5	.43	.43			
	39-80	2-35	40-70	15-30	1.40-1.50	4.00-14.00	0.19-0.21	0.0-2.9	0.2-1.5	.43	.43			
46002:														
Hepler	0-8	4-6	70-80	15-20	1.25-1.35	4.00-14.00	0.19-0.21	0.5-2.9	1.0-4.5	.37	.37	5	5	56
	8-18	7-15	70-80	13-20	1.25-1.35	1.40-4.00	0.19-0.21	0.5-2.9	0.5-1.8	.64	.64			
	18-48	4-15	55-80	15-35	1.35-1.45	1.40-4.00	0.19-0.21	0.5-2.9	0.2-1.0	.49	.49			
	48-80	4-5	50-65	30-45	1.35-1.45	1.40-4.00	0.15-0.21	0.5-2.9	0.2-0.8	.37	.37			
46004:														
Osage	0-7	2-8	60-70	27-40	1.40-1.60	0.42-1.40	0.19-0.21	6.0-8.9	3.0-4.5	.37	.37	5	4	86
	7-10	2-6	50-60	40-50	1.50-1.70	0.01-0.42	0.15-0.17	9.0-25.0	1.5-3.0	.32	.32			
	10-43	2-11	40-55	40-60	1.50-1.70	0.01-0.42	0.15-0.17	9.0-25.0	0.2-2.0	.28	.28			
	43-80	4-12	55-60	35-40	1.50-1.70	0.01-0.42	0.19-0.21	6.0-8.9	0.2-0.4	.43	.43			
46005:														
Verdigris	0-7	1-8	65-80	15-25	1.30-1.40	4.00-14.00	0.19-0.21	0.0-2.9	6.5-7.0	.37	.37	5	6	48
	7-29	1-7	65-75	25-30	1.30-1.40	4.00-14.00	0.19-0.21	0.0-2.9	1.5-3.5	.43	.43			
	29-80	2-35	50-70	15-30	1.40-1.50	4.00-14.00	0.19-0.21	0.0-2.9	0.2-1.5	.43	.43			
70006:														
Creldon	0-8	5-20	55-75	10-25	1.20-1.40	4.00-14.00	0.19-0.22	0.0-2.9	1.0-4.0	.32	.37	4	5	56
	8-27	5-20	30-60	27-50	1.30-1.50	1.40-4.00	0.15-0.17	3.0-5.9	1.0-2.0	.28	.32			
	27-37	5-20	45-65	20-35	1.60-1.90	0.01-0.42	0.04-0.07	0.0-2.9	0.1-0.5	.15	.49			
	37-60	10-25	20-35	40-70	1.30-1.55	4.00-14.00	0.04-0.08	6.0-8.9	0.1-0.5	.10	.15			
70012:														
Hoberg	0-12	5-15	65-75	15-25	1.30-1.60	4.00-14.00	0.17-0.20	0.0-2.9	1.0-3.0	.32	.37	4	6	48
	12-26	5-15	60-70	20-30	1.50-1.70	4.00-14.00	0.12-0.19	0.0-2.9	0.5-2.0	.32	.43			
	26-42	5-25	55-70	20-30	1.60-1.90	0.42-1.40	0.02-0.06	0.0-2.9	0.2-1.0	.10	.49			
	42-62	5-20	20-40	40-75	1.10-1.40	1.40-4.00	0.02-0.05	3.0-5.9	0.1-0.5	.05	.28			
70045:														
Keeno	0-6	10-35	40-70	15-25	1.30-1.60	14.00-42.00	0.12-0.16	0.0-2.9	1.0-4.0	.24	.37	4	8	0
	6-19	5-30	40-65	27-35	1.30-1.50	4.00-14.00	0.02-0.10	0.0-2.9	0.5-3.0	.15	.43			
	19-29	15-30	40-65	20-35	1.60-1.90	0.42-1.40	0.01-0.08	0.0-2.9	0.2-0.5	.10	.43			
	29-60	10-20	30-60	35-80	1.30-1.50	14.00-42.00	0.02-0.05	3.0-5.9	0.2-0.5	.15	.28			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
70056:														
Crackerneck	0-9	6-20	70-80	6-11	1.30-1.50	14.00-42.00	0.05-0.08	0.0-2.9	0.5-8.0	.02	.37	4	5	56
	9-23	12-25	55-75	11-20	1.40-1.50	4.00-14.00	0.05-0.11	0.0-2.9	0.2-0.5	.05	.55			
	23-42	13-25	25-40	50-55	1.50-1.70	1.40-4.00	0.03-0.06	3.0-5.9	0.1-0.5	.02	.17			
	42-68	9-25	20-40	45-70	1.30-1.50	4.00-14.00	0.03-0.10	3.0-5.9	0.1-0.5	.02	.17			
70057:														
Crackerneck	0-9	6-20	70-80	6-11	1.30-1.50	14.00-42.00	0.05-0.08	0.0-2.9	0.5-8.0	.02	.37	4	5	56
	9-23	12-25	55-80	11-20	1.40-1.50	4.00-14.00	0.05-0.11	0.0-2.9	0.2-0.5	.05	.55			
	23-42	13-25	25-40	50-55	1.50-1.70	1.40-4.00	0.03-0.06	3.0-5.9	0.1-0.5	.02	.17			
	42-68	9-25	20-40	45-70	1.30-1.50	4.00-14.00	0.03-0.10	3.0-5.9	0.1-0.5	.02	.17			
70058:														
Crackerneck	0-4	6-20	70-80	6-11	1.30-1.50	14.00-42.00	0.07-0.14	0.0-2.9	0.5-8.0	.17	.43	4	5	56
	4-7	6-20	70-80	6-11	1.30-1.50	14.00-42.00	0.07-0.14	0.0-2.9	0.5-8.0	.17	.43			
	7-29	12-25	55-75	11-18	1.40-1.50	4.00-14.00	0.05-0.11	0.0-2.9	0.2-0.5	.05	.55			
	29-42	13-25	25-40	45-55	1.50-1.70	1.40-4.00	0.03-0.06	3.0-5.9	0.1-0.5	.02	.17			
	42-65	9-25	20-40	45-70	1.30-1.50	4.00-14.00	0.03-0.10	3.0-5.9	0.1-0.5	.02	.17			
	65	---	---	---	---	---	---	---	---	---	---			
70059:														
Goss	0-7	5-20	60-80	16-27	1.10-1.30	14.00-42.00	0.05-0.08	0.0-2.9	0.5-3.3	.10	.37	2	8	0
	7-16	5-20	60-80	12-27	1.10-1.30	14.00-42.00	0.07-0.14	0.0-2.9	0.5-1.5	.10	.43			
	16-24	5-20	60-80	16-27	1.10-1.30	14.00-42.00	0.05-0.14	0.0-2.9	0.5-1.0	.10	.43			
	24-41	5-20	35-60	35-60	1.30-1.50	4.00-14.00	0.04-0.14	3.0-5.9	0.0-1.0	.10	.37			
	41-80	5-10	20-40	40-80	1.30-1.50	4.00-14.00	0.04-0.09	3.0-5.9	0.0-1.4	.10	.37			
70060:														
Hoberg	0-7	5-15	65-75	15-25	1.30-1.60	4.00-14.00	0.13-0.18	0.0-2.9	1.0-3.0	.43	.43	4	6	48
	7-22	5-15	60-70	20-30	1.50-1.70	4.00-14.00	0.08-0.14	0.0-2.9	0.5-2.0	.37	.43			
	22-47	5-25	55-70	20-30	1.60-1.90	0.42-1.40	0.01-0.05	0.0-2.9	0.2-1.0	.28	.49			
	47-72	5-20	20-40	40-75	1.10-1.40	1.40-4.00	0.04-0.10	3.0-5.9	0.1-0.5	.05	.10			
Eldorado	0-7	5-15	60-80	10-27	1.30-1.50	4.00-14.00	0.19-0.21	0.0-2.9	2.0-4.0	.32	.37	5	7	38
	7-20	5-18	60-75	17-27	1.30-1.50	4.00-14.00	0.10-0.12	0.0-2.9	2.0-4.0	.15	.43			
	20-33	5-20	50-70	17-40	1.35-1.65	4.00-14.00	0.04-0.06	0.0-2.9	0.3-2.0	.05	.43			
	33-80	1-25	10-35	40-85	1.35-1.65	4.00-14.00	0.08-0.10	3.0-5.9	0.2-0.5	.05	.10			
Pomme	0-7	5-30	50-75	15-25	1.35-1.45	4.00-14.00	0.17-0.21	0.1-2.9	1.0-4.5	.37	.37	5	5	56
	7-19	5-25	45-65	22-35	1.30-1.45	4.00-14.00	0.13-0.21	0.1-2.9	1.0-2.2	.28	.37			
	19-57	5-25	40-60	23-40	1.30-1.45	4.00-14.00	0.05-0.14	0.1-2.9	0.1-1.0	.10	.37			
	57-86	4-20	15-35	45-75	1.25-1.40	4.00-14.00	0.03-0.10	3.0-5.9	0.1-1.0	.05	.17			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
70061:														
Pomme	0-7	5-30	50-75	15-25	1.35-1.45	4.00-14.00	0.17-0.21	0.1-2.9	1.0-4.5	.37	.37	5	5	56
	7-19	5-25	45-65	22-35	1.30-1.45	4.00-14.00	0.13-0.21	0.1-2.9	1.0-2.2	.28	.37			
	19-57	5-25	40-60	23-40	1.30-1.45	4.00-14.00	0.05-0.14	0.1-2.9	0.1-1.0	.10	.37			
	57-86	4-20	15-35	45-75	1.25-1.40	4.00-14.00	0.03-0.10	3.0-5.9	0.1-1.0	.05	.17			
70062:														
Pomme	0-7	5-30	50-75	15-25	1.35-1.45	4.00-14.00	0.17-0.21	0.1-2.9	1.0-4.5	.37	.37	5	5	56
	7-19	5-25	45-65	22-35	1.30-1.45	4.00-14.00	0.13-0.21	0.1-2.9	1.0-2.2	.28	.37			
	19-57	5-25	40-60	23-40	1.30-1.45	4.00-14.00	0.05-0.14	0.1-2.9	0.1-1.0	.10	.37			
	57-86	4-20	15-35	45-75	1.25-1.40	4.00-14.00	0.03-0.10	3.0-5.9	0.1-1.0	.05	.17			
Rueter	0-13	10-20	65-85	10-20	1.20-1.40	14.00-42.00	0.07-0.14	0.1-2.9	1.0-5.0	.15	.43	3	8	0
	13-42	10-25	55-80	12-35	1.30-1.45	14.00-42.00	0.05-0.14	0.1-2.9	0.0-1.7	.05	.49			
	42-80	1-15	5-40	40-90	1.20-1.40	4.00-14.00	0.03-0.06	6.0-8.9	0.0-0.9	.02	.10			
70063:														
Rueter	0-14	10-20	65-85	10-20	1.20-1.40	14.00-42.00	0.05-0.08	0.0-2.9	1.0-5.0	.10	.43	3	8	0
	14-40	10-25	55-80	12-35	1.30-1.45	14.00-42.00	0.05-0.14	0.0-2.9	0.0-1.7	.05	.49			
	40-80	1-15	5-40	40-90	1.20-1.40	4.00-14.00	0.03-0.06	6.0-8.9	0.0-0.9	.02	.10			
70064:														
Rueter	0-13	10-20	65-85	10-20	1.20-1.40	14.00-42.00	0.07-0.14	0.1-2.9	1.0-5.0	.15	.43	3	8	0
	13-42	10-25	55-80	12-35	1.30-1.45	14.00-42.00	0.05-0.14	0.1-2.9	0.0-1.7	.05	.49			
	42-80	1-15	5-40	40-90	1.20-1.40	4.00-14.00	0.03-0.06	6.0-8.9	0.0-0.9	.02	.10			
70065:														
Rueter	0-13	10-20	65-85	10-20	1.20-1.40	14.00-42.00	0.07-0.14	0.0-2.9	1.0-5.0	.15	.43	3	8	0
	13-42	10-25	55-80	12-35	1.30-1.45	14.00-42.00	0.05-0.14	0.0-2.9	0.0-1.7	.05	.49			
	42-80	1-15	5-40	40-90	1.20-1.40	4.00-14.00	0.03-0.06	6.0-8.9	0.0-0.9	.02	.10			
70066:														
Winnipeg	0-9	5-7	60-85	8-20	1.20-1.40	4.00-14.00	0.20-0.22	0.1-2.9	0.5-2.8	.37	.37	5	5	56
	9-45	2-5	60-80	15-30	1.20-1.40	4.00-14.00	0.18-0.22	0.1-2.9	0.5-1.5	.43	.43			
	45-64	4-5	45-70	25-40	1.20-1.50	4.00-14.00	0.16-0.20	0.1-2.9	0.1-1.0	.43	.32			
	64-80	10-30	40-65	25-40	1.30-1.55	1.40-4.00	0.12-0.16	3.0-5.9	0.1-0.5	.20	.28			
71751:														
Bearthicket	0-11	1-30	50-85	8-25	1.20-1.40	4.00-14.00	0.20-0.24	0.1-2.9	1.4-5.0	.37	.37	5	5	56
	11-64	1-15	55-80	15-30	1.20-1.50	4.00-14.00	0.18-0.22	0.1-2.9	0.5-1.5	.28	.28			
	64-80	3-35	45-65	21-40	1.20-1.50	4.00-14.00	0.12-0.22	0.1-2.9	0.2-1.0	.28	.28			
73031:														
Gerald	0-11	2-15	75-85	11-25	1.25-1.45	4.00-14.00	0.18-0.20	0.0-2.9	1.0-2.0	.64	.64	4	6	48
	11-16	5-15	75-85	11-27	1.20-1.40	0.42-1.40	0.11-0.13	0.0-2.9	0.5-1.0	.64	.64			
	16-33	2-10	45-55	27-60	1.60-1.80	0.01-0.42	0.15-0.17	3.0-5.9	0.5-1.5	.28	.32			
	33-49	3-15	50-65	27-35	1.60-1.80	0.01-0.42	0.02-0.11	0.0-2.9	0.2-0.5	.32	.43			
	49-77	5-15	20-60	35-65	1.30-1.45	4.00-14.00	0.02-0.07	3.0-5.9	0.2-0.5	.24	.37			

Table 22.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
75376:														
Cedargap	0-11	15-25	50-65	12-25	1.20-1.45	4.00-14.00	0.11-0.18	0.0-2.9	2.0-8.0	.17	.28	5	8	0
	11-37	25-50	20-50	12-35	1.30-1.50	4.00-14.00	0.10-0.15	0.0-2.9	2.0-6.0	.05	.20			
	37-80	35-50	20-30	18-35	1.40-1.55	4.00-14.00	0.04-0.12	0.0-2.9	0.5-3.0	.05	.20			
99000. Pits and Quarries														
99001. Water														
99002. Borrow areas														
99003. Miscellaneous water														
99005. Landfill														
99010. Dumps and Pits														
99011:														
Kanima	0-6	30-50	30-50	8-26	1.30-1.60	4.23-14.00	0.05-0.12	0.0-2.9	0.5-4.5	.10	.32	2	7	38
	6-85	20-50	20-50	8-40	1.40-1.70	4.23-14.00	0.05-0.14	0.0-2.9	0.0-3.5	.10	.32			

Table 23.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
40000:				
Barden	0-10	8.0-18	---	5.1-7.3
	10-47	19-30	---	4.5-7.3
	47-80	14-20	---	4.5-7.8
40011:				
Barco	0-11	8.0-15	5.0-11	5.1-7.3
	11-17	5.0-15	5.4-11	4.5-5.5
	17-22	10-20	2.0-18	4.5-5.5
	22-30	5.0-20	3.0-18	4.5-5.5
	30-60	---	---	---
40015:				
Eldorado	0-7	10-25	---	5.6-6.5
	7-20	10-25	---	5.6-6.5
	20-33	10-25	---	5.6-6.5
	33-80	13-50	---	5.6-6.5
40016:				
Eldorado	0-6	11-25	---	5.6-6.5
	6-15	11-25	---	5.6-6.5
	15-34	7.0-25	---	5.6-6.5
	34-64	13-50	---	5.6-6.5
	64	---	---	---
40017:				
Maplegrove	0-11	11-17	---	5.1-7.3
	11-27	17-33	---	5.1-7.3
	27-46	14-43	---	6.1-7.8
	46-80	18-53	---	6.6-7.8
40018:				
Medoc	0-9	8.3-13	---	5.1-7.3
	9-13	7.4-12	---	4.5-7.3
	13-32	19-35	---	4.5-5.5
	32-75	11-22	---	4.5-6.0
	75-80	17-25	---	4.5-5.5
40019:				
Newtonia	0-15	10-25	---	5.6-7.3
	15-29	10-25	---	5.1-7.3
	29-80	10-40	---	5.1-7.3
Eldorado	0-7	10-25	---	5.6-6.5
	7-20	10-25	---	5.6-6.5
	20-33	10-25	---	5.6-6.5
	33-80	13-50	---	5.6-6.5
40020:				
Newtonia	0-8	10-15	---	5.6-7.3
	8-24	10-25	---	5.1-7.3
	24-80	10-40	---	5.1-7.3
Eldorado	0-7	10-25	---	5.6-6.5
	7-20	10-25	---	5.6-6.5
	20-33	10-25	---	5.6-6.5
	33-80	13-50	---	5.6-6.5

Table 23.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
40021:				
Opolis	0-8	8.2-14	2.0-12	5.1-7.3
	8-15	6.6-27	3.3-9.3	5.1-7.3
	15-30	13-31	14-24	4.5-6.0
	30-70	10-18	8.8-16	5.1-6.5
	70-80	13-20	8.3-16	5.1-6.0
Hepler	0-8	13-18	9.5-11	5.6-6.5
	8-18	7.0-12	5.0-10	4.5-6.0
	18-48	7.5-19	6.8-15	4.5-6.0
	48-80	19-29	16-26	5.6-6.0
40022:				
Opolis	0-8	8.2-14	2.0-12	5.1-7.3
	8-15	6.6-27	3.3-9.3	5.1-7.3
	15-30	13-31	14-24	4.5-6.0
	30-70	10-18	8.8-16	5.1-6.5
	70-80	13-20	8.3-16	5.1-6.0
40023:				
Opolis	0-8	8.2-14	2.0-12	5.1-7.3
	8-15	6.6-27	3.3-9.3	5.1-7.3
	15-30	13-31	14-24	4.5-6.0
	30-70	10-18	8.8-16	5.1-6.5
	70-80	13-20	8.3-16	5.1-6.0
40024:				
Opolis	0-6	8.6-14	2.0-12	5.6-7.3
	6-14	21-27	14-24	5.1-7.3
	14-35	12-17	8.8-16	5.6-6.5
	35-72	12-18	8.3-16	5.1-6.0
40026:				
Sylvania	0-6	13-26	7.0-25	4.5-5.5
	6-20	11-28	5.0-25	4.5-5.5
	20-23	9.0-35	5.0-30	4.5-5.0
	23-52	9.0-32	6.7-26	4.5-5.5
	52-80	---	---	---
40027:				
Sylvania	0-5	13-26	7.0-25	4.5-5.5
	5-12	11-28	5.0-25	4.5-5.5
	12-19	9.0-35	5.0-30	4.5-5.0
	19-57	9.0-32	6.7-26	4.5-5.5
	57-80	---	---	---
40028:				
Sylvania	0-7	14-26	7.0-16	4.5-6.0
	7-12	10-15	5.0-10	4.5-5.5
	12-44	9.0-32	6.7-26	4.5-5.5
	44-60	---	---	---
40029:				
Sylvania	0-8	14-26	7.0-16	4.5-6.0
	8-30	9.0-32	6.7-26	4.5-5.5
	30-56	10-32	7.1-26	3.5-5.0
	56-80	---	---	---

Table 23.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
44000:				
Cherokee	0-11	7.0-12	7.0-9.8	6.1-7.3
	11-16	3.0-25	4.6-7.5	5.1-7.3
	16-35	6.6-20	15-25	3.5-5.5
	35-60	3.2-13	9.5-18	3.5-6.5
	60-99	3.3-11	14-16	4.5-7.3
44002:				
Carl	0-13	16-39	---	5.6-7.8
	13-27	27-42	---	6.1-7.8
	27-68	22-49	---	6.6-7.8
	68-80	19-41	---	6.6-7.8
44004:				
McCune	0-11	8.8-18	4.7-13	4.5-6.0
	11-22	4.7-14	2.3-8.6	4.5-5.5
	22-80	11-21	6.7-16	4.5-5.5
46001:				
Verdigris	0-3	25-29	21-25	6.1-6.5
	3-39	19-21	11-18	5.1-6.5
	39-80	9.5-19	7.2-17	4.5-6.5
46002:				
Hepler	0-8	13-18	9.5-11	5.6-6.5
	8-18	7.0-12	5.0-10	4.5-6.0
	18-48	7.5-19	6.8-15	4.5-6.0
	48-80	19-29	16-26	5.6-6.0
46004:				
Osage	0-7	19-34	16-31	6.1-7.3
	7-10	34-37	28-35	5.6-7.3
	10-43	27-46	29-45	5.6-7.8
	43-80	23-27	23-28	6.6-7.8
46005:				
Verdigris	0-7	25-29	21-25	6.1-6.5
	7-29	19-21	11-18	5.1-6.5
	29-80	9.5-19	7.2-17	4.5-6.5
70006:				
Creldon	0-8	12-18	10-18	4.5-7.3
	8-27	15-24	12-24	4.5-6.5
	27-37	9.0-15	6.0-14	3.5-5.5
	37-60	25-40	20-40	4.5-6.5
70012:				
Hoberg	0-12	11-18	5.0-13	5.1-7.3
	12-26	11-18	5.0-13	5.1-6.5
	26-42	11-18	5.0-13	3.5-6.0
	42-62	15-25	14-36	3.5-6.0
70045:				
Keeno	0-6	8.0-17	14-19	4.5-7.3
	6-19	15-20	14-16	3.5-6.5
	19-29	8.0-15	4.0-15	3.5-5.5
	29-60	14-40	11-40	4.5-5.5

Table 23.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
70056:				
Crackerneck	0-9	5.0-20	5.0-20	4.5-6.5
	9-23	2.0-20	3.1-6.5	4.5-6.0
	23-42	5.0-32	7.1-29	4.5-5.0
	42-68	10-30	14-24	3.5-5.0
70057:				
Crackerneck	0-9	5.0-20	5.0-20	4.5-6.5
	9-23	2.0-20	3.1-6.5	4.5-6.0
	23-42	5.0-32	7.1-29	4.5-5.0
	42-68	10-30	14-24	3.5-5.0
70058:				
Crackerneck	0-4	5.0-20	2.2-11	4.5-6.5
	4-7	5.0-20	2.2-11	4.5-6.5
	7-29	2.0-20	3.1-6.5	4.5-6.0
	29-42	5.0-32	7.1-29	4.5-5.0
	42-65	10-30	14-24	3.5-5.0
	65	---	---	---
70059:				
Goss	0-7	10-15	10-15	4.5-6.5
	7-16	8.0-12	8.0-12	4.5-7.3
	16-24	9.0-12	9.0-12	4.5-7.3
	24-41	15-20	10-15	4.5-7.3
	41-80	15-20	10-15	4.5-7.3
70060:				
Hoberg	0-7	12-18	5.0-18	5.1-7.3
	7-22	12-18	5.0-10	5.1-6.5
	22-47	11-18	5.0-13	3.5-6.0
	47-72	16-40	12-36	3.5-6.0
Eldorado	0-7	10-25	---	5.6-6.5
	7-20	10-25	---	5.6-6.5
	20-33	10-25	---	5.6-6.5
	33-80	13-50	---	5.6-6.5
Pomme	0-7	5.0-12	5.0-10	5.6-7.3
	7-19	8.0-16	5.0-15	4.5-7.3
	19-57	8.0-16	5.0-15	4.5-7.3
	57-86	10-30	10-25	4.5-7.3
70061:				
Pomme	0-7	5.0-12	5.0-10	5.6-7.3
	7-19	8.0-16	5.0-15	4.5-7.3
	19-57	8.0-16	5.0-15	4.5-7.3
	57-86	10-30	10-25	4.5-7.3
70062:				
Pomme	0-7	5.0-12	5.0-10	5.6-7.3
	7-19	8.0-16	5.0-15	4.5-7.3
	19-57	8.0-16	5.0-15	4.5-7.3
	57-86	10-30	10-25	4.5-7.3
Rueter	0-13	7.1-17	4.0-14	4.5-7.3
	13-42	5.7-12	4.3-12	4.5-7.3
	42-80	17-32	12-22	4.5-6.5

Table 23.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
70063:				
Rueter	0-14	7.1-17	4.0-14	4.5-7.3
	14-40	5.7-12	4.3-12	4.5-7.3
	40-80	17-32	12-22	4.5-6.5
70064:				
Rueter	0-13	7.1-17	4.0-14	4.5-7.3
	13-42	5.7-12	4.3-12	4.5-7.3
	42-80	17-32	12-22	4.5-6.5
70065:				
Rueter	0-13	7.1-17	4.0-14	4.5-7.3
	13-42	5.7-12	4.3-12	4.5-7.3
	42-80	17-32	12-22	4.5-6.5
70066:				
Winnipeg	0-9	7.0-14	5.0-13	5.1-7.8
	9-45	5.0-14	4.0-10	4.5-7.8
	45-64	10-18	6.0-12	4.5-7.8
	64-80	8.0-20	6.0-12	4.5-7.8
71751:				
Bearthicket	0-11	5.0-17	5.0-12	5.1-7.3
	11-64	5.0-15	4.0-10	5.1-7.3
	64-80	7.0-17	4.0-10	5.1-6.5
73031:				
Gerald	0-11	8.0-16	---	4.5-7.3
	11-16	5.0-20	---	4.5-6.5
	16-33	15-30	---	4.5-6.5
	33-49	15-30	---	4.5-7.3
	49-77	20-30	---	4.5-7.3
75376:				
Cedargap	0-11	12-30	12-30	5.6-7.8
	11-37	12-30	12-30	5.6-7.8
	37-80	12-25	12-25	5.6-7.8
99000.				
Pits and Quarries				
99001.				
Water				
99002.				
Borrow areas				
99003.				
Miscellaneous water				
99005.				
Landfill				
99010.				
Dumps and Pits				
99011:				
Kanima	0-6	13-21	---	5.1-6.5
	6-85	11-21	---	3.5-6.5

Table 24.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
40000:							
Barden	---	---	---	---	None	High	Moderate
40011:							
Barco	Bedrock (lithic)	20-40	---	---	None	Low	Moderate
40015:							
Eldorado	---	---	---	---	None	High	Moderate
40016:							
Eldorado	---	---	---	---	None	High	Moderate
40017:							
Maplegrove	---	---	---	---	None	High	High
40018:							
Medoc	---	---	---	---	None	High	Moderate
40019:							
Newtonia	---	---	---	---	None	Moderate	Moderate
Eldorado	---	---	---	---	None	High	Moderate
40020:							
Newtonia	---	---	---	---	None	Moderate	Moderate
Eldorado	---	---	---	---	None	High	Moderate
40021:							
Opolis	---	---	---	---	None	High	Moderate
Hepler	---	---	---	---	None	High	Moderate
40022:							
Opolis	---	---	---	---	None	Moderate	Moderate
40023:							
Opolis	---	---	---	---	None	Moderate	Moderate
40024:							
Opolis	---	---	---	---	None	High	Moderate
40026:							
Sylvania	Bedrock (paralithic)	40-60	---	---	None	Low	Moderate
40027:							
Sylvania	Bedrock (paralithic)	40-60	---	---	None	Low	Moderate
40028:							
Sylvania	Bedrock (paralithic)	40-60	---	---	None	Low	Moderate
40029:							
Sylvania	Bedrock (paralithic)	40-60	---	---	None	Low	Moderate

Table 24.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
44000:							
Cherokee	---	---	---	---	None	High	Moderate
44002:							
Carl	---	---	---	---	None	High	Moderate
44004:							
McCune	---	---	---	---	None	High	Moderate
46001:							
Verdigris	---	---	---	---	None	Low	Low
46002:							
Hepler	---	---	---	---	None	High	Moderate
46004:							
Osage	---	---	---	---	None	High	Moderate
46005:							
Verdigris	---	---	---	---	None	Low	Low
70006:							
Creldon	Fragipan	18-35	6-30	Noncemented	Moderate	High	High
70012:							
Hoberg	Fragipan	20-36	11-35	Noncemented	Moderate	Moderate	High
70045:							
Keeno	Fragipan	18-36	6-30	Noncemented	Moderate	Moderate	High
70056:							
Crackerneck	---	---	---	---	None	Moderate	High
70057:							
Crackerneck	---	---	---	---	None	Moderate	High
70058:							
Crackerneck	Bedrock (lithic)	>60	---	---	None	Moderate	High
70059:							
Goss	---	---	---	---	None	Moderate	Moderate
70060:							
Hoberg	---	---	---	---	None	Moderate	High
Eldorado	---	---	---	---	None	High	Moderate
Pomme	---	---	---	---	None	Moderate	Moderate
70061:							
Pomme	---	---	---	---	None	Moderate	Moderate
70062:							
Pomme	---	---	---	---	None	Moderate	Moderate
Rueter	---	---	---	---	None	Low	High
70063:							
Rueter	---	---	---	---	None	Low	High
70064:							
Rueter	---	---	---	---	None	Low	High

Table 24.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
70065:							
Rueter	---	---	---	---	None	Low	High
70066:							
Winnipeg	---	---	---	---	None	Moderate	Moderate
71751:							
Bearthicket	---	---	---	---	None	Moderate	Moderate
73031:							
Gerald	Fragipan	20-40	15-36	Noncemented	High	High	High
75376:							
Cedargap	---	---	---	---	Moderate	Low	Low
99000.							
Pits and Quarries							
99001.							
Water							
99002.							
Borrow areas							
99003.							
Miscellaneous water							
99005.							
Landfill							
99010:							
Dumps.							
Pits	Bedrock (lithic)	0	---	---	---	---	---
99011:							
Kanima	---	---	---	---	None	Moderate	Low

Table 25.--Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
40000:						
Barden	C					
		January	2.0-3.0	>6.0	---	None
		February	2.0-3.0	>6.0	---	None
		March	2.0-3.0	>6.0	---	None
		November	2.0-3.0	>6.0	---	None
		December	2.0-3.0	>6.0	---	None
40011:						
Barco	B					
		Jan-Dec	---	---	---	None
40015:						
Eldorado	B					
		Jan-Dec	---	---	---	None
40016:						
Eldorado	B					
		Jan-Dec	---	---	---	None
40017:						
Maplegrove	D					
		March	1.1-2.3	2.3-2.3	---	None
40018:						
Medoc	D					
		February	1.0-1.5	1.5-1.5	---	None
		March	1.0-1.5	1.5-1.5	---	None
		April	1.0-1.5	1.5-1.5	---	None
40019:						
Newtonia	B					
		Jan-Dec	---	---	---	None
Eldorado	B					
		Jan-Dec	---	---	---	None
40020:						
Newtonia	B					
		Jan-Dec	---	---	---	None
Eldorado	B					
		Jan-Dec	---	---	---	None
40021:						
Opolis	D					
		March	1.1-2.0	2.0-2.0	---	None

Table 25.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
40021:						
Hepler	C					
		January	1.0-3.0	>6.0	Very brief	Rare
		February	1.0-3.0	>6.0	Very brief	Rare
		March	1.0-3.0	>6.0	Brief	Occasional
		April	1.0-3.0	>6.0	Brief	Occasional
		May	1.0-3.0	>6.0	Brief	Occasional
		June	---	---	Brief	Occasional
		July	---	---	Brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Occasional
		November	---	---	Brief	Occasional
		December	---	---	Very brief	Rare
40022:						
Opolis	D					
		March	1.1-2.0	2.0-2.0	---	None
40023:						
Opolis	D					
		March	1.1-2.0	2.0-2.0	---	None
40024:						
Opolis	D					
		March	1.1-2.0	2.0-2.0	---	None
40026:						
Sylvania	B					
		March	1.7-4.0	4.0-4.0	---	None
40027:						
Sylvania	B					
		March	2.5-4.0	4.0-4.0	---	None
40028:						
Sylvania	B					
		March	2.5-4.0	4.0-4.0	---	None
40029:						
Sylvania	B					
		March	1.7-4.0	4.0-4.0	---	None
44000:						
Cherokee	D					
		February	1.0-1.5	3.0-3.0	---	None
		March	1.0-1.5	3.0-3.0	---	None
		April	1.0-1.5	3.0-3.0	---	None
		May	1.0-1.5	3.0-3.0	---	None
44002:						
Carl	D					
		January	0.0-1.5	3.0-3.0	Very brief	Rare
		February	0.0-1.5	3.0-3.0	Very brief	Rare
		March	0.0-1.5	3.0-3.0	Brief	Rare
		April	0.0-1.5	3.0-3.0	Brief	Rare
		May	0.0-1.5	3.0-3.0	Brief	Rare
		June	---	---	Brief	Rare
		July	---	---	Brief	Rare
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Rare
		November	0.0-1.5	3.0-3.0	Brief	Rare
		December	0.0-1.5	3.0-3.0	Very brief	Rare

Table 25.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
44004:						
McCune	D					
		January	1.0-3.0	>6.0	---	None
		February	1.0-3.0	>6.0	---	None
		March	1.0-3.0	>6.0	---	None
		April	1.0-3.0	>6.0	---	None
		December	1.0-3.0	>6.0	---	None
46001:						
Verdigris	B					
		January	---	---	Very brief	Rare
		February	---	---	Very brief	Rare
		March	---	---	Brief	Frequent
		April	---	---	Brief	Frequent
		May	---	---	Brief	Frequent
		June	---	---	Brief	Frequent
		July	---	---	Brief	Frequent
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Frequent
		November	---	---	Brief	Frequent
		December	---	---	Very brief	Rare
46002:						
Hepler	C					
		January	1.0-3.0	>6.0	Very brief	Rare
		February	1.0-3.0	>6.0	Very brief	Rare
		March	1.0-3.0	>6.0	Brief	Occasional
		April	1.0-3.0	>6.0	Brief	Occasional
		May	1.0-3.0	>6.0	Brief	Occasional
		June	---	---	Brief	Occasional
		July	---	---	Brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Occasional
		November	---	---	Brief	Occasional
		December	---	---	Very brief	Rare
46004:						
Osage	D					
		January	0.0-1.5	3.0-3.0	Very brief	Rare
		February	0.0-1.5	3.0-3.0	Very brief	Rare
		March	0.0-1.5	3.0-3.0	Brief	Occasional
		April	0.0-1.5	3.0-3.0	Brief	Occasional
		May	0.0-1.5	3.0-3.0	Brief	Occasional
		June	---	---	Brief	Occasional
		July	---	---	Brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Occasional
		November	0.0-1.5	3.0-3.0	Brief	Occasional
		December	0.0-1.5	3.0-3.0	Very brief	Rare

Table 25.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
46005:						
Verdigris	B					
		January	---	---	Very brief	Rare
		February	---	---	Very brief	Rare
		March	---	---	Brief	Occasional
		April	---	---	Brief	Occasional
		May	---	---	Brief	Occasional
		June	---	---	Brief	Occasional
		July	---	---	Brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Occasional
		November	---	---	Brief	Occasional
		December	---	---	Very brief	Rare
70006:						
Creldon	C					
		January	1.5-3.0	>6.0	---	None
		February	1.5-3.0	>6.0	---	None
		March	1.5-3.0	>6.0	---	None
		April	1.5-3.0	>6.0	---	None
		December	1.5-3.0	>6.0	---	None
70012:						
Hoberg	C					
		January	1.0-3.0	>6.0	---	None
		February	1.0-3.0	>6.0	---	None
		March	1.0-3.0	>6.0	---	None
		December	1.0-3.0	>6.0	---	None
70045:						
Keeno	C					
		January	1.5-2.5	>6.0	---	None
		February	1.5-2.5	>6.0	---	None
		March	1.5-2.5	>6.0	---	None
		December	1.5-2.5	>6.0	---	None
70056:						
Crackerneck	C					
		March	1.3-3.5	3.5-3.5	---	None
70057:						
Crackerneck	C					
		March	1.3-3.5	3.5-3.5	---	None
70058:						
Crackerneck	C					
		March	1.3-3.5	3.5-3.5	---	None
70059:						
Goss	B					
		Jan-Dec	---	---	---	None
70060:						
Hoberg	C					
		January	1.0-3.0	>6.0	---	None
		February	1.0-3.0	>6.0	---	None
		March	1.0-3.0	>6.0	---	None
		December	1.0-3.0	>6.0	---	None

Table 25.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
70060:						
Eldorado	B					
		Jan-Dec	---	---	---	None
Pomme	B					
		Jan-Dec	---	---	---	None
70061:						
Pomme	B					
		Jan-Dec	---	---	---	None
70062:						
Pomme	B					
		Jan-Dec	---	---	---	None
Rueter	B					
		Jan-Dec	---	---	---	None
70063:						
Rueter	B					
		Jan-Dec	---	---	---	None
70064:						
Rueter	B					
		Jan-Dec	---	---	---	None
70065:						
Rueter	B					
		Jan-Dec	---	---	---	None
70066:						
Winnipeg	B					
		Jan-Dec	---	---	---	None
71751:						
Bearthicket	B					
		January	---	---	Very brief	Rare
		February	---	---	Very brief	Rare
		March	---	---	Brief	Occasional
		April	---	---	Brief	Occasional
		May	---	---	Brief	Occasional
		June	---	---	Brief	Occasional
		July	---	---	Brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Brief	Occasional
		November	---	---	Brief	Occasional
		December	---	---	Very brief	Rare
73031:						
Gerald	D					
		January	1.0-2.0	>6.0	---	None
		February	1.0-2.0	>6.0	---	None
		March	1.0-2.0	>6.0	---	None
		April	1.0-2.0	>6.0	---	None
		December	1.0-2.0	>6.0	---	None

Table 25.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water saturation		Flooding	
			Upper limit	Lower limit	Duration	Frequency
			Ft	Ft		
75376:						
Cedargap	B					
		January	---	---	Very brief	Rare
		February	---	---	Very brief	Rare
		March	---	---	Very brief	Frequent
		April	---	---	Very brief	Frequent
		May	---	---	Very brief	Frequent
		June	---	---	Very brief	Frequent
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Very brief	Frequent
		November	---	---	Very brief	Frequent
		December	---	---	Very brief	Rare
99000.						
Pits and Quarries						
99001.						
Water						
99002.						
Borrow areas						
99003.						
Miscellaneous water						
99005.						
Landfill						
99010.						
Dumps and Pits						
99011:						
Kanima	C					
		Jan-Dec	---	---	---	None

Table 26.--Classification of the Soils

Soil name	Family or higher taxonomic class
Barco	Fine-loamy, mixed, active, thermic Humic Hapludults
Barden	Fine, mixed, active, thermic Aquollic Hapludalfs
Bearthicket	Fine-silty, mixed, active, mesic Ultic Hapludalfs
Carl	Fine, smectitic, thermic Typic Epiaquerts
Cedargap	Loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls
Cherokee	Fine, mixed, active, thermic Typic Albaqualfs
Crackerneck	Loamy-skeletal, semiactive, mesic Oxyaquic Paleudults
Creldon	Fine, mixed, active, mesic Oxyaquic Fragiudalfs
Eldorado	Loamy-skeletal, mixed, active, thermic Typic Paleudolls
Gerald	Fine, mixed, active, mesic Aeric Fragiaqualfs
Goss	Clayey-skeletal, mixed, active, mesic Typic Paleudalfs
Hepler	Fine-silty, mixed, active, thermic Mollic Endoaqualfs
Hoberg	Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs
Kanima	Loamy-skeletal, mixed, active, nonacid, thermic Alfic Udarents
Keeno	Loamy-skeletal, siliceous, active, mesic Oxyaquic Fragiudalfs
Maplegrove	Fine, mixed, active, thermic Oxyaquic Argiudolls
McCune	Fine-silty, mixed, active, thermic Aeric Glossaqualfs
Medoc	Fine, mixed, active, thermic Aeric Albaqualfs
Newtonia	Fine-silty, mixed, active, thermic Typic Paleudolls
Opolis	Fine, mixed, active, thermic Albaquic Hapludalfs
Osage	Fine, smectitic, thermic Typic Epiaquerts
Pomme	Fine-loamy, mixed, semiactive, mesic Typic Paleudalfs
Rueter	Loamy-skeletal, siliceous, active, mesic Typic Paleudalfs
Sylvania	Fine, mixed, active, thermic Oxyaquic Haplohumults
Verdigris	Fine-silty, mixed, superactive, thermic Cumulic Hapludolls
Winnipeg	Fine-silty, mixed, active, mesic Typic Paleudalfs