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*\*County specific computer generated reports.*

## ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Bourbon County, Kansas: Published

Map symbol	Soil name	Acres	Percent
001CB	Catoosa-Rock Outcrop Complex, 1 To 8 Percent Slopes-----	1,683	0.4
001CC	Collinsville-Bates Complex, 2 To 15 Percent Slopes-----	81	*
037MD	Kanima Silty Clay Loam, 3 To 50 Percent Slopes-----	10	*
107CM	Clareson-Rock Outcrop Complex, 2 To 15 Percent Slopes-----	1,318	0.3
107EF	Eram-Lebo Silty Clay Loams, 5 To 20 Percent Slopes-----	772	0.2
107SN	Summit Silty Clay Loam, 1 To 4 Percent Slopes-----	1,185	0.3
107SO	Summit Silty Clay Loam, 4 To 8 Percent Slopes-----	565	0.1
107VC	Verdigris Silt Loam, Frequently Flooded-----	74	*
133EC	Eram Silty Clay Loam, 3 To 7 Percent Slopes-----	9	*
133SC	Shidler-Catoosa Silt Loams, 1 To 8 Percent Slopes-----	173	*
AED	Arents, Earthen Dam-----	16	*
Ba	Bates Loam, 1 To 4 Percent Slopes-----	10,848	2.7
Bc	Bates Loam, 4 To 7 Percent Slopes-----	4,228	1.0
Bd	Bates Loam, 4 To 7 Percent Slopes, Eroded-----	1,117	0.3
Bh	Bolivar-Hector Fine Sandy Loams, 5 To 15 Percent Slopes-----	1,291	0.3
Ca	Catoosa Silt Loam, 0 To 2 Percent Slopes-----	57,481	14.1
Cs	Clareson Stony Silty Clay Loam, 1 To 4 Percent Slopes-----	52,077	12.7
De	Dennis Silt Loam, 1 To 3 Percent Slopes-----	28,685	7.0
Df	Dennis Silt Loam, 3 To 6 Percent Slopes-----	28,025	6.9
Ec	Eram-Collinsville Complex, 5 To 12 Percent Slopes-----	4,966	1.2
Ke	Kenoma Silt Loam, 1 To 3 Percent Slopes-----	50,767	12.4
La	Lanton Silty Clay Loam, Occasionally Flooded-----	7,199	1.8
Le	Leanna Silt Loam, Occasionally Flooded-----	1,297	0.3
Ma	Mason Silt Loam, Rarely Flooded-----	5,028	1.2
No	Nowata Silt Loam, 3 To 5 Percent Slopes-----	13,634	3.3
Or	Orthents, Hilly-----	3,426	0.8
Os	Osage Silty Clay, Occasionally Flooded-----	4,077	1.0
Pa	Parsons Silt Loam, 0 To 2 Percent Slopes-----	17,190	4.2
Pt	Pits, Quarries-----	199	*
Rc	Ringo-Clareson Complex, 9 To 15 Percent Slopes-----	26,750	6.5
Ta	Tamaha Silt Loam, 1 To 5 Percent Slopes-----	2,821	0.7
Ve	Verdigris Silt Loam, Occasionally Flooded-----	20,649	5.0
Vf	Verdigris Silt Loam, Channeled-----	2,412	0.6
W	Water-----	1,305	0.3
Za	Zaar Silty Clay, 0 To 2 Percent Slopes-----	30,371	7.4
ZAA	Zaar Silty Clay, 1 To 3 Percent Slopes-----	29	*
Zb	Zaar Silty Clay, 2 To 6 Percent Slopes-----	27,343	6.7
	Total-----	409,101	100.0

\* Less than 0.1 percent.

NONTECHNICAL SOIL DESCRIPTIONS  
Bourbon County, Kansas

Nontechnical soil descriptions describe soil properties or management considerations specific to a soil map unit or group of map units, shown in the NonTechnical Descriptions report. These descriptions are written in terminology that Non-technical users of soil survey information can understand. Nontechnical soil descriptions are a powerful tool for creating reports. These high quality, easy to read reports can be generated by conservation planners and other NRCS employees for distribution to land users. Soil map unit descriptions and National Soil Information System records are the basis for these descriptions.

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001CB Catoosa-Rock Outcrop Complex, 1 To 8 Percent Slopes

Catoosa soil makes up 60 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to strongly sloping backslope hillslope on upland. The runoff class is medium. The parent material consists of residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6s.

001CC Collinsville-Bates Complex, 2 To 15 Percent Slopes

Collinsville soil makes up 50 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately steep backslope hillslope on upland. The runoff class is low. The parent material consists of sandstone residuum. The soil is 4 to 20 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately rapid. It has a very low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Sandstone (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

Bates soil makes up 40 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping backslope hillslope on upland. The runoff class is medium. The parent material consists of sandy and silty residuum weathered from sandstone over sandy and silty residuum weathered from sandstone and shale. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is moderate. It has a low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

037MD Kanima Silty Clay Loam, 3 To 50 Percent Slopes

Kanima soil makes up 100 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to very steep hillslope on upland. The runoff class is high. The parent material consists of residuum. This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. It is in the nonirrigated land capability classification 7s.

107CM Clareson-Rock Outcrop Complex, 2 To 15 Percent Slopes

Clareson soil makes up 60 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a strongly sloping to moderately steep summit hillslope on ridge on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from limestone, unspecified. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Flats (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

107EF Eram-Lebo Silty Clay Loams, 5 To 20 Percent Slopes

Eram soil makes up 50 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to strongly sloping backslope hillslope on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from shale, unspecified. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is moderately well drained. The slowest permeability is moderately slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 28 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

Lebo soil makes up 30 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a strongly sloping to moderately steep backslope hillslope on upland. The runoff class is high. The parent material consists of residuum weathered from shale-sandstone. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is impermeable. It has a moderate available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

NONTECHNICAL SOIL DESCRIPTIONS--Continued  
Bourbon County, Kansas

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## 107SN Summit Silty Clay Loam, 1 To 4 Percent Slopes

Summit soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping footslope hillslope on upland. The runoff class is medium. The parent material consists of silty and clayey colluvium and/or silty and clayey residuum weathered from calcareous shale. This soil is moderately well drained. The slowest permeability is slow. It has a moderate available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 30 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2e.

## 107SO Summit Silty Clay Loam, 4 To 8 Percent Slopes

Summit soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to strongly sloping footslope hillslope on upland. The runoff class is medium. The parent material consists of silty and clayey colluvium and/or silty and clayey residuum weathered from calcareous shale. This soil is moderately well drained. The slowest permeability is slow. It has a moderate available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 30 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

## 107VC Verdigris Silt Loam, Frequently Flooded

Verdigris soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping flood plain on river valley. The runoff class is low. The parent material consists of silty alluvium. This soil is moderately well drained. The slowest permeability is moderately slow. It has a very high available water capacity and a low shrink swell potential. This soil is frequently flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 5w.

## 133EC Eram Silty Clay Loam, 3 To 7 Percent Slopes

Eram soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping backslope hillslope on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from shale, unspecified. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is moderately well drained. The slowest permeability is slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 24 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 4e.

## 133SC Shidler-Catoosa Silt Loams, 1 To 8 Percent Slopes

Shidler soil makes up 50 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to strongly sloping drainage way on upland. The runoff class is medium. The parent material consists of residuum weathered from limestone. The soil is 4 to 20 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderate. It has a very low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Limy (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

Catoosa soil makes up 40 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping ridge on upland. The runoff class is low. The parent material consists of residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2e.

## Ba Bates Loam, 1 To 4 Percent Slopes

Bates soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping hillslope on upland. The runoff class is medium. The parent material consists of sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is moderate. It has a moderate available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2e.

## Bc Bates Loam, 4 To 7 Percent Slopes

Bates soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping hillslope on upland. The runoff class is high. The parent material consists of sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is moderate. It has a low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

NONTECHNICAL SOIL DESCRIPTIONS--Continued  
Bourbon County, Kansas

**Bd Bates Loam, 4 To 7 Percent Slopes, Eroded**

Bates soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping hillslope on upland. The runoff class is high. The parent material consists of sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is moderate. It has a low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 4e.

**Bh Bolivar-Hector Fine Sandy Loams, 5 To 15 Percent Slopes**

Bolivar soil makes up 65 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to moderately steep hillslope, upland. The runoff class is high. The parent material consists of residuum weathered from sandstone. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is well drained. The slowest permeability is moderate. It has a low available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Savannah (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

Hector soil makes up 20 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to moderately steep upland, ridge. The runoff class is medium. The parent material consists of residuum weathered from sandstone. The soil is 10 to 20 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately rapid. It has a very low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Savannah (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

**Ca Catoosa Silt Loam, 0 To 2 Percent Slopes**

Catoosa soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping summit upland, ridge. The runoff class is medium. The parent material consists of residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2e.

**Cs Clareson Stony Silty Clay Loam, 1 To 4 Percent Slopes**

Clareson soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping hillslope on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from limestone, unspecified. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is slow. It has a low available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Flats (pe35-42) range site. It is in the nonirrigated land capability classification 6s.

**De Dennis Silt Loam, 1 To 3 Percent Slopes**

Dennis soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping hillslope on upland. The runoff class is medium. The parent material consists of silty and clayey residuum weathered from shale, unspecified. This soil is moderately well drained. The slowest permeability is slow. It has a high available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 15 inches. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2e.

**Df Dennis Silt Loam, 3 To 6 Percent Slopes**

Dennis soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping hillslope on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from shale, unspecified. This soil is moderately well drained. The slowest permeability is slow. It has a high available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 15 inches. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

**Ec Eram-Collinsville Complex, 5 To 12 Percent Slopes**

Eram soil makes up 75 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to strongly sloping hillslope on upland. The runoff class is very high. The parent material consists of silty and clayey residuum weathered from shale, unspecified. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is moderately well drained. The slowest permeability is slow. It has a low available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 12 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

NONTECHNICAL SOIL DESCRIPTIONS--Continued  
Bourbon County, Kansas

Collinsville soil makes up 15 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to strongly sloping upland, ridge. The runoff class is medium. The parent material consists of sandstone residuum. The soil is 4 to 20 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately rapid. It has a very low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Sandstone (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

**Ke Kenoma Silt Loam, 1 To 3 Percent Slopes**

Kenoma soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping ridge on upland. The runoff class is very high. The parent material consists of loess over ancient clayey alluvium and/or residuum weathered from limestone and shale. This soil is moderately well drained. The slowest permeability is very slow. It has a high available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 12 inches. This soil contains a very slightly saline horizon. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

**La Lanton Silty Clay Loam, Occasionally Flooded**

Lanton soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level flood plain on river valley. The runoff class is medium. The parent material consists of silty and clayey alluvium. This soil is somewhat poorly drained. The slowest permeability is very slow. It has a high available water capacity and a moderate shrink swell potential. This soil is occasionally flooded and is not ponded. The top of the seasonal high water table is at 18 inches. This soil is in the Loamy Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 2w.

**Le Leanna Silt Loam, Occasionally Flooded**

Leanna soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping flood plain on river valley. The runoff class is medium. The parent material consists of silty and clayey alluvium. This soil is somewhat poorly drained. The slowest permeability is slow. It has a high available water capacity and a moderate shrink swell potential. This soil is occasionally flooded and is not ponded. The top of the seasonal high water table is at 15 inches. This soil is in the Clay Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 2w.

**Ma Mason Silt Loam, Rarely Flooded**

Mason soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level flood plain on river valley. The runoff class is medium. The parent material consists of silty alluvium. This soil is well drained. The slowest permeability is moderately slow. It has a high available water capacity and a moderate shrink swell potential. This soil is rarely flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 1.

**No Nowata Silt Loam, 3 To 5 Percent Slopes**

Nowata soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping ridge on upland. The runoff class is medium. The parent material consists of residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is moderately slow. It has a low available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Upland (pe35-42) range site. It is in the nonirrigated land capability classification 4e.

**Or Orthents, Hilly**

Orthents soil makes up 100 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a moderately sloping to very steep hillslope on upland. The runoff class is high. The parent material consists of mine spoil or earthy fill. This soil is excessively drained. The slowest permeability is moderate. It has a low available water capacity and a low shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. It is in the nonirrigated land capability classification 6s.

**Os Osage Silty Clay, Occasionally Flooded**

Osage soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping flood plain on river valley. The runoff class is high. The parent material consists of clayey alluvium. This soil is poorly drained. The slowest permeability is very slow. It has a moderate available water capacity and a very high shrink swell potential. This soil is occasionally flooded and is occasional ponded. The top of the seasonal high water table is at 6 inches. This soil is in the Clay Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 3w.

**Pa Parsons Silt Loam, 0 To 2 Percent Slopes**

Parsons soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping ridge on upland, paleoterrace on upland. The runoff class is very high. The parent material consists of loess over ancient clayey alluvium and/or residuum weathered from shale. This soil is somewhat poorly drained. The slowest permeability is very slow. It has a high available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 12 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 2s.

NONTECHNICAL SOIL DESCRIPTIONS--Continued  
Bourbon County, Kansas

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Rc Ringo-Clareson Complex, 9 To 15 Percent Slopes

Ringo soil makes up 70 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a strongly sloping to moderately steep hillslope on upland. The runoff class is very high. The parent material consists of residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (paralithic). This soil is moderately well drained. The slowest permeability is very slow. It has a low available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 6e.

Clareson soil makes up 15 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping ridge on upland. The runoff class is high. The parent material consists of silty and clayey residuum weathered from limestone. The soil is 20 to 40 inches deep to bedrock (lithic). This soil is well drained. The slowest permeability is slow. It has a low available water capacity and a moderate shrink swell potential. This soil is not flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Shallow Flats (pe35-42) range site. It is in the nonirrigated land capability classification 6s.

Ta Tamaha Silt Loam, 1 To 5 Percent Slopes

Tamaha soil makes up 85 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping hillslope on upland. The runoff class is very high. The parent material consists of loamy colluvium and/or residuum weathered from shale. This soil is moderately well drained. The slowest permeability is very slow. It has a high available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 12 inches. This soil is in the Savannah (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

Ve Verdigris Silt Loam, Occasionally Flooded

Verdigris soil makes up 95 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping flood plain on river valley. The runoff class is low. The parent material consists of silty alluvium. This soil is well drained. The slowest permeability is moderate. It has a very high available water capacity and a low shrink swell potential. This soil is occasionally flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 2w.

Vf Verdigris Silt Loam, Channeled

Verdigris, channeled, soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping flood plain on river valley. The runoff class is low. The parent material consists of silty alluvium. This soil is well drained. The slowest permeability is moderate. It has a very high available water capacity and a low shrink swell potential. This soil is frequently flooded and is not ponded. The seasonal high water table is at a depth of more than 6 feet. This soil is in the Loamy Lowland (pe35-42) range site. It is in the nonirrigated land capability classification 5w.

Za Zaar Silty Clay, 0 To 2 Percent Slopes

Zaar soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a nearly level to gently sloping hillslope on upland. The runoff class is very high. The parent material consists of ancient alluvium and/or clayey colluvium and/or residuum weathered from shale. This soil is somewhat poorly drained. The slowest permeability is very slow. It has a moderate available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 18 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3w.

ZAA Zaar Silty Clay, 1 To 3 Percent Slopes

Zaar soil makes up 96 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping hillslope on upland. The runoff class is high. The parent material consists of ancient alluvium and/or clayey colluvium and/or residuum weathered from shale. This soil is moderately well drained. The slowest permeability is slow. It has a moderate available water capacity and a very high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 16 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 3e.

Zb Zaar Silty Clay, 2 To 6 Percent Slopes

Zaar soil makes up 90 percent of the map unit. This map unit is in the Cherokee Prairies Major Land Resource Area. This soil occurs on a gently sloping to moderately sloping hillslope on upland. The runoff class is very high. The parent material consists of ancient alluvium and/or clayey colluvium and/or residuum weathered from shale. This soil is somewhat poorly drained. The slowest permeability is very slow. It has a moderate available water capacity and a high shrink swell potential. This soil is not flooded and is not ponded. The top of the seasonal high water table is at 18 inches. This soil is in the Clay Upland (pe35-42) range site. It is in the nonirrigated land capability classification 4e.

## 001CB—Catoosa-Rock outcrop complex, 1 to 8 percent slopes

### Map Unit Composition

Catoosa: 60 percent  
 Rock outcrop: 30 percent  
 Minor components: 10 percent

### Component Descriptions

#### Catoosa

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Hillslope position:* Summit  
*Parent material:* Residuum weathered from limestone  
*Slope:* 1 to 8 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* Low (About 5.4 inches)  
*Shrink-swell potential:* High (About 6.0 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 6s

#### Typical Profile:

H1—0 to 11 inches; silty clay loam  
 H2—11 to 27 inches; silty clay loam  
 R—27 to 31 inches; unweathered bedrock

#### Rock outcrop

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Depth to seasonal water saturation:* More than 6 feet  
*Land capability (nonirrigated):* 8

### Minor Components

#### Eram

*Composition:* About 10 percent  
*Geomorphic Position:* drainage way on upland ridge on upland  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

## 001CC—Collinsville-Bates complex, 2 to 15 percent slopes

### Map Unit Composition

Collinsville: 50 percent  
 Bates: 40 percent  
 Minor components: 10 percent

### Component Descriptions

#### Collinsville

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope:* 2 to 15 percent  
*Depth to restrictive feature:* 4 to 20 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (About 2.00 in/hr)  
*Available water capacity:* Very low (About 2.0 inches)  
*Shrink-swell potential:* Low (About 1.8 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Low  
*Ecological site:* Shallow Sandstone (pe35-42)  
*Land capability (nonirrigated):* 6e

#### Typical Profile:

H1—0 to 7 inches; fine sandy loam  
 H2—7 to 15 inches; gravelly fine sandy loam  
 R—15 to 17 inches; unweathered bedrock

#### Bates

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Sandy and silty residuum weathered from sandstone  
*Slope:* 2 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Low (About 5.2 inches)  
*Shrink-swell potential:* Low (About 2.8 LEP)  
*Flooding hazard:* None

*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 6e

**Typical Profile:**

H1—0 to 8 inches; loam  
 H2—8 to 11 inches; loam  
 H3—11 to 32 inches; gravelly clay loam  
 Cr—32 to 34 inches; weathered bedrock

**Minor Components****Catoosa**

*Composition:* About 4 percent  
*Geomorphic Position:* ridge on upland  
*Slope:* 1 to 8 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Eram**

*Composition:* About 3 percent  
*Geomorphic Position:* drainageway on upland  
 ridge on upland  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Dennis**

*Composition:* About 3 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 7 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**037MD—Kanima silty clay loam, 3 to 50 percent slopes****Map Unit Composition**

Kanima: 100 percent

**Component Descriptions****Kanima**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Residuum  
*Slope:* 3 to 50 percent

*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* Low (About 4.5 inches)  
*Shrink-swell potential:* Moderate (About 4.3 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Land capability (nonirrigated):* 7s

**Typical Profile:**

H1—0 to 6 inches; channery silty clay loam  
 H2—6 to 60 inches; very channery silty clay loam

**107CM—Clareson-Rock outcrop complex, 2 to 15 percent slopes****Map Unit Composition**

Clareson: 60 percent  
 Rock outcrop: 20 percent  
 Minor components: 20 percent

**Component Descriptions****Clareson**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on ridge on upland  
*Hillslope position:* Summit  
*Parent material:* Silty and clayey residuum weathered from limestone, unspecified  
*Slope:* 7 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* Low (About 3.9 inches)  
*Shrink-swell potential:* High (About 6.2 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Ecological site:* Shallow Flats (pe35-42)  
*Land capability (nonirrigated):* 6e

**Typical Profile:**

H1—0 to 11 inches; silty clay loam  
 H2—11 to 16 inches; flaggy silty clay loam  
 H3—16 to 33 inches; very flaggy silty clay  
 R—33 to 37 inches; unweathered bedrock

**Rock outcrop***MLRA:* 112 - Cherokee Prairies*Landform:* Ridge on upland*Hillslope position:* Shoulder*Drainage class:* Well drained*Depth to seasonal water saturation:* More than 6 feet*Land capability (nonirrigated):* 8**Minor Components****Catoosa***Composition:* About 5 percent*Geomorphic Position:* hillslope on ridge on upland*Slope:* 1 to 3 percent*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)*Drainage class:* Well drained*Ecological site:* Loamy Upland (pe35-42)**Eram***Composition:* About 5 percent*Geomorphic Position:* hillslope on ridge on upland*Slope:* 4 to 8 percent*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)*Drainage class:* Moderately well drained*Ecological site:* Clay Upland (pe35-42)**Lebo***Composition:* About 5 percent*Geomorphic Position:* hillslope on upland*Slope:* 15 to 30 percent*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)*Drainage class:* Well drained*Ecological site:* Loamy Upland (pe35-42)**Summit***Composition:* About 5 percent*Geomorphic Position:* hillslope on upland*Slope:* 4 to 8 percent*Drainage class:* Moderately well drained*Ecological site:* Clay Upland (pe35-42)**107EF—Eram-Lebo silty clay loams, 5 to 20 percent slopes****Map Unit Composition**

Eram: 50 percent

Lebo: 30 percent

Minor components: 20 percent

**Component Descriptions****Eram***MLRA:* 112 - Cherokee Prairies*Landform:* Hillslope on upland*Hillslope position:* Backslope*Parent material:* Silty and clayey residuum weathered from shale, unspecified*Slope:* 5 to 12 percent*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)*Drainage class:* Moderately well drained*Slowest permeability:* Moderately slow (About 0.20 in/hr)*Available water capacity:* Low (About 4.1 inches)*Shrink-swell potential:* High (About 6.4 LEP)*Flooding hazard:* None*Depth to seasonal water saturation:* About 24 to 36 inches*Runoff class:* High*Ecological site:* Clay Upland (pe35-42)*Land capability (nonirrigated):* 6e*Typical Profile:*

H1—0 to 8 inches; silty clay loam

H2—8 to 27 inches; silty clay

Cr—27 to 31 inches; weathered bedrock

**Lebo***MLRA:* 112 - Cherokee Prairies*Landform:* Hillslope on upland*Hillslope position:* Backslope*Parent material:* Residuum weathered from shale-sandstone*Slope:* 8 to 20 percent*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)*Drainage class:* Well drained*Slowest permeability:* Impermeable (About 0.00 in/hr)*Available water capacity:* Moderate (About 6.3 inches)*Shrink-swell potential:* Very high (About 9.4 LEP)*Flooding hazard:* None*Depth to seasonal water saturation:* More than 6 feet*Runoff class:* High*Ecological site:* Loamy Upland (pe35-42)*Land capability (nonirrigated):* 6e*Typical Profile:*

H1—0 to 12 inches; silty clay

H2—12 to 28 inches; silty clay

H3—28 to 38 inches; extremely channery silty clay loam

Cr—38 to 42 inches; weathered bedrock

**Minor Components****Clareson**

*Composition:* About 10 percent  
*Geomorphic Position:* hillslope on ridge on upland  
*Slope:* 7 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Ecological site:* Shallow Flats (pe35-42)

**Dennis**

*Composition:* About 10 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**107SN—Summit silty clay loam, 1 to 4 percent slopes****Map Unit Composition**

Summit: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Summit**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Footslope  
*Parent material:* Silty and clayey colluvium and/or silty and clayey residuum weathered from calcareous shale  
*Slope:* 1 to 4 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Moderate (About 8.1 inches)  
*Shrink-swell potential:* High (About 8.2 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 24 to 36 inches  
*Runoff class:* Medium  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 2e

*Typical Profile:*

H1—0 to 11 inches; silty clay loam  
 H2—11 to 24 inches; silty clay  
 H3—24 to 33 inches; silty clay  
 H4—33 to 60 inches; silty clay

**Minor Components****Catoosa**

*Composition:* About 15 percent  
*Geomorphic Position:* hillslope on ridge on upland  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

**107SO—Summit silty clay loam, 4 to 8 percent slopes****Map Unit Composition**

Summit: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Summit**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Footslope  
*Parent material:* Silty and clayey colluvium and/or silty and clayey residuum weathered from calcareous shale  
*Slope:* 4 to 8 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Moderate (About 8.0 inches)  
*Shrink-swell potential:* High (About 8.2 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 24 to 36 inches  
*Runoff class:* Medium  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 3e

*Typical Profile:*

H1—0 to 9 inches; silty clay loam  
 H2—9 to 22 inches; silty clay  
 H3—22 to 31 inches; silty clay  
 H4—31 to 60 inches; silty clay

**Minor Components****Catoosa**

*Composition:* About 10 percent  
*Geomorphic Position:* hillslope on ridge on upland  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

### Dennis

*Composition:* About 5 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

## 133EC—Eram silty clay loam, 3 to 7 percent slopes

### Map Unit Composition

Eram: 90 percent  
Minor components: 10 percent

## 107VC—Verdigris silt loam, frequently flooded

### Map Unit Composition

Verdigris: 85 percent  
Minor components: 15 percent

### Component Descriptions

#### Verdigris

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Silty alluvium  
*Slope:* 0 to 2 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* High (About 11.9 inches)  
*Shrink-swell potential:* Low (About 2.2 LEP)  
*Flooding hazard:* Frequent  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Low  
*Ecological site:* Loamy Lowland (pe35-42)  
*Land capability (nonirrigated):* 5w

#### Typical Profile:

H1—0 to 9 inches; silt loam  
H2—9 to 32 inches; silt loam  
H3—32 to 52 inches; silt loam  
H4—52 to 60 inches; silt loam

### Minor Components

#### Osage

*Composition:* About 10 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Poorly drained  
*Ecological site:* Clay Lowland (pe35-42)

#### Summit

*Composition:* About 5 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 1 to 4 percent

### Component Descriptions

#### Eram

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Silty and clayey residuum weathered from shale, unspecified  
*Slope:* 3 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Low (About 4.5 inches)  
*Shrink-swell potential:* High (About 8.3 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 6 to 31 inches  
*Runoff class:* High  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 4e

#### Typical Profile:

H1—0 to 10 inches; silty clay  
H2—10 to 29 inches; silty clay  
Cr—29 to 31 inches; weathered bedrock

### Minor Components

#### Lebo

*Composition:* About 5 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 8 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

#### Bates

*Composition:* About 5 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained

*Ecological site:* Loamy Upland (pe35-42)

## 133SC—Shidler-Catoosa silt loams, 1 to 8 percent slopes

### Map Unit Composition

Shidler: 50 percent  
Catoosa: 40 percent  
Minor components: 10 percent

### Component Descriptions

#### Shidler

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Drainageway on upland  
*Parent material:* Residuum weathered from limestone  
*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* 4 to 20 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Very low (About 2.4 inches)  
*Shrink-swell potential:* Low (About 1.7 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Shallow Limy (pe35-42)  
*Land capability (nonirrigated):* 6e

#### Typical Profile:

H1—0 to 12 inches; silt loam  
R—12 to 14 inches; unweathered bedrock

#### Catoosa

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Hillslope position:* Backslope  
*Parent material:* Residuum weathered from limestone  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* Low (About 5.3 inches)  
*Shrink-swell potential:* Very high (About 9.3 LEP)

*Flooding hazard:* None

*Depth to seasonal water saturation:* More than 6 feet

*Runoff class:* Low

*Ecological site:* Loamy Upland (pe35-42)

*Land capability (nonirrigated):* 2e

#### Typical Profile:

H1—0 to 10 inches; silt loam  
H2—10 to 31 inches; silty clay loam  
R—31 to 33 inches; unweathered bedrock

### Minor Components

#### Lebo

*Composition:* About 5 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 8 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

#### Rock outcrop

*Composition:* About 5 percent  
*Drainage class:* Well drained

## AED—Arents, Earthen Dam

## Ba—Bates loam, 1 to 4 percent slopes

### Map Unit Composition

Bates: 90 percent  
Minor components: 10 percent

### Component Descriptions

#### Bates

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale  
*Slope:* 1 to 4 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)

*Available water capacity:* Moderate (About 6.4 inches)  
*Shrink-swell potential:* Low (About 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 2e

**Typical Profile:**

H1—0 to 12 inches; loam  
 H2—12 to 20 inches; loam  
 H3—20 to 28 inches; sandy clay loam  
 H4—28 to 35 inches; sandy loam  
 Cr—35 to 37 inches; weathered bedrock

**Minor Components****Kenoma**

*Composition:* About 10 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Bc—Bates loam, 4 to 7 percent slopes****Map Unit Composition**

Bates: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Bates**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Low (About 5.0 inches)  
*Shrink-swell potential:* Low (About 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Ecological site:* Loamy Upland (pe35-42)

*Land capability (nonirrigated):* 3e

**Typical Profile:**

H1—0 to 10 inches; loam  
 H2—10 to 16 inches; loam  
 H3—16 to 24 inches; sandy clay loam  
 H4—24 to 28 inches; sandy loam  
 Cr—28 to 30 inches; unweathered bedrock

**Minor Components****Dennis**

*Composition:* About 10 percent  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Kenoma**

*Composition:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Bd—Bates loam, 4 to 7 percent slopes, eroded****Map Unit Composition**

Bates: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Bates**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Sandy and silty residuum weathered from sandstone, unspecified over sandy and silty residuum weathered from sandstone-shale  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Low (About 4.0 inches)  
*Shrink-swell potential:* Low (About 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 4e

*Typical Profile:*

H1—0 to 5 inches; loam  
 H2—5 to 23 inches; sandy clay loam  
 Cr—23 to 25 inches; unweathered bedrock

**Minor Components****Dennis**

*Composition:* About 10 percent  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Kenoma**

*Composition:* About 5 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Bh—Bolivar-Hector fine sandy loams, 5 to 15 percent slopes****Map Unit Composition**

Bolivar: 65 percent  
 Hector: 20 percent  
 Minor components: 15 percent

**Component Descriptions****Bolivar**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Residuum weathered from sandstone  
*Slope:* 5 to 15 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Low (About 5.5 inches)  
*Shrink-swell potential:* Moderate (About 5.0 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Ecological site:* Savannah (pe35-42)  
*Land capability (nonirrigated):* 6e

*Typical Profile:*

H1—0 to 12 inches; fine sandy loam  
 H2—12 to 17 inches; loam  
 H3—17 to 26 inches; sandy clay loam

H4—26 to 34 inches; loam  
 Cr—34 to 36 inches; weathered bedrock

**Hector**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Hillslope position:* Summit  
*Parent material:* Residuum weathered from sandstone  
*Slope:* 5 to 15 percent  
*Depth to restrictive feature:* 10 to 20 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (About 2.00 in/hr)  
*Available water capacity:* Very low (About 1.4 inches)  
*Shrink-swell potential:* Low (About 1.1 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Shallow Savannah (pe35-42)  
*Land capability (nonirrigated):* 6e

*Typical Profile:*

H1—0 to 3 inches; fine sandy loam  
 H2—3 to 7 inches; fine sandy loam  
 H3—7 to 12 inches; fine sandy loam  
 R—12 to 14 inches; unweathered bedrock

**Minor Components****Dennis**

*Composition:* About 10 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Kenoma**

*Composition:* About 5 percent  
*Geomorphic Position:* divide on upland terrace on river valley  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Ca—Catoosa silt loam, 0 to 2 percent slopes****Map Unit Composition**

Catoosa: 85 percent  
 Minor components: 15 percent

## Component Descriptions

### Catoosa

*MLRA:* 112 - Cherokee Prairies

*Landform:* Ridge, upland

*Hillslope position:* Summit

*Parent material:* Residuum weathered from limestone

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained

*Slowest permeability:* Moderately slow (About 0.20 in/hr)

*Available water capacity:* Low (About 4.6 inches)

*Shrink-swell potential:* High (About 7.4 LEP)

*Flooding hazard:* None

*Depth to seasonal water saturation:* More than 6 feet

*Runoff class:* Medium

*Ecological site:* Loamy Upland (pe35-42)

*Land capability (nonirrigated):* 2e

#### Typical Profile:

H1—0 to 11 inches; silt loam

H2—11 to 16 inches; silty clay loam

H3—16 to 27 inches; silty clay loam

R—27 to 35 inches; unweathered bedrock

### Minor Components

#### Clareson

*Composition:* About 10 percent

*Geomorphic Position:* hillslope on upland

*Slope:* 1 to 4 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained

*Ecological site:* Shallow Flats (pe35-42)

#### Kenoma

*Composition:* About 5 percent

*Geomorphic Position:* ridge on paleoterrace on upland

*Slope:* 1 to 3 percent

*Drainage class:* Moderately well drained

*Ecological site:* Clay Upland (pe35-42)

## Cs—Clareson stony silty clay loam, 1 to 4 percent slopes

### Map Unit Composition

Clareson: 90 percent

Minor components: 10 percent

## Component Descriptions

### Clareson

*MLRA:* 112 - Cherokee Prairies

*Landform:* Hillslope on upland

*Parent material:* Silty and clayey residuum weathered from limestone, unspecified

*Slope:* 1 to 4 percent

*Surface fragments:* About 0 to 3 percent subangular stones

*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained

*Slowest permeability:* Slow (About 0.06 in/hr)

*Available water capacity:* Low (About 3.1 inches)

*Shrink-swell potential:* Very high (About 11.0 LEP)

*Flooding hazard:* None

*Depth to seasonal water saturation:* More than 6 feet

*Runoff class:* High

*Ecological site:* Shallow Flats (pe35-42)

*Land capability (nonirrigated):* 6s

#### Typical Profile:

H1—0 to 10 inches; stony silty clay loam

H2—10 to 15 inches; very flaggy silty clay loam

H3—15 to 32 inches; extremely flaggy silty clay

R—32 to 34 inches; unweathered bedrock

### Minor Components

#### Ringo

*Composition:* About 10 percent

*Slope:* 9 to 15 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)

*Drainage class:* Moderately well drained

*Ecological site:* Clay Upland (pe35-42)

## De—Dennis silt loam, 1 to 3 percent slopes

### Map Unit Composition

Dennis: 85 percent

Minor components: 15 percent

## Component Descriptions

### Dennis

*MLRA:* 112 - Cherokee Prairies

*Landform:* Hillslope on upland

*Parent material:* Silty and clayey residuum weathered from shale, unspecified  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* High (About 10.6 inches)  
*Shrink-swell potential:* Very high (About 9.0 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 12 to 18 inches  
*Runoff class:* Medium  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 2e

**Typical Profile:**

H1—0 to 15 inches; silt loam  
 H2—15 to 22 inches; silty clay loam  
 H3—22 to 48 inches; silty clay  
 H4—48 to 60 inches; silty clay loam

**Minor Components****Eram**

*Composition:* About 10 percent  
*Slope:* 5 to 12 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Verdigris**

*Composition:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Ecological site:* Loamy Lowland (pe35-42)

**Df—Dennis silt loam, 3 to 6 percent slopes****Map Unit Composition**

Dennis: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Dennis**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Silty and clayey residuum weathered from shale, unspecified  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)

*Available water capacity:* High (About 10.6 inches)  
*Shrink-swell potential:* Very high (About 9.0 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 12 to 18 inches  
*Runoff class:* High  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 3e

**Typical Profile:**

H1—0 to 15 inches; silt loam  
 H2—15 to 22 inches; silty clay loam  
 H3—22 to 55 inches; silty clay  
 H4—55 to 60 inches; silty clay loam

**Minor Components****Bates**

*Composition:* About 10 percent  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Verdigris**

*Composition:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Ecological site:* Loamy Lowland (pe35-42)

**Ec—Eram-Collinsville complex, 5 to 12 percent slopes****Map Unit Composition**

Eram: 75 percent  
 Collinsville: 15 percent  
 Minor components: 10 percent

**Component Descriptions****Eram**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Backslope  
*Parent material:* Silty and clayey residuum weathered from shale, unspecified  
*Slope:* 5 to 12 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Low (About 4.6 inches)

*Shrink-swell potential:* High (About 8.3 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 6 to 18 inches  
*Runoff class:* Very high  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 6e

*Typical Profile:*

H1—0 to 10 inches; silty clay loam  
 H2—10 to 30 inches; silty clay  
 Cr—30 to 32 inches; weathered bedrock

**Collinsville**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Hillslope position:* Shoulder  
*Parent material:* Sandstone residuum  
*Slope:* 5 to 12 percent  
*Depth to restrictive feature:* 4 to 20 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately rapid (About 2.00 in/hr)  
*Available water capacity:* Very low (About 1.7 inches)  
*Shrink-swell potential:* Low (About 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Shallow Sandstone (pe35-42)  
*Land capability (nonirrigated):* 6e

*Typical Profile:*

H1—0 to 14 inches; fine sandy loam  
 R—14 to 16 inches; unweathered bedrock

**Minor Components**

**Bates**

*Composition:* About 6 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 4 to 7 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Dennis**

*Composition:* About 4 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 6 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Ke—Kenoma silt loam, 1 to 3 percent slopes**

**Map Unit Composition**

Kenoma: 90 percent  
 Minor components: 10 percent

**Component Descriptions**

**Kenoma**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Parent material:* Loess over ancient clayey alluvium and/or residuum weathered from limestone and shale  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)  
*Available water capacity:* High (About 9.0 inches)  
*Shrink-swell potential:* High (About 7.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 6 to 18 inches  
*Runoff class:* Very high  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 3e

*Typical Profile:*

H1—0 to 8 inches; silt loam  
 H2—8 to 24 inches; silty clay  
 H3—24 to 50 inches; silty clay  
 H4—50 to 60 inches; silty clay loam

**Minor Components**

**Parsons**

*Composition:* About 10 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clay Upland (pe35-42)

**La—Lanton silty clay loam, occasionally flooded**

**Map Unit Composition**

Lanton: 85 percent  
 Minor components: 15 percent

## Component Descriptions

### Lanton

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Silty and clayey alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)  
*Available water capacity:* High (About 10.6 inches)  
*Shrink-swell potential:* Moderate (About 4.5 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal water saturation:* About 12 to 24 inches  
*Runoff class:* Medium  
*Ecological site:* Loamy Lowland (pe35-42)  
*Land capability (nonirrigated):* 2w

#### Typical Profile:

H1—0 to 8 inches; silty clay loam  
 H2—8 to 36 inches; silty clay loam  
 H3—36 to 48 inches; silty clay  
 H4—48 to 60 inches; silty clay

### Minor Components

#### Mason

*Composition:* About 10 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Loamy Lowland (pe35-42)

#### Osage

*Composition:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Poorly drained  
*Ecological site:* Clay Lowland (pe35-42)

## Le—Leanna silt loam, occasionally flooded

### Map Unit Composition

Leanna: 85 percent  
 Minor components: 15 percent

### Component Descriptions

#### Leanna

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Silty and clayey alluvium  
*Slope:* 0 to 2 percent

*Drainage class:* Somewhat poorly drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* High (About 10.1 inches)  
*Shrink-swell potential:* Very high (About 10.7 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal water saturation:* About 6 to 24 inches  
*Runoff class:* Medium  
*Ecological site:* Clay Lowland (pe35-42)  
*Land capability (nonirrigated):* 2w

#### Typical Profile:

H1—0 to 6 inches; silt loam  
 H2—6 to 13 inches; silt loam  
 H3—13 to 38 inches; silty clay  
 H4—38 to 60 inches; silty clay loam

### Minor Components

#### Mason

*Composition:* About 15 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Ecological site:* Loamy Lowland (pe35-42)

## Ma—Mason silt loam, rarely flooded

### Map Unit Composition

Mason: 90 percent  
 Minor components: 10 percent

### Component Descriptions

#### Mason

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Silty alluvium  
*Slope:* 0 to 1 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* High (About 10.6 inches)  
*Shrink-swell potential:* Moderate (About 4.5 LEP)  
*Flooding hazard:* Rare  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Loamy Lowland (pe35-42)  
*Land capability (nonirrigated):* 1

*Typical Profile:*

H1—0 to 17 inches; silt loam  
H2—17 to 60 inches; silty clay loam

**Minor Components****Lanton**

*Composition:* About 10 percent  
*Slope:* 0 to 1 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Loamy Lowland (pe35-42)

**No—Nowata silt loam, 3 to 5 percent slopes****Map Unit Composition**

Nowata: 85 percent  
Minor components: 15 percent

**Component Descriptions****Nowata**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Parent material:* Residuum weathered from limestone  
*Slope:* 3 to 5 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Moderately slow (About 0.20 in/hr)  
*Available water capacity:* Low (About 4.9 inches)  
*Shrink-swell potential:* Moderate (About 4.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Medium  
*Ecological site:* Loamy Upland (pe35-42)  
*Land capability (nonirrigated):* 4e

*Typical Profile:*

H1—0 to 15 inches; silt loam  
H2—15 to 36 inches; extremely gravelly silty clay loam  
R—36 to 38 inches; unweathered bedrock

**Minor Components****Kenoma**

*Composition:* About 15 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Or—Orthents, Hilly****Map Unit Composition**

Orthents: 100 percent

**Component Descriptions****Orthents**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Mine spoil or earthy fill  
*Slope:* 3 to 50 percent  
*Drainage class:* Excessively drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Low (About 4.5 inches)  
*Shrink-swell potential:* Low (About 1.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Land capability (nonirrigated):* 6s

*Typical Profile:*

H1—0 to 6 inches; extremely channery silty clay loam  
H2—6 to 72 inches; extremely channery silty clay loam

**Os—Osage silty clay, occasionally flooded****Map Unit Composition**

Osage: 90 percent  
Minor components: 10 percent

**Component Descriptions****Osage**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Clayey alluvium  
*Slope:* 0 to 2 percent  
*Drainage class:* Poorly drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)

*Available water capacity:* Moderate (About 6.3 inches)

*Shrink-swell potential:* Very high (About 13.0 LEP)

*Flooding hazard:* Occasional

*Ponding hazard:* Occasional

*Depth to seasonal water saturation:* About 0 to 12 inches

*Runoff class:* High

*Ecological site:* Clay Lowland (pe35-42)

*Land capability (nonirrigated):* 3w

*Typical Profile:*

H1—0 to 13 inches; silty clay

H2—13 to 60 inches; silty clay

**Minor Components**

**Lanton**

*Composition:* About 10 percent

*Slope:* 0 to 1 percent

*Drainage class:* Somewhat poorly drained

*Ecological site:* Loamy Lowland (pe35-42)

**Pa—Parsons silt loam, 0 to 2 percent slopes**

**Map Unit Composition**

Parsons: 90 percent

Minor components: 10 percent

**Component Descriptions**

**Parsons**

*MLRA:* 112 - Cherokee Prairies

*Landform:* Paleoterrace on upland, ridge on upland

*Parent material:* Loess over ancient clayey alluvium and/or residuum weathered from shale

*Slope:* 0 to 2 percent

*Drainage class:* Somewhat poorly drained

*Slowest permeability:* Very slow (About 0.00 in/hr)

*Available water capacity:* High (About 9.8 inches)

*Shrink-swell potential:* Very high (About 11.0 LEP)

*Flooding hazard:* None

*Depth to seasonal water saturation:* About 6 to 18 inches

*Runoff class:* Very high

*Ecological site:* Clay Upland (pe35-42)

*Land capability (nonirrigated):* 2s

*Typical Profile:*

H1—0 to 7 inches; silt loam

H2—7 to 15 inches; silt loam

H3—15 to 40 inches; silty clay

H4—40 to 60 inches; silty clay

**Minor Components**

**Bates**

*Composition:* About 6 percent

*Slope:* 1 to 4 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)

*Drainage class:* Well drained

*Ecological site:* Loamy Upland (pe35-42)

**Catoosa**

*Composition:* About 4 percent

*Slope:* 0 to 2 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained

*Ecological site:* Loamy Upland (pe35-42)

**Pt—Pits, Quarries**

*General Considerations:* Pits are open excavations from which soil and commonly underlying material have been removed, exposing either rock or other material. Kinds include Pits, mine; Pits, gravel; and Pits, quarry. Commonly, pits are closely associated with Dumps.

**Rc—Ringo-Clareson complex, 9 to 15 percent slopes**

**Map Unit Composition**

Ringo: 70 percent

Clareson: 15 percent

Minor components: 15 percent

**Component Descriptions**

**Ringo**

*MLRA:* 112 - Cherokee Prairies

*Landform:* Hillslope on upland

*Hillslope position:* Backslope

*Parent material:* Residuum weathered from limestone

*Slope:* 9 to 15 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)  
*Available water capacity:* Low (About 5.0 inches)  
*Shrink-swell potential:* High (About 7.8 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Very high  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 6e

**Typical Profile:**

H1—0 to 10 inches; silty clay  
 H2—10 to 30 inches; silty clay  
 Cr—30 to 31 inches; weathered bedrock

**Clareson**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Ridge on upland  
*Hillslope position:* Summit  
*Parent material:* Silty and clayey residuum weathered from limestone  
*Slope:* 1 to 4 percent  
*Surface fragments:* About 1 to 3 percent rounded stones  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Low (About 3.1 inches)  
*Shrink-swell potential:* High (About 6.2 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* High  
*Ecological site:* Shallow Flats (pe35-42)  
*Land capability (nonirrigated):* 6s

**Typical Profile:**

H1—0 to 10 inches; stony silty clay loam  
 H2—10 to 15 inches; very flaggy silty clay loam  
 H3—15 to 32 inches; extremely flaggy silty clay  
 R—32 to 34 inches; unweathered bedrock

**Minor Components****Catoosa**

*Composition:* About 8 percent  
*Geomorphic Position:* ridge on upland  
*Slope:* 0 to 2 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

**Zaar**

*Composition:* About 7 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 2 to 6 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clay Upland (pe35-42)

**Ta—Tamaha silt loam, 1 to 5 percent slopes****Map Unit Composition**

Tamaha: 85 percent  
 Minor components: 15 percent

**Component Descriptions****Tamaha**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Parent material:* Loamy colluvium and/or residuum weathered from shale  
*Slope:* 1 to 5 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)  
*Available water capacity:* High (About 10.7 inches)  
*Shrink-swell potential:* High (About 7.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 12 to 24 inches  
*Runoff class:* Very high  
*Ecological site:* Savannah (pe35-42)  
*Land capability (nonirrigated):* 3e

**Typical Profile:**

H1—0 to 7 inches; silt loam  
 H2—7 to 12 inches; silty clay loam  
 H3—12 to 40 inches; silty clay  
 H4—40 to 60 inches; silty clay loam

**Minor Components****Kenoma**

*Composition:* About 10 percent  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

**Osage**

*Composition:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Poorly drained  
*Ecological site:* Clay Lowland (pe35-42)

## **Ve—Verdigris silt loam, occasionally flooded**

### **Map Unit Composition**

Verdigris: 95 percent  
Minor components: 5 percent

### **Component Descriptions**

#### **Verdigris**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Flood plain on river valley  
*Parent material:* Silty alluvium  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Very high (About 12.3 inches)  
*Shrink-swell potential:* Low (About 2.0 LEP)  
*Flooding hazard:* Occasional  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Low  
*Ecological site:* Loamy Lowland (pe35-42)  
*Land capability (nonirrigated):* 2w

#### *Typical Profile:*

H1—0 to 22 inches; silt loam  
H2—22 to 60 inches; silt loam

#### **Minor Components**

##### **Osage**

*Composition:* About 5 percent  
*Slope:* 0 to 2 percent  
*Drainage class:* Poorly drained  
*Ecological site:* Clay Lowland (pe35-42)

## **Vf—Verdigris silt loam, channeled**

### **Map Unit Composition**

Verdigris: 90 percent  
Minor components: 10 percent

### **Component Descriptions**

#### **Verdigris**

*MLRA:* 112 - Cherokee Prairies

*Landform:* Flood plain on river valley  
*Parent material:* Silty alluvium  
*Slope:* 0 to 2 percent  
*Drainage class:* Well drained  
*Slowest permeability:* Moderate (About 0.60 in/hr)  
*Available water capacity:* Very high (About 12.3 inches)  
*Shrink-swell potential:* Low (About 2.2 LEP)  
*Flooding hazard:* Frequent  
*Depth to seasonal water saturation:* More than 6 feet  
*Runoff class:* Low  
*Ecological site:* Loamy Lowland (pe35-42)  
*Land capability (nonirrigated):* 5w

#### *Typical Profile:*

H1—0 to 22 inches; silt loam  
H2—22 to 60 inches; silt loam

#### **Minor Components**

##### **Dennis**

*Composition:* About 10 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

## **W—Water**

## **Za—Zaar silty clay, 0 to 2 percent slopes**

### **Map Unit Composition**

Zaar: 90 percent  
Minor components: 10 percent

### **Component Descriptions**

#### **Zaar**

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Footslope  
*Parent material:* Ancient alluvium and/or clayey colluvium and/or residuum weathered from shale  
*Slope:* 0 to 2 percent  
*Drainage class:* Somewhat poorly drained  
*Slowest permeability:* Very slow (About 0.00 in/hr)

*Available water capacity:* Moderate (About 8.4 inches)  
*Shrink-swell potential:* Very high (About 11.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 12 to 24 inches  
*Runoff class:* Very high  
*Ecological site:* Clay Upland (pe35-42)  
*Land capability (nonirrigated):* 3w

*Typical Profile:*  
 H1—0 to 15 inches; silty clay  
 H2—15 to 48 inches; silty clay  
 H3—48 to 60 inches; silty clay

### Minor Components

#### Kenoma

*Composition:* About 10 percent  
*Geomorphic Position:* terrace on river valley divide on upland  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

## ZAA—Zaar silty clay, 1 to 3 percent slopes

### Map Unit Composition

Zaar: 96 percent  
 Minor components: 4 percent

### Component Descriptions

#### Zaar

*MLRA:* 112 - Cherokee Prairies  
*Landform:* Hillslope on upland  
*Hillslope position:* Footslope  
*Parent material:* Ancient alluvium and/or clayey colluvium and/or residuum weathered from shale  
*Slope:* 1 to 3 percent  
*Drainage class:* Moderately well drained  
*Slowest permeability:* Slow (About 0.06 in/hr)  
*Available water capacity:* Moderate (About 8.5 inches)  
*Shrink-swell potential:* Very high (About 11.5 LEP)  
*Flooding hazard:* None  
*Depth to seasonal water saturation:* About 14 to 22 inches  
*Runoff class:* High  
*Ecological site:* Clay Upland (pe35-42)

*Land capability (nonirrigated):* 3e

#### Typical Profile:

H1—0 to 16 inches; silty clay  
 H2—16 to 38 inches; silty clay  
 H3—38 to 53 inches; silty clay  
 H4—53 to 60 inches; silty clay

### Minor Components

#### Dennis

*Composition:* About 1 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 1 to 4 percent  
*Drainage class:* Moderately well drained  
*Ecological site:* Loamy Upland (pe35-42)

#### Parsons

*Composition:* About 1 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 1 to 3 percent  
*Drainage class:* Somewhat poorly drained  
*Ecological site:* Clay Upland (pe35-42)

#### Lula

*Composition:* About 1 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 1 to 3 percent  
*Depth to restrictive feature:* 40 to 60 inches to bedrock (lithic)  
*Drainage class:* Well drained  
*Ecological site:* Loamy Upland (pe35-42)

#### Ringo

*Composition:* About 1 percent  
*Geomorphic Position:* hillslope on upland  
*Slope:* 3 to 9 percent  
*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)  
*Drainage class:* Moderately well drained  
*Ecological site:* Clay Upland (pe35-42)

## Zb—Zaar silty clay, 2 to 6 percent slopes

### Map Unit Composition

Zaar: 90 percent  
 Minor components: 10 percent

## Component Descriptions

### Zaar

*MLRA:* 112 - Cherokee Prairies

*Landform:* Hillslope on upland

*Hillslope position:* Footslope

*Parent material:* Ancient alluvium and/or clayey colluvium and/or residuum weathered from shale

*Slope:* 2 to 6 percent

*Drainage class:* Somewhat poorly drained

*Slowest permeability:* Very slow (About 0.00 in/hr)

*Available water capacity:* Moderate (About 8.4 inches)

*Shrink-swell potential:* Very high (About 11.5 LEP)

*Flooding hazard:* None

*Depth to seasonal water saturation:* About 12 to 24 inches

*Runoff class:* Very high

*Ecological site:* Clay Upland (pe35-42)

*Land capability (nonirrigated):* 4e

### Typical Profile:

H1—0 to 15 inches; silty clay

H2—15 to 48 inches; silty clay

H3—48 to 60 inches; silty clay

## Minor Components

### Clareson

*Composition:* About 6 percent

*Geomorphic Position:* hillslope on upland

*Slope:* 1 to 4 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (lithic)

*Drainage class:* Well drained

*Ecological site:* Shallow Flats (pe35-42)

### Ringo

*Composition:* About 4 percent

*Geomorphic Position:* hillslope on upland

*Slope:* 9 to 15 percent

*Depth to restrictive feature:* 20 to 40 inches to bedrock (paralithic)

*Drainage class:* Moderately well drained

*Ecological site:* Clay Upland (pe35-42)

Farmland Classification  
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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 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.

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 the following table. 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 the "Acres and Proportionate Extent of Soils" table. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described in other tables in this document."

Map symbol	Mapunit name	Farmland Classification
107SN	Summit silty clay loam, 1 to 4 percent slopes	All areas are prime farmland
107SO	Summit silty clay loam, 4 to 8 percent slopes	All areas are prime farmland
Ba	Bates loam, 1 to 4 percent slopes	All areas are prime farmland
Bc	Bates loam, 4 to 7 percent slopes	All areas are prime farmland
Ca	Catoosa silt loam, 0 to 2 percent slopes	All areas are prime farmland
De	Dennis silt loam, 1 to 3 percent slopes	All areas are prime farmland
Df	Dennis silt loam, 3 to 6 percent slopes	All areas are prime farmland
Ke	Kenoma silt loam, 1 to 3 percent slopes	All areas are prime farmland
Ma	Mason silt loam, rarely flooded	All areas are prime farmland
Pa	Parsons silt loam, 0 to 2 percent slopes	All areas are prime farmland
Ta	Tamaha silt loam, 1 to 5 percent slopes	All areas are prime farmland
Ve	Verdigris silt loam, occasionally flooded	All areas are prime farmland
Za	Zaar silty clay, 0 to 2 percent slopes	All areas are prime farmland
ZAA	Zaar silty clay, 1 to 3 percent slopes	All areas are prime farmland
Zb	Zaar silty clay, 2 to 6 percent slopes	All areas are prime farmland
La	Lanton silty clay loam, occasionally flooded	Prime farmland if drained
Le	Leanna silt loam, occasionally flooded	Prime farmland if drained
Os	Osage silty clay, occasionally flooded	Prime farmland if drained

The "Soil Rating for Plant Growth, modified 1998" (SRPG) is a relative rating of the capacity of a soil to produce a specific plant under a defined management system. The index is determined from yield data on a few benchmark soils and is used to calculate yields, the net returns from crops, land assessment values, and taxes and to perform risk analysis when land management decisions are made. Specific information on plants and yields can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Map symbol	Soil name	Crop Index
001CB	Catoosa-Rock Outcrop Complex, 1 To 8 Percent Slopes-----	30
001CC	Collinsville-Bates Complex, 2 To 15 Percent Slopes-----	28
037MD	Kanima Silty Clay Loam, 3 To 50 Percent Slopes-----	49
107CM	Clareson-Rock Outcrop Complex, 2 To 15 Percent Slopes-----	33
107EF	Eram-Lebo Silty Clay Loams, 5 To 20 Percent Slopes-----	43
107SN	Summit Silty Clay Loam, 1 To 4 Percent Slopes-----	72
107SO	Summit Silty Clay Loam, 4 To 8 Percent Slopes-----	69
107VC	Verdigris Silt Loam, Frequently Flooded-----	61
133EC	Eram Silty Clay Loam, 3 To 7 Percent Slopes-----	38
133SC	Shidler-Catoosa Silt Loams, 1 To 8 Percent Slopes-----	27
AED	Arents, Earthen Dam-----	0
Ba	Bates Loam, 1 To 4 Percent Slopes-----	68
Bc	Bates Loam, 4 To 7 Percent Slopes-----	47
Bd	Bates Loam, 4 To 7 Percent Slopes, Eroded-----	36
Bh	Bolivar-Hector Fine Sandy Loams, 5 To 15 Percent Slopes-----	42
Ca	Catoosa Silt Loam, 0 To 2 Percent Slopes-----	43
Cs	Clareson Stony Silty Clay Loam, 1 To 4 Percent Slopes-----	16
De	Dennis Silt Loam, 1 To 3 Percent Slopes-----	74
Df	Dennis Silt Loam, 3 To 6 Percent Slopes-----	71
Ec	Eram-Collinsville Complex, 5 To 12 Percent Slopes-----	37
Ke	Kenoma Silt Loam, 1 To 3 Percent Slopes-----	75
La	Lanton Silty Clay Loam, Occasionally Flooded-----	82
Le	Leanna Silt Loam, Occasionally Flooded-----	74
Ma	Mason Silt Loam, Rarely Flooded-----	88
No	Nowata Silt Loam, 3 To 5 Percent Slopes-----	58
Or	Orthents, Hilly-----	12
Os	Osage Silty Clay, Occasionally Flooded-----	56
Pa	Parsons Silt Loam, 0 To 2 Percent Slopes-----	71
Pt	Pits, Quarries-----	0
Rc	Ringo-Clareson Complex, 9 To 15 Percent Slopes-----	40
Ta	Tamaha Silt Loam, 1 To 5 Percent Slopes-----	71
Ve	Verdigris Silt Loam, Occasionally Flooded-----	87
Vf	Verdigris Silt Loam, Channeled-----	61
W	Water-----	0
ZAA	Zaar Silty Clay, 1 To 3 Percent Slopes-----	71
Za	Zaar Silty Clay, 0 To 2 Percent Slopes-----	69
Zb	Zaar Silty Clay, 2 To 6 Percent Slopes-----	63

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(Entries under "Erosion factors--T" apply to the entire profile. Entries under "K", "Kf", "Wind Erodibility Group" and "Wind Erodibility Index" apply only to the surface layer)

Map symbol and soil name	Percent	Irr Cap Class	Nonirr Cap Class	Prime Farmland	Hydro-logic Group	Range site name	Windbreak suitability group	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
001CB:CATOOSA---	60	N/A	6s	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.37	.37	2	6	48
001CB:ROCK OUTCROP-----	30	N/A	8	Not prime farmland	D	Unspecified		---	---	-	---	---
001CC:COLLINSVILLE-----	50	N/A	6e	Not prime farmland	D	Shallow Sandstone (pe35-42)	10	.20	.20	1	3	86
001CC:BATES-----	40	N/A	6e	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.32	.32	3	5	56
037MD:KANIMA---	100	N/A	7s	Not prime farmland	C	Unspecified	10	.28	.37	5	7	38
107CM:CLARESON--	60	N/A	6e	Not prime farmland	C	Shallow Flats (pe35-42)	6D	.32	.32	2	7	38
107CM:ROCK OUTCROP-----	20	N/A	8	Not prime farmland	D	Unspecified		---	---	-	---	0
107EF:ERAM-----	50	N/A	6e	Not prime farmland	C	Clay Upland (pe35-42)	4C	.37	.37	3	7	38
107EF:LEBO-----	30	N/A	6e	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.32	.37	3	7	38
107SN:SUMMIT----	85	N/A	2e	All areas are prime farmland	C	Clay Upland (pe35-42)	4C	.37	.37	5	4	86
107SO:SUMMIT----	85	N/A	3e	All areas are prime farmland	C	Clay Upland (pe35-42)	4C	.37	.37	5	4	86
107VC:VERDIGRIS-	85	N/A	5w	Not prime farmland	B	Loamy Lowland (pe35-42)	1	.32	.32	5	6	48
133EC:ERAM-----	90	N/A	4e	Not prime farmland	C	Clay Upland (pe35-42)	4C	.37	.37	3	7	38
133SC:SHIDLER---	50	N/A	6e	Not prime farmland	D	Shallow Limy (pe35-42)	10	.32	.32	1	4L	86
133SC:CATOOSA---	40	N/A	2e	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.37	.37	2	6	48
AED:ARENTS, EARTHEN DAM----	100	N/A	8	Not prime farmland		Unspecified		---	---	-	---	---
Ba:BATES-----	90	N/A	2e	All areas are prime farmland	B	Loamy Upland (pe35-42)	6D	.32	.32	3	5	56
Bc:BATES-----	85	N/A	3e	All areas are prime farmland	B	Loamy Upland (pe35-42)	6D	.32	.32	3	5	56
Bd:BATES-----	85	N/A	4e	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.32	.32	3	5	56

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Map symbol and soil name	Percent	Irr Cap Class	Nonirr Cap Class	Prime Farmland	Hydro-logic Group	Range site name	Windbreak suitability group	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
								K	Kf	T		
Bh:BOLIVAR-----	65	N/A	6e	Not prime farmland	B	Savannah (pe35-42)	6D	.24	.24	3	3	86
Bh:HECTOR-----	20	N/A	6e	Not prime farmland	D	Shallow Savannah (pe35-42)	10	.24	.28	1	3	86
Ca:CATOOSA-----	85	N/A	2e	All areas are prime farmland	B	Loamy Upland (pe35-42)	6D	.37	.37	2	6	48
Cs:CLARESON-----	90	N/A	6s	Not prime farmland	C	Shallow Flats (pe35-42)	6D	.24	.49	2	8	0
De:DENNIS-----	85	N/A	2e	All areas are prime farmland	C	Loamy Upland (pe35-42)	4C	.43	.43	5	6	48
Df:DENNIS-----	85	N/A	3e	All areas are prime farmland	C	Loamy Upland (pe35-42)	4C	.43	.43	5	6	48
Ec:ERAM-----	75	N/A	6e	Not prime farmland	C	Clay Upland (pe35-42)	4C	.37	.37	3	7	38
Ec:COLLINSVILLE-	15	N/A	6e	Not prime farmland	D	Shallow Sandstone (pe35-42)	10	.20	.20	1	3	86
Ke:KENOMA-----	90	N/A	3e	All areas are prime farmland	D	Clay Upland (pe35-42)	4C	.43	.43	3	6	48
La:LANTON-----	85	N/A	2w	Prime farmland if drained	C	Loamy Lowland (pe35-42)	1	.37	.37	5	7	38
Le:LEANNA-----	85	N/A	2w	Prime farmland if drained	D	Clay Lowland (pe35-42)	2	.32	.32	3	6	48
Ma:MASON-----	90	N/A	1	All areas are prime farmland	B	Loamy Lowland (pe35-42)	1	.37	.37	5	6	48
No:NOWATA-----	85	N/A	4e	Not prime farmland	B	Loamy Upland (pe35-42)	6D	.37	.37	2	6	48
Or:ORTHENTS-----	100	N/A	6s	Not prime farmland	C	Unspecified	10	.28	.28	5	7	38
Os:OSAGE-----	90	N/A	3w	Prime farmland if drained	D	Clay Lowland (pe35-42)	2	.28	.28	5	4	86
Pa:PARSONS-----	90	N/A	2s	All areas are prime farmland	D	Clay Upland (pe35-42)	4C	.49	.49	3	5	56
Pt:Pits, quarries-----	100	N/A	N/A	Not prime farmland		Unspecified		---	---	-	---	0
Rc:RINGO-----	70	N/A	6e	Not prime farmland	D	Clay Upland (pe35-42)	4C	.28	.28	3	4	86
Rc:CLARESON-----	15	N/A	6s	Not prime farmland	C	Shallow Flats (pe35-42)	6D	.24	.49	2	8	0

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Map symbol and soil name	Percent	Irr Cap Class	Nonirr Cap Class	Prime Farmland	Hydro-logic Group	Range site name	Windbreak suitability group	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
								K	Kf	T		
Ta:TAMAHA-----	85	N/A	3e	All areas are prime farmland	D	Savannah (pe35-42)	4C	.43	.43	5	5	56
Ve:VERDIGRIS----	95	N/A	2w	All areas are prime farmland	B	Loamy Lowland (pe35-42)	1	.32	.32	5	6	48
Vf:VERDIGRIS----	90	N/A	5w	Not prime farmland	B	Loamy Lowland (pe35-42)	1	.32	.32	5	6	48
W:WATER-----	100	N/A	N/A			Unspecified		---	---	-	---	---
ZAA:ZAAR-----	96	N/A	3e	All areas are prime farmland	D	Clay Upland (pe35-42)	4C	.28	.28	5	4	86
Za:ZAAR-----	90	N/A	3w	All areas are prime farmland	D	Clay Upland (pe35-42)	4C	.28	.28	5	4	86
Zb:ZAAR-----	90	N/A	4e	All areas are prime farmland	D	Clay Upland (pe35-42)	4C	.28	.28	5	4	86

RANGELAND PRODUCTIVITY  
Bourbon County, Kansas

Use and Explanation of Rangeland, Grazed Forest Land, Native Pastureland Interpretations

Information in this subsection can be used to plan the use and management of soils for rangeland, grazed forest land, and native pasture. Different kinds of soils vary in their capacity to produce native grasses and other plants suitable for grazing. Information in this subsection provides groupings of similar soils and estimates of potential forage production, which can be used to determine livestock stocking rates.

Rangeland. Range is land on which the native vegetation (climax or natural potential plant community) is predominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing and browsing. Range includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain shrub and forb communities. Rangeland receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed Forest Land. Includes land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significantly impairing other forest values.

Native Pasture. Includes land on which the native vegetation (climax or natural potential plant community) is forest but which is used and managed primarily for production of native plants for forage. Native pasture includes cut-over forest land and forest land cleared and now managed for native or naturalized forage plants.

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management based on the relationship between the soils and vegetation and water.

The Rangeland, Grazed Forest land, Native Pastureland Interpretations shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, unfavorable years. An explanation of the column headings in this table follows.

An ecological site is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of a site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, average, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the National Range and Pasture Handbook, which is available in local offices of the Natural Resources Conservation Service. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

RANGELAND PRODUCTIVITY--Continued  
Bourbon County, Kansas

(Only the soils that support rangeland vegetation suitable for grazing are rated.) Refer to range site description to determine the percentage allowable of grasses, forbs, and shrubs for the range ecological site.

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Average year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
001CB:				
Catoosa-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Rock Outcrop-----	---	---	---	---
001CC:				
Collinsville-----	Shallow Sandstone (pe35-42)	2,600	1,850	1,250
Bates-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
037MD:				
Kanima-----	---	---	---	---
107CM:				
Clareson-----	Shallow Flats (pe35-42)	5,000	4,000	3,000
Rock Outcrop-----	---	---	---	---
107EF:				
Eram-----	Clay Upland (pe35-42)	6,000	4,000	2,500
Lebo-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
107SN:				
Summit-----	Clay Upland (pe35-42)	6,000	4,000	2,500
107SO:				
Summit-----	Clay Upland (pe35-42)	6,000	4,000	2,500
107VC:				
Verdigris-----	Loamy Lowland (pe35-42)	9,000	7,000	5,500
133EC:				
Eram-----	Clay Upland (pe35-42)	6,000	4,000	2,500
133SC:				
Shidler-----	Shallow Limy (pe35-42)	3,500	2,500	1,750
Catoosa-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
AED:				
Arents, Earthen Dam-----	---	---	---	---
Ba:				
Bates-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Bc:				
Bates-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Bd:				
Bates-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Bh:				
Bolivar-----	Savannah (pe35-42)	5,000	4,000	3,000
Hector-----	Shallow Savannah (pe35-42)	2,600	1,850	1,250
Ca:				
Catoosa-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Cs:				
Clareson-----	Shallow Flats (pe35-42)	5,000	4,000	3,000
De:				
Dennis-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Df:				
Dennis-----	Loamy Upland (pe35-42)	6,250	4,750	3,250
Ec:				
Eram-----	Clay Upland (pe35-42)	6,000	4,000	2,500
Collinsville-----	Shallow Sandstone (pe35-42)	4,000	3,000	2,000
Ke:				
Kenoma-----	Clay Upland (pe35-42)	6,000	4,000	2,500
La:				
Lanton-----	Loamy Lowland (pe35-42)	9,000	7,000	5,500
Le:				
Leanna-----	Clay Lowland (pe35-42)	8,750	6,250	4,500
Ma:				
Mason-----	Loamy Lowland (pe35-42)	9,000	7,000	5,500
No:				
Nowata-----	Loamy Upland (pe35-42)	5,500	4,000	2,500
Or:				
Orthents-----	---	---	---	---
Os:				
Osage-----	Clay Lowland (pe35-42)	8,750	6,250	4,500
Pa:				
Parsons-----	Clay Upland (pe35-42)	6,000	4,000	2,500
Pt:				
Pits, Quarries-----	---	---	---	---
Rc:				
Ringo-----	Clay Upland (pe35-42)	6,000	4,000	2,500
Clareson-----	Shallow Flats (pe35-42)	5,000	4,000	3,000
Ta:				
Tamaha-----	Savannah (pe35-42)	5,000	3,500	2,500
Ve:				
Verdigris-----	Loamy Lowland (pe35-42)	9,000	7,000	5,500
Vf:				
Verdigris, channeled-----	Loamy Lowland (pe35-42)	9,000	7,000	5,500
W:				
Water-----	---	---	---	---
Za:				
Zaar-----	Clay Upland (pe35-42)	6,000	4,000	2,500
ZAA:				
Zaar-----	Clay Upland (pe35-42)	6,000	4,000	2,500
Zb:				
Zaar-----	Clay Upland (pe35-42)	6,000	4,000	2,500

BUILDING SITE DEVELOPMENT  
Bourbon County, Kansas

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. The following tables show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

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 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. Somewhat 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. 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 tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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 depth to 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 depth to 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 depth to 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, depth to 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, depth to 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, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for 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.

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; depth to 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, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Very limited Shrink-swell	1.00	Very limited Depth to hard bedrock	1.00	Very limited Shrink-swell	1.00
		Depth to hard bedrock	0.74	Shrink-swell	1.00	Depth to hard bedrock	0.74
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	1.00
Bates-----	40	Not limited		Somewhat limited Depth to soft bedrock	0.29	Somewhat limited Slope	0.12
037MD: Kanima-----	100	Somewhat limited Shrink-swell	0.04	Somewhat limited Shrink-swell	0.04	Somewhat limited Slope Shrink-swell	0.12 0.04
107CM: Clareson-----	60	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
		Slope	0.37	Depth to hard bedrock	1.00	Slope	1.00
		Content of large stones	0.26	Slope	0.37	Content of large stones	0.26
		Depth to hard bedrock	0.20	Content of large stones	0.26	Depth to hard bedrock	0.20
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
		Slope	0.04	Depth to saturated zone	1.00	Slope	1.00
		Depth to saturated zone	0.04	Depth to soft bedrock	0.71	Depth to saturated zone	0.04
				Slope	0.04		
Lebo-----	30	Somewhat limited Shrink-swell	0.99	Very limited Shrink-swell	0.99	Very limited Slope	1.00
		Slope	0.96	Slope	0.96	Shrink-swell	0.99
				Depth to soft bedrock	0.01		
107SN: Summit-----	85	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
				Depth to saturated zone	1.00		
107SO: Summit-----	85	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
				Depth to saturated zone	1.00	Slope	0.48
107VC: Verdigris-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
133EC: Eram-----	90	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone	1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	1.00	Depth to saturated zone	0.44
				Depth to soft bedrock	0.54	Slope	0.12
133SC: Shidler-----	50	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00
						Slope	0.48
Catoosa-----	40	Very limited Shrink-swell	1.00	Very limited Depth to hard bedrock	1.00	Very limited Shrink-swell	1.00
		Depth to hard bedrock	0.38	Shrink-swell	1.00	Depth to hard bedrock	0.38
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba: Bates-----	90	Not limited		Somewhat limited Depth to soft bedrock	0.10	Not limited	
Bc: Bates-----	85	Not limited		Somewhat limited Depth to soft bedrock	0.68	Somewhat limited Slope	0.48
Bd: Bates-----	85	Not limited		Somewhat limited Depth to soft bedrock	0.95	Somewhat limited Slope	0.48
Bh: Bolivar-----	65	Somewhat limited Shrink-swell Slope	0.62 0.16	Somewhat limited Shrink-swell Slope Depth to soft bedrock	0.62 0.16 0.15	Very limited Slope Shrink-swell	1.00 0.62
Hector-----	20	Very limited Depth to hard bedrock Slope	1.00 0.16	Very limited Depth to hard bedrock Slope	1.00 0.16	Very limited Depth to hard bedrock Slope	1.00 1.00
Ca: Catoosa-----	85	Very limited Shrink-swell Depth to hard bedrock	1.00 0.74	Very limited Depth to hard bedrock Shrink-swell	1.00 1.00	Very limited Shrink-swell Depth to hard bedrock	1.00 0.74
Cs: Clareson-----	90	Very limited Shrink-swell Content of large stones Depth to hard bedrock	1.00 0.49 0.29	Very limited Shrink-swell Depth to hard bedrock Content of large stones	1.00 1.00 0.49	Very limited Shrink-swell Content of large stones Depth to hard bedrock	1.00 0.49 0.29
De: Dennis-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell Depth to saturated zone	1.00 1.00
Df: Dennis-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell Depth to saturated zone Slope	1.00 1.00 0.12
Ec: Eram-----	75	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.89 0.04	Very limited Depth to saturated zone Shrink-swell Depth to soft bedrock Slope	1.00 0.89 0.46 0.04	Very limited Depth to saturated zone Slope Shrink-swell	1.00 1.00 0.89
Collinsville-----	15	Very limited Depth to hard bedrock Slope	1.00 0.04	Very limited Depth to hard bedrock Slope	1.00 0.04	Very limited Depth to hard bedrock Slope	1.00 1.00
Ke: Kenoma-----	90	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell Depth to saturated zone	1.00 1.00
La: Lanton-----	85	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
Le: Leanna-----	85	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.89	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.89	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.89

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ma: Mason-----	90	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
No: Nowata-----	85	Somewhat limited Shrink-swell	0.50	Very limited Depth to hard bedrock Shrink-swell	1.00 0.50	Somewhat limited Shrink-swell	0.50
		Depth to hard bedrock	0.06			Depth to hard bedrock Slope	0.06 0.00
Or: Orthents-----	100	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Os: Osage-----	90	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 1.00	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 1.00	Very limited Ponding Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00 1.00
Pa: Parsons-----	90	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	1.00			Depth to saturated zone	1.00
Pt: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
Rc: Ringo-----	70	Very limited Shrink-swell Slope	1.00 0.63	Very limited Shrink-swell Slope Depth to soft bedrock	1.00 0.63 0.46	Very limited Slope Shrink-swell	1.00 1.00
		Content of large stones Shrink-swell	1.00 0.38	Very limited Depth to hard bedrock Content of large stones Shrink-swell	1.00 1.00 0.38	Very limited Content of large stones Shrink-swell	1.00 0.38
		Depth to hard bedrock	0.29	Depth to hard bedrock Shrink-swell	0.38	Depth to hard bedrock	0.29
Ta: Tamaha-----	85	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	1.00			Depth to saturated zone	1.00
Ve: Verdigris-----	95	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	1.00			Depth to saturated zone	1.00
ZAA: Zaar-----	96	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	1.00			Depth to saturated zone	1.00
Zb: Zaar-----	90	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell	1.00
		Depth to saturated zone	1.00			Depth to saturated zone Slope	1.00 0.03

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Very limited Shrink-swell	1.00	Very limited Depth to hard bedrock	1.00	Somewhat limited Depth to bedrock	0.74
Rock Outcrop-----	30	Depth to hard bedrock Not rated	0.74	Cutbanks cave Not rated	0.10	Not rated	
001CC: Collinsville-----	50	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to bedrock	1.00
Bates-----	40	Slope Not limited	0.04	Cutbanks cave Somewhat limited Depth to soft bedrock	0.10 0.29	Droughty Slope Somewhat limited Depth to bedrock	1.00 0.04 0.29
037MD: Kanima-----	100	Somewhat limited Shrink-swell	0.04	Cutbanks cave Somewhat limited Cutbanks cave	0.10	Very limited Too clayey Droughty	1.00 0.37
107CM: Clareson-----	60	Very limited Shrink-swell	1.00	Very limited Depth to hard bedrock	1.00	Somewhat limited Slope	0.37
Rock Outcrop-----	20	Slope Content of large stones Depth to hard bedrock	0.37 0.26 0.20	Too clayey Slope Content of large stones Cutbanks cave	1.00 0.37 0.26 0.10	Depth to bedrock Droughty Not rated	0.20 0.00
107EF: Eram-----	50	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to bedrock	0.71
Lebo-----	30	Slope Depth to saturated zone	0.04 0.02	Too clayey Depth to soft bedrock Cutbanks cave Slope	0.88 0.71 0.10 0.04	Slope Depth to saturated zone	0.04 0.02
107SN: Summit-----	85	Very limited Shrink-swell	1.00	Somewhat limited Slope Too clayey Cutbanks cave Depth to soft bedrock	0.96 0.50 0.10 0.01	Very limited Too clayey Slope Depth to bedrock	1.00 0.96 0.01
107SO: Summit-----	85	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Not limited	
107VC: Verdigris-----	85	Very limited Flooding	1.00	Somewhat limited Flooding Cutbanks cave	0.80 0.10	Very limited Flooding	1.00
133EC: Eram-----	90	Very limited Shrink-swell	1.00	Very limited Depth to saturated zone Too clayey Depth to soft bedrock Cutbanks cave	1.00 0.88 0.54 0.10	Very limited Too clayey Depth to bedrock Depth to saturated zone	1.00 0.54 0.19

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
133SC: Shidler-----	50	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock	1.00
Catoosa-----	40	Very limited Shrink-swell Depth to hard bedrock	1.00 0.38	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10	Droughty Content of large stones Somewhat limited Depth to bedrock	0.92 0.46 0.39
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	
Ba: Bates-----	90	Not limited		Somewhat limited Cutbanks cave Depth to soft bedrock	0.10 0.10	Somewhat limited Depth to bedrock	0.10
Bc: Bates-----	85	Not limited		Somewhat limited Depth to soft bedrock Cutbanks cave	0.68 0.10	Somewhat limited Depth to bedrock	0.68
Bd: Bates-----	85	Not limited		Somewhat limited Depth to soft bedrock Cutbanks cave	0.95 0.10	Somewhat limited Depth to bedrock	0.95
Bh: Bolivar-----	65	Somewhat limited Shrink-swell Slope	0.62 0.16	Somewhat limited Slope Depth to soft bedrock Cutbanks cave	0.16 0.15 0.10	Somewhat limited Slope Depth to bedrock	0.16 0.16
Hector-----	20	Very limited Depth to hard bedrock Slope	1.00 0.16	Very limited Depth to hard bedrock Slope Cutbanks cave	1.00 0.16 0.10	Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.16
Ca: Catoosa-----	85	Very limited Shrink-swell Depth to hard bedrock	1.00 0.74	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10	Somewhat limited Depth to bedrock	0.74
Cs: Clareson-----	90	Very limited Shrink-swell Content of large stones Depth to hard bedrock	1.00 0.49 0.29	Very limited Depth to hard bedrock Too clayey Content of large stones Cutbanks cave	1.00 1.00 0.49 0.10	Somewhat limited Content of large stones Droughty Depth to bedrock	0.88 0.41 0.29
De: Dennis-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 0.94	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.59 0.10	Somewhat limited Depth to saturated zone	0.94
DF: Dennis-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 0.94	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Somewhat limited Depth to saturated zone	0.94

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ec: Eram-----	75	Very limited Depth to saturated zone Shrink-swell Slope	1.00 0.89 0.04	Very limited Depth to saturated zone Too clayey Depth to soft bedrock Cutbanks cave Slope	1.00 0.88 0.46 0.10 0.04	Very limited Depth to saturated zone Depth to bedrock Slope	1.00 0.46 0.04
Collinsville-----	15	Very limited Depth to hard bedrock Slope	1.00 0.04	Very limited Depth to hard bedrock Cutbanks cave Slope	1.00 0.10 0.04	Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.04
Ke: Kenoma-----	90	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.50 0.10	Very limited Depth to saturated zone	1.00
La: Lanton-----	85	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 0.75 0.50	Very limited Depth to saturated zone Flooding Cutbanks cave Too clayey	1.00 0.60 0.10 0.02	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
Le: Leanna-----	85	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 0.94 0.89	Very limited Depth to saturated zone Flooding Cutbanks cave Too clayey	1.00 0.60 0.10 0.02	Somewhat limited Depth to saturated zone Flooding	0.94 0.60
Ma: Mason-----	90	Somewhat limited Shrink-swell Flooding	0.50 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
No: Nowata-----	85	Somewhat limited Shrink-swell Depth to hard bedrock	0.50 0.06	Very limited Depth to hard bedrock Cutbanks cave	1.00 1.00	Somewhat limited Depth to bedrock	0.06
Or: Orthents-----	100	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope Droughty Gravel content	1.00 0.37 0.19
Os: Osage-----	90	Very limited Shrink-swell Ponding Depth to saturated zone Flooding	1.00 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Flooding Too clayey Cutbanks cave	1.00 1.00 0.60 0.24 0.10	Very limited Ponding Depth to saturated zone Too clayey Flooding	1.00 1.00 1.00 0.60
Pa: Parsons-----	90	Very limited Low strength Shrink-swell Depth to saturated zone	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.59 0.10	Very limited Depth to saturated zone	1.00
Pt: Pits, Quarries-----	100	Not rated		Not rated		Not rated	

BUILDING SITE DEVELOPMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Rc: Ringo-----	70	Very limited Shrink-swell Slope	1.00 0.63	Somewhat limited Slope Depth to soft bedrock Too clayey Cutbanks cave	0.63 0.46 0.12 0.10	Very limited Too clayey Slope Depth to bedrock	1.00 0.63 0.46
Clareson-----	15	Very limited Content of large stones Shrink-swell Depth to hard bedrock	1.00 0.38 0.29	Very limited Depth to hard bedrock Content of large stones Too clayey Cutbanks cave	1.00 1.00 1.00 0.10	Very limited Content of large stones Droughty Depth to bedrock	1.00 0.41 0.29
Ta: Tamaha-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Very limited Depth to saturated zone	1.00
Ve: Verdigris-----	95	Very limited Flooding	1.00	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Somewhat limited Flooding Cutbanks cave	0.80 0.10	Very limited Flooding	1.00
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Very limited Shrink-swell Depth to saturated zone	1.00 0.75	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Very limited Too clayey Depth to saturated zone	1.00 0.75
ZAA: Zaar-----	96	Very limited Shrink-swell Depth to saturated zone	1.00 0.88	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Very limited Too clayey Depth to saturated zone	1.00 0.88
Zb: Zaar-----	90	Very limited Shrink-swell Depth to saturated zone	1.00 0.75	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Very limited Too clayey Depth to saturated zone	1.00 0.75

CONSTRUCTION MATERIALS  
Bourbon County, Kansas

Construction Materials

The following tables give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated good, fair, or poor as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

The soils are rated as a probable or improbable source of sand and gravel. A rating of probable means that the source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

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 these tables, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the 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 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, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to 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.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

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, depth to 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).

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
001CB: Catoosa-----	60	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Rock Outcrop-----	30	Not rated		Not rated	
001CC: Collinsville-----	50	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Bates-----	40	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
037MD: Kanima-----	100	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
107CM: Clareson-----	60	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Rock Outcrop-----	20	Not rated		Not rated	
107EF: Eram-----	50	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Lebo-----	30	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
107SN: Summit-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
107SO: Summit-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
107VC: Verdigris-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
133EC: Eram-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
133SC: Shidler-----	50	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Catoosa-----	40	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
AED: Arents, Earthen Dam-	100	Not rated		Not rated	
Ba: Bates-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
Bc: Bates-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Bd: Bates-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Bh: Bolivar-----	65	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Hector-----	20	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ca: Catoosa-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Cs: Clareson-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
De: Dennis-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Df: Dennis-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ec: Eram-----	75	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Collinsville-----	15	Poor Bottom layer Thickest layer	0.00 0.00	Fair Bottom layer Thickest layer	0.00 0.08
Ke: Kenoma-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
La: Lanton-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Le: Leanna-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ma: Mason-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
No: Nowata-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Or: Orthents-----	100	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
Os: Osage-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Pa: Parsons-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Pt: Pits, Quarries-----	100	Not rated		Not rated	
Rc: Ringo-----	70	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Clareson-----	15	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ta: Tamaha-----	85	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Ve: Verdigris-----	95	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Vf: Verdigris, channeled	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
W: Water-----	100	Not rated		Not rated	
Za: Zaar-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
ZAA: Zaar-----	96	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Zb: Zaar-----	90	Poor Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(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 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Poor Too clayey Depth to bedrock Too acid Droughty No water erosion limitation	0.00 0.26 0.74 0.93 0.99	Poor Depth to bedrock Shrink-swell	0.00 0.61	Poor Too Clayey Depth to bedrock	0.00 0.26
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Poor Droughty Depth to bedrock Too acid	0.00 0.00 0.54	Poor Depth to bedrock	0.00	Poor Depth to bedrock Rock fragments Slope Too acid	0.00 0.01 0.96 0.98
Bates-----	40	Fair Too clayey Too acid Depth to bedrock Low content of organic matter Droughty	0.32 0.61 0.71 0.88 0.90	Poor Depth to bedrock	0.00	Fair Too Clayey Depth to bedrock Too acid	0.23 0.71 0.99
037MD: Kanima-----	100	Fair Too clayey Low content of organic matter Droughty Too acid	0.01 0.02 0.57 0.97	Fair Shrink-swell	0.99	Poor Hard to reclaim Too Clayey  Rock fragments Hard to reclaim	0.00 0.00  0.04 0.99
107CM: Clareson-----	60	Poor Too clayey Droughty Low content of organic matter Cobble content Depth to bedrock	0.00 0.20 0.50 0.74 0.79	Poor Depth to bedrock Cobble content Shrink-swell	0.00 0.11 0.59	Poor Rock fragments Too Clayey Slope  Depth to bedrock	0.00 0.00 0.63  0.79
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Poor Too clayey Depth to bedrock Droughty  Low content of organic matter Too acid No water erosion limitation	0.00 0.29 0.31  0.88 0.95 0.99	Poor Depth to bedrock Shrink-swell Depth to saturated zone	0.00 0.37 0.80	Poor Too Clayey Depth to bedrock Depth to saturated zone Slope	0.00 0.29 0.80  0.96
Lebo-----	30	Poor Too clayey Depth to bedrock	0.00 0.99	Poor Depth to bedrock Shrink-swell	0.00 0.72	Poor Too Clayey Slope Depth to bedrock	0.00 0.04 0.99
107SN: Summit-----	85	Poor Too clayey Low content of organic matter No water erosion limitation	0.00 0.88 0.99	Fair Shrink-swell Depth to saturated zone	0.15 0.89	Poor Too Clayey Depth to saturated zone	0.00 0.89
107SO: Summit-----	85	Poor Too clayey Low content of organic matter No water erosion limitation	0.00 0.88 0.99	Fair Shrink-swell Depth to saturated zone	0.14 0.89	Poor Too Clayey Depth to saturated zone	0.00 0.89

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(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 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107VC: Verdigris-----	85	Good		Good		Good	
133EC: Eram-----	90	Poor Too clayey Depth to bedrock Droughty  Too acid No water erosion limitation	0.00 0.46 0.53  0.68 0.99	Poor Depth to bedrock Shrink-swell Depth to saturated zone	0.00 0.37 0.53	Poor Too Clayey Depth to bedrock Depth to saturated zone	0.00 0.46 0.53
133SC: Shidler-----	50	Poor Droughty Depth to bedrock Too acid	0.00 0.00 0.99	Poor Depth to bedrock	0.00	Poor Depth to bedrock Rock fragments	0.00 0.32
Catoosa-----	40	Poor Too clayey Depth to bedrock Too acid Droughty No water erosion limitation	0.00 0.61 0.68 0.92 0.99	Poor Depth to bedrock Shrink-swell	0.00 0.00	Poor Too Clayey Depth to bedrock	0.00 0.61
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	
Ba: Bates-----	90	Fair Too acid Depth to bedrock	0.84 0.90	Poor Depth to bedrock	0.00	Fair Depth to bedrock	0.90
Bc: Bates-----	85	Fair Depth to bedrock Droughty Too acid	0.32 0.83 0.84	Poor Depth to bedrock	0.00	Fair Depth to bedrock	0.32
Bd: Bates-----	85	Fair Depth to bedrock Droughty Too acid Too clayey	0.05 0.27 0.84 0.92	Poor Depth to bedrock	0.00	Fair Rock fragments Depth to bedrock Too Clayey	0.01 0.05 0.87
Bh: Bolivar-----	65	Fair Too acid Depth to bedrock Droughty	0.54 0.84 0.96	Poor Depth to bedrock Shrink-swell	0.00 0.95	Fair Slope Depth to bedrock	0.84 0.84
Hector-----	20	Poor Droughty Depth to bedrock Too acid Low content of organic matter	0.00 0.00 0.32 0.50	Poor Depth to bedrock	0.00	Poor Depth to bedrock Slope Rock fragments Too acid	0.00 0.84 0.88 0.88
Ca: Catoosa-----	85	Fair Depth to bedrock Droughty Too acid No water erosion limitation	0.26 0.62 0.95 0.99	Poor Depth to bedrock Shrink-swell	0.00 0.32	Fair Depth to bedrock	0.26
Cs: Clareson-----	90	Poor Stone content Too clayey Droughty Depth to bedrock	0.00 0.00 0.00 0.71	Poor Depth to bedrock Stone content Shrink-swell	0.00 0.00 0.00	Poor Too Clayey Rock fragments Depth to bedrock	0.00 0.12 0.71

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(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 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
De: Dennis-----	85	Poor Too clayey  Low content of organic matter Too acid Water erosion	0.00  0.50 0.74 0.90	Fair Depth to saturated zone Shrink-swell	0.04  0.16	Poor Too Clayey  Depth to saturated zone	0.00  0.04
DF: Dennis-----	85	Poor Too clayey  Low content of organic matter Too acid Water erosion	0.00  0.50 0.74 0.90	Fair Depth to saturated zone Shrink-swell	0.04  0.14	Poor Too Clayey  Depth to saturated zone	0.00  0.04
Ec: Eram-----	75	Poor Too clayey  Depth to bedrock  Droughty Too acid No water erosion limitation	0.00  0.54  0.60 0.95 0.99	Poor Depth to bedrock  Depth to saturated zone Shrink-swell	0.00  0.00 0.70	Poor Depth to saturated zone Too Clayey  Depth to bedrock Slope	0.00  0.00  0.54 0.96
Collinsville-----	15	Poor Droughty Depth to bedrock Too acid	0.00 0.00 0.68	Poor Depth to bedrock	0.00	Poor Depth to bedrock Slope	0.00 0.96
Ke: Kenoma-----	90	Poor Too clayey  Low content of organic matter Too acid Water erosion	0.00  0.50 0.84 0.90	Poor Depth to saturated zone Shrink-swell	0.00  0.12	Poor Too Clayey  Depth to saturated zone	0.00  0.00
La: Lanton-----	85	Fair Too acid  Too clayey No water erosion limitation	0.95  0.98 0.99	Fair Depth to saturated zone Shrink-swell	0.14  0.16	Fair Depth to saturated zone Too Clayey	0.14  0.97
Le: Leanna-----	85	Poor Too clayey  Too acid  No water erosion limitation	0.00  0.61  0.99	Fair Depth to saturated zone Shrink-swell	0.04  0.15	Poor Too Clayey  Depth to saturated zone	0.00  0.04
Ma: Mason-----	90	Fair Low content of organic matter Too acid No water erosion limitation	0.50  0.97 0.99	Fair Shrink-swell	0.94	Good	
No: Nowata-----	85	Fair Droughty Depth to bedrock Too acid Too clayey No water erosion limitation	0.78 0.93 0.95 0.98 0.99	Poor Depth to bedrock Cobble content Shrink-swell	0.00 0.93 0.95	Poor Rock fragments Too Clayey Depth to bedrock	0.00 0.76 0.93

CONSTRUCTION MATERIALS--Continued  
Bourbon County, Kansas

(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 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Or: Orthents-----	100	Fair Low content of organic matter Too clayey Droughty	0.50 0.68 0.94	Poor Slope	0.00	Poor Rock fragments Slope Hard to reclaim Too Clayey	0.00 0.00 0.08 0.44
Os: Osage-----	90	Poor Too clayey Low content of organic matter	0.00 0.88	Poor Depth to saturated zone Shrink-swell	0.00 0.00	Poor Depth to saturated zone Too Clayey	0.00 0.00
Pa: Parsons-----	90	Poor Too clayey Too acid Water erosion	0.00 0.61 0.68	Poor Low strength Depth to saturated zone Shrink-swell	0.00 0.00 0.01	Poor Too Clayey Depth to saturated zone Too acid	0.00 0.00 0.99
Pt: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
Rc: Ringo-----	70	Poor Too clayey Depth to bedrock Droughty	0.00 0.54 0.81	Poor Depth to bedrock Shrink-swell	0.00 0.08	Poor Too Clayey Slope Depth to bedrock	0.00 0.37 0.54
Clareson-----	15	Poor Stone content Too clayey Droughty Depth to bedrock	0.00 0.00 0.00 0.71	Poor Depth to bedrock Stone content Shrink-swell	0.00 0.00 0.83	Poor Too Clayey Rock fragments Depth to bedrock	0.00 0.68 0.71
Ta: Tamaha-----	85	Poor Too clayey Low content of organic matter Too acid Water erosion	0.00 0.50 0.54 0.68	Poor Depth to saturated zone Shrink-swell	0.00 0.43	Poor Too Clayey Depth to saturated zone Too acid	0.00 0.00 0.98
Ve: Verdigris-----	95	Good		Good		Good	
Vf: Verdigris, channeled	90	Good		Good		Good	
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Poor Too clayey	0.00	Fair Depth to saturated zone Shrink-swell	0.14 0.15	Poor Too Clayey Depth to saturated zone	0.00 0.14
ZAA: Zaar-----	96	Poor Too clayey Too acid	0.00 0.97	Poor Shrink-swell Depth to saturated zone	0.00 0.07	Poor Too Clayey Depth to saturated zone	0.00 0.07
Zb: Zaar-----	90	Poor Too clayey	0.00	Fair Shrink-swell Depth to saturated zone	0.04 0.14	Poor Too Clayey Depth to saturated zone	0.00 0.14

RECREATIONAL INTERPRETATIONS  
Bourbon County, Kansas

Recreation

The soils of the survey area are rated in the following tables according to limitations that affect their suitability for recreation. 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 recreational uses. 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. Somewhat 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. 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 tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables 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 information in this table 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 ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

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, depth to 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, depth to 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, depth to 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 slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. 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; depth to 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, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability	0.15	Somewhat limited Depth to bedrock Slope Restricted permeability	0.74 0.28 0.15
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 1.00
Bates-----	40	Not limited		Not limited		Somewhat limited Slope Depth to bedrock	0.87 0.29
037MD: Kanima-----	100	Very limited Too clayey Restricted permeability	1.00 0.15	Very limited Too clayey Restricted permeability	1.00 0.15	Very limited Too clayey Slope Gravel content Restricted permeability	1.00 0.87 0.37 0.15
107CM: Clareson-----	60	Somewhat limited Slope Restricted permeability	0.37 0.15	Somewhat limited Slope Restricted permeability	0.37 0.15	Very limited Slope Depth to bedrock Restricted permeability	1.00 0.20 0.15
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Somewhat limited Restricted permeability Slope Depth to saturated zone	0.15 0.04 0.04	Somewhat limited Restricted permeability Slope Depth to saturated zone	0.15 0.04 0.02	Very limited Slope Depth to bedrock Restricted permeability Depth to saturated zone	1.00 0.71 0.15 0.04
Lebo-----	30	Very limited Too clayey Slope Restricted permeability	1.00 0.96 0.94	Very limited Too clayey Slope Restricted permeability	1.00 0.96 0.94	Very limited Slope Too clayey Restricted permeability Gravel content Depth to bedrock	1.00 1.00 0.94 0.32 0.01
107SN: Summit-----	85	Somewhat limited Restricted permeability	0.94	Somewhat limited Restricted permeability	0.94	Somewhat limited Restricted permeability Slope	0.94 0.13
107SO: Summit-----	85	Somewhat limited Restricted permeability	0.94	Somewhat limited Restricted permeability	0.94	Very limited Slope Restricted permeability	1.00 0.94
107VC: Verdigris-----	85	Very limited Flooding Restricted permeability	1.00 0.15	Somewhat limited Flooding Restricted permeability	0.40 0.15	Very limited Flooding Restricted permeability	1.00 0.15
133EC: Eram-----	90	Very limited Too clayey Restricted permeability Depth to saturated zone	1.00 0.94 0.44	Very limited Too clayey Restricted permeability Depth to saturated zone	1.00 0.94 0.19	Very limited Too clayey Restricted permeability Slope Depth to bedrock Depth to saturated zone	1.00 0.94 0.87 0.54 0.44
133SC: Shidler-----	50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Slope	1.00 1.00

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Catoosa-----	40	Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability	0.15	Content of large stones	0.46
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Somewhat limited Restricted permeability Slope	0.15 0.00
Ba: Bates-----	90	Not limited		Not limited		Not rated	
Bc: Bates-----	85	Not limited		Not limited		Somewhat limited Slope	0.00
Bd: Bates-----	85	Not limited		Not limited		Very limited Slope Depth to bedrock	1.00 0.68
Bh: Bolivar-----	65	Somewhat limited Slope	0.16	Somewhat limited Slope	0.16	Very limited Slope Depth to bedrock	1.00 0.16
Hector-----	20	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Slope	1.00 1.00
Ca: Catoosa-----	85	Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability Slope	0.15 0.00
Cs: Clareson-----	90	Somewhat limited Restricted permeability Too Stony	0.94 0.19	Somewhat limited Restricted permeability Too Stony	0.94 0.19	Somewhat limited Restricted permeability Content of large stones Depth to bedrock Too Stony Slope	0.94 0.88 0.29 0.19 0.03
De: Dennis-----	85	Very limited Depth to saturated zone Restricted permeability	1.00 0.94	Somewhat limited Restricted permeability Depth to saturated zone	0.94 0.94	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.94 0.00
DF: Dennis-----	85	Very limited Depth to saturated zone Restricted permeability	1.00 0.94	Somewhat limited Restricted permeability Depth to saturated zone	0.94 0.94	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.94 0.87
Ec: Eram-----	75	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.94 0.04	Very limited Depth to saturated zone Restricted permeability Slope	1.00 0.94 0.04	Very limited Depth to saturated zone Slope Restricted permeability Depth to bedrock	1.00 1.00 0.94 0.46
Collinsville-----	15	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 1.00
Ke: Kenoma-----	90	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Restricted permeability Depth to saturated zone	1.00 1.00	Very limited Restricted permeability Depth to saturated zone Slope	1.00 1.00 1.00 0.03
La: Lanton-----	85	Very limited Flooding Depth to saturated zone	1.00 1.00	Somewhat limited Restricted permeability Depth to saturated zone	0.94 0.75	Somewhat limited Depth to saturated zone Restricted permeability	1.00 0.94

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

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Map symbol and soil name	Pct of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Le: Leanna-----	85	Restricted permeability	0.94			Flooding	0.60
		Very limited Flooding	1.00	Somewhat limited Restricted permeability	0.94	Very limited Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.94	Restricted permeability	0.94
Ma: Mason-----	90	Restricted permeability	0.94			Flooding	0.60
		Very limited Flooding	1.00	Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability	0.15
No: Nowata-----	85	Restricted permeability	0.15				
		Somewhat limited Restricted permeability	0.15	Somewhat limited Restricted permeability	0.15	Somewhat limited Gravel content	0.92
Or: Orthents-----	100	Slope	0.50			Slope	0.50
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
Os: Osage-----	90	Depth to saturated zone	1.00	Somewhat limited Restricted permeability	0.15	Depth to bedrock	0.06
		Flooding	1.00	Very limited Slope Gravel content	1.00 0.19	Very limited Gravel content Slope	1.00 1.00
Pa: Parsons-----	90	Ponding	1.00	Very limited Ponding	1.00	Very limited Depth to saturated zone	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Too clayey	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Very limited Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
Pt: Pits, Quarries-----	100	Depth to saturated zone	1.00	Very limited Restricted permeability	1.00	Flooding	0.60
		Not rated		Depth to saturated zone	1.00	Very limited Restricted permeability	1.00
Rc: Ringo-----	70	Not rated		Not rated		Depth to saturated zone	1.00
		Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Restricted permeability	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
Clareson-----	15	Slope	0.63	Slope	0.63	Depth to bedrock	0.46
		Somewhat limited Restricted permeability	0.94	Somewhat limited Restricted permeability	0.94	Somewhat limited	
		Too Stony	0.19	Too Stony	0.19	Content of large stones	1.00
Ta: Tamaha-----	85	Content of large stones	0.01	Content of large stones	0.01	Restricted permeability	0.94
		Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Depth to bedrock	0.29
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too Stony	0.19
Ve: Verdigris-----	95	Slope	0.03			Slope	0.03
		Very limited Flooding	1.00	Not limited		Very limited Restricted permeability	1.00
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Somewhat limited Flooding	0.40	Depth to saturated zone	1.00
		Very limited Flooding	1.00			Slope	0.28
W: Water-----	100	Not rated		Not rated		Somewhat limited Flooding	0.60
						Very limited Flooding Slope	1.00 0.00

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Za: Zaar-----	90	Very limited Restricted permeability Too clayey Depth to saturated zone	1.00 1.00 1.00	Very limited Restricted permeability Too clayey Depth to saturated zone	1.00 1.00 0.75	Very limited Restricted permeability Too clayey Depth to saturated zone	1.00 1.00 1.00
ZAA: Zaar-----	96	Very limited Depth to saturated zone Too clayey  Restricted permeability	1.00 1.00 0.94	Very limited Too clayey  Restricted permeability Depth to saturated zone	1.00 0.94 0.88	Very limited Depth to saturated zone Too clayey  Restricted permeability Slope	1.00 1.00 0.94 0.00
Zb: Zaar-----	90	Very limited Restricted permeability Too clayey Depth to saturated zone	1.00 1.00 1.00	Very limited Restricted permeability Too clayey Depth to saturated zone	1.00 1.00 0.75	Very limited Restricted permeability Too clayey Depth to saturated zone Slope	1.00 1.00 1.00 0.72

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Paths and trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Not limited		Somewhat limited Depth to bedrock	0.74
Rock Outcrop-----	30	Not rated		Not rated	
001CC: Collinsville-----	50	Not limited		Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.04
Bates-----	40	Not limited		Somewhat limited Depth to bedrock	0.29
037MD: Kanima-----	100	Very limited Too clayey	1.00	Very limited Too clayey Droughty	1.00 0.37
107CM: Clareson-----	60	Not limited		Somewhat limited Slope Depth to bedrock Droughty	0.37 0.20 0.00
Rock Outcrop-----	20	Not rated		Not rated	
107EF: Eram-----	50	Not limited		Somewhat limited Depth to bedrock Slope Depth to saturated zone	0.71 0.04 0.02
Lebo-----	30	Very limited Too clayey	1.00	Very limited Too clayey Slope Depth to bedrock	1.00 0.96 0.01
107SN: Summit-----	85	Not limited		Not limited	
107SO: Summit-----	85	Not limited		Not limited	
107VC: Verdigris-----	85	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
133EC: Eram-----	90	Very limited Too clayey	1.00	Very limited Too clayey Depth to bedrock Depth to saturated zone	1.00 0.54 0.19
133SC: Shidler-----	50	Not limited		Very limited Depth to bedrock Droughty Content of large stones	1.00 0.92 0.46
Catoosa-----	40	Not limited		Somewhat limited Depth to bedrock	0.39
AED: Arents, Earthen Dam-	100	Not rated		Not rated	
Ba: Bates-----	90	Not limited		Somewhat limited Depth to bedrock	0.10
Bc: Bates-----	85	Not limited		Somewhat limited Depth to bedrock	0.68
Bd: Bates-----	85	Not limited		Somewhat limited Depth to bedrock	0.95
Bh: Bolivar-----	65	Not limited		Somewhat limited Slope Depth to bedrock	0.16 0.16
Hector-----	20	Not limited		Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.16
Ca: Catoosa-----	85	Not limited		Somewhat limited Depth to bedrock	0.74

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Paths and trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Cs: Clareson-----	90	Somewhat limited Too Stony	0.19	Somewhat limited Content of large stones Droughty Depth to bedrock	0.88 0.41 0.29
De: Dennis-----	85	Somewhat limited Depth to saturated zone	0.86	Somewhat limited Depth to saturated zone	0.94
DF: Dennis-----	85	Somewhat limited Depth to saturated zone	0.86	Somewhat limited Depth to saturated zone	0.94
Ec: Eram-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Depth to bedrock Slope	1.00 0.46 0.04
Collinsville-----	15	Not limited		Very limited Depth to bedrock Droughty Slope	1.00 1.00 0.04
Ke: Kenoma-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
La: Lanton-----	85	Somewhat limited Depth to saturated zone	0.44	Somewhat limited Depth to saturated zone Flooding	0.75 0.60
Le: Leanna-----	85	Somewhat limited Depth to saturated zone	0.86	Somewhat limited Depth to saturated zone Flooding	0.94 0.60
Ma: Mason-----	90	Not limited		Not limited	
NO: Nowata-----	85	Not limited		Somewhat limited Depth to bedrock	0.06
Or: Orthents-----	100	Very limited Slope	1.00	Very limited Slope Droughty Gravel content	1.00 0.37 0.19
Os: Osage-----	90	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey Flooding	1.00 1.00 1.00 0.60
Pa: Parsons-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Pt: Pits, Quarries-----	100	Not rated		Not rated	
RC: Ringo-----	70	Very limited Too clayey	1.00	Very limited Too clayey Slope Depth to bedrock	1.00 0.63 0.46
Clareson-----	15	Somewhat limited Too Stony Content of large stones	0.19 0.01	Very limited Content of large stones Droughty Depth to bedrock	1.00 0.41 0.29
Ta: Tamaha-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Ve: Verdigris-----	95	Not limited		Somewhat limited	

RECREATIONAL INTERPRETATIONS--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Paths and trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Vf: Verdigris, channeled	90	Somewhat limited Flooding	0.40	Flooding	0.60
W: Water-----	100	Not rated		Very limited Flooding	1.00
Za: Zaar-----	90	Very limited Too clayey Depth to saturated zone	1.00 0.44	Not rated	
ZAA: Zaar-----	96	Very limited Too clayey Depth to saturated zone	1.00 0.73	Very limited Too clayey Depth to saturated zone	1.00 0.88
Zb: Zaar-----	90	Very limited Too clayey Depth to saturated zone	1.00 0.44	Very limited Too clayey Depth to saturated zone	1.00 0.75

WILDLIFE INTERPRETATIONS  
Bourbon County, Kansas

Use and Explanation of Wildlife Interpretations

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the development of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, water, and living space. If any one of these elements is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area. If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

In the Wildlife Interpretations table, 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.

Suitability Ratings

The potential of the soil is rated good, fair, poor, or very poor.

Good - means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose.

Fair - means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results.

Poor - means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort.

Very Poor - means that limitations are very severe for the designated element or kind of wildlife habitat. Habitat is difficult to create, improve, or maintain in most places, and management is difficult and requires intensive effort.

Description of Wildlife Habitat Elements

Openland habitat consists of croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kind of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, killdeer, cottontail rabbit, red fox, and coyote.

Woodland habitat consists of hardwood or conifers, or a mixture of these and associated grasses, legumes and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, thrushes, woodpeckers, owl, tree squirrels, raccoon, and deer.

Wetland habitat consists of water-tolerant plants in open, marshy or swampy, shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, bitterns, rails, kingfishers, shorebirds, muskrat, mink, and beaver.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are fragrant sumac, chokecherry, American plum, sand plum, and garden currant.

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

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

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, red fox and coyote.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, cottontail rabbit, prairie chicken, meadowlark, quail, and pheasant.

WILDLIFE INTERPRETATIONS  
Bourbon County, Kansas

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
001CB: CATOOSA-----	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	Good
ROCK OUTCROP----	---	---	---	---	---	---	---	---	---	---	---	---
001CC: COLLINSVILLE----	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	Fair
BATES-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
037MD: KANIMA-----	Very poor	Poor	Fair	Fair	Poor	---	Very poor	Very poor	Poor	Fair	Very poor	---
107CM: CLARESON-----	Fair	Good	Good	Fair	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor	Fair
ROCK OUTCROP----	---	---	---	---	---	---	---	---	---	---	---	---
107EF: ERAM-----	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	Good
LEBO-----	Poor	Poor	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
107SN: SUMMIT-----	Good	Good	Fair	Good	Good	---	Poor	Poor	Good	Good	Poor	Good
107SO: SUMMIT-----	Fair	Good	Fair	Good	Good	---	Poor	Very poor	Fair	Good	Very poor	Good
107VC: VERDIGRIS-----	Poor	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor	Good
133EC: ERAM-----	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	Good
133SC: SHIDLER-----	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	Poor	Very poor	Poor
CATOOSA-----	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	Good
AED: ARENTS, EARTHEN DAM-----	---	---	---	---	---	---	---	---	---	---	---	---
Ba: BATES-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
Bc: BATES-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
Bd: BATES-----	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
Bh: BOLIVAR-----	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
HECTOR-----	Very poor	Poor	Poor	Poor	Very poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
Ca: CATOOSA-----	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	Good
Cs: CLARESON-----	Poor	Good	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
De: DENNIS-----	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	Good

WILDLIFE INTERPRETATIONS--Continued  
Bourbon County, Kansas

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
Df: DENNIS-----	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Ec: ERAM-----	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
COLLINSVILLE----	Very poor	Poor	Poor	Very poor	Very poor	---	Very poor	Very poor	Poor	Very poor	Very poor	---
Ke: KENOMA-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Fair	Good	Fair	Poor	Fair
La: LANTON-----	Fair	Good	Fair	Good	Good	Good	Fair	Good	Fair	Good	Fair	---
Le: LEANNA-----	Fair	Good	Fair	Good	Good	Good	Fair	Good	Fair	Good	Fair	---
Ma: MASON-----	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
No: NOWATA-----	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Or: ORTHENTS-----	Very poor	Poor	Fair	Fair	Poor	---	Very poor	Very poor	Poor	Fair	Very poor	---
Os: OSAGE-----	Fair	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Good	Good	---
Pa: PARSONS-----	Fair	Good	Good	Good	Good	---	Fair	Poor	Good	Good	Poor	Good
Pt: Pits, quarries--	---	---	---	---	---	---	---	---	---	---	---	---
Rc: RINGO-----	Poor	Fair	Fair	Fair	Fair	Good	Poor	Very poor	Fair	Fair	Very poor	Fair
CLARESON-----	Poor	Good	Good	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
Ta: TAMAHA-----	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor	---
Ve: VERDIGRIS-----	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good
Vf: VERDIGRIS-----	Poor	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor	Good
W: WATER-----	---	---	---	---	---	---	---	---	---	---	---	---
Za: ZAAR-----	Fair	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor	Fair
ZAA: ZAAR-----	Fair	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor	Fair
Zb: ZAAR-----	Fair	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor	Fair

YIELDS PER ACRE OF PASTURE AND HAYLAND  
Bourbon County, Kansas

## Use and Explanation of Pastureland and Hayland Interpretations

This subsection provides information concerning the suitability of soils for the production of pasture and hayland. This subsection may contain pasture and hayland suitability groupings, land capability and yield estimates, yield estimates for individual grasses or legumes, or other information pertaining to the production of forage.

## Pasture and Hayland Suitability Groupings

Soils are placed in pasture and hayland groups according to their suitability for the production of forage. The soils in each group are enough alike to be suited to the same grasses or legumes, to have similar limitations and hazards, to require similar management, and to have similar productivity and other responses to management. Thus, the pasture and hayland suitability group is a convenient way of grouping the soils for their management. If used, these groupings are identified and described in other reports in the subsection.

## Yield Estimates

The average yields per acre that can be expected of the principal pasture or hayland crops, under a high level of management, are presented in this subsection. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall or other climatic factors. The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

Under good management, proper grazing is essential for the production of high quality forage, stand survival, and erosion control. Proper grazing helps plants maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation are also important management practices.

The Pasture and Hayland table show yield estimates in tons per acre and animal unit months for pasture and hayland groups. An animal unit month is the amount of forage required by one animal unit (AU) for 30 days. One animal unit (AU) is one (1000 pound) mature cow and a calf up to weaning age (usually six months of age) or their equivalent. The Natural Resources Conservation Service uses 900 pounds of air dry forage as the amount needed to meet this requirement. To maintain a healthy and vigorous plant community, the degree of use should never be greater than 50 percent. Therefore only 25 percent of the total biomass grown is considered consumed by the grazing animal. Animal Unit Months can be converted to air dry pounds per acre production by multiplying the AUM by 30 days, then by 30 pounds per day, and then by four. This figure is the amount of total forage production.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil in the Nontechnical Description section. Specific information on plants and yields can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

(Yields in the "N" columns are for nonirrigated soils; those in the "I" columns are for irrigated soils. Yields are those that can be expected under a high level of nonirrigated and irrigated management by component. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)  
Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Map symbol and soil name	Land capability		Alfalfa hay		Bromegrass hay		Tall fescue		Tall fescue hay	
	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM	Tons	Tons
001CB: Catoosa-----	6s	---	5.60	---	2.20	---	4.40	---	2.40	---
Rock Outcrop-----	8	---	---	---	---	---	---	---	---	---
001CC: Collinsville-----	6e	---	---	---	---	---	---	---	---	---
Bates-----	6e	---	5.60	---	2.20	---	4.40	---	2.40	---
037MD: Kanima-----	7s	---	---	---	---	---	---	---	---	---
107CM: Clareson-----	6e	---	---	---	---	---	---	---	---	---
Rock Outcrop-----	8	---	---	---	---	---	---	---	---	---
107EF: Eram-----	6e	---	---	---	---	---	---	---	---	---
Lebo-----	6e	---	---	---	---	---	---	---	---	---
107SN: Summit-----	2e	---	---	---	---	---	---	---	---	---
107SO: Summit-----	3e	---	---	---	---	---	---	---	---	---
107VC: Verdigris-----	5w	---	---	---	---	---	---	---	---	---
133EC: Eram-----	4e	---	---	---	---	---	4.50	---	2.50	---
133SC: Shidler-----	6e	---	---	---	---	---	---	---	---	---
Catoosa-----	2e	---	4.30	---	---	---	4.50	---	2.50	---
AED: Arents, Earthen Dam-----	8	---	---	---	---	---	---	---	---	---
Ba: Bates-----	2e	---	5.60	---	2.20	---	4.40	---	2.40	---
Bc: Bates-----	3e	---	5.60	---	2.20	---	4.40	---	2.40	---
Bd: Bates-----	4e	---	5.60	---	2.20	---	4.40	---	2.40	---
Bh: Bolivar-----	6e	---	5.60	---	2.20	---	4.40	---	2.40	---
Hector-----	6e	---	---	---	---	---	---	---	---	---
Ca: Catoosa-----	2e	---	5.60	---	2.20	---	4.40	---	2.40	---
Cs: Clareson-----	6s	---	---	---	---	---	---	---	---	---
De: Dennis-----	2e	---	4.90	---	2.60	---	5.00	---	2.70	---
Df: Dennis-----	3e	---	---	---	---	---	3.70	---	2.10	---
Ec: Eram-----	6e	---	---	---	---	---	3.70	---	2.10	---
Collinsville-----	6e	---	---	---	---	---	---	---	---	---
Ke: Kenoma-----	3e	---	---	---	---	---	3.70	---	2.10	---
La: Lanton-----	2w	---	---	---	---	---	5.00	---	2.70	---

(Yields in the "N" columns are for nonirrigated soils; those in the "I" columns are for irrigated soils. Yields are those that can be expected under a high level of nonirrigated and irrigated management by component. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)  
Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Map symbol and soil name	Land capability		Alfalfa hay		Bromegrass hay		Tall fescue		Tall fescue hay	
	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Tons	Tons	AUM	AUM	Tons	Tons
Le: Leanna-----	2w	---	---	---	---	---	5.00	---	2.70	---
Ma: Mason-----	1	---	5.60	---	2.90	---	5.60	---	3.10	---
No: Nowata-----	4e	---	---	---	---	---	---	---	---	---
Or: Orthents-----	6s	---	---	---	---	---	---	---	---	---
Os: Osage-----	3w	---	---	---	---	---	5.00	---	2.70	---
Pa: Parsons-----	2s	---	---	---	---	---	3.70	---	2.10	---
Pt: Pits, Quarries-----	---	---	---	---	---	---	---	---	---	---
Rc: Ringo-----	6e	---	---	---	2.20	---	4.40	---	2.40	---
Clareson-----	6s	---	---	---	---	---	---	---	---	---
Ta: Tamaha-----	3e	---	4.90	---	2.60	---	5.00	---	2.70	---
Ve: Verdigris-----	2w	---	5.60	---	2.90	---	5.60	---	3.10	---
Vf: Verdigris, channeled-----	5w	---	5.60	---	2.90	---	5.60	---	3.10	---
W: Water-----	---	---	---	---	---	---	---	---	---	---
Za: Zaar-----	3w	---	---	---	2.20	---	4.40	---	2.40	---
ZAA: Zaar-----	3e	---	---	---	---	---	4.40	---	2.40	---
Zb: Zaar-----	4e	---	---	---	2.20	---	4.40	---	2.40	---

CONSERVATION TREE AND SHRUB MANAGEMENT  
Bourbon County, Kansas

A Conservation Tree/Shrub Suitability Group (CTSG), formerly Windbreak Suitability Group, is a physiographic unit or area having similar climatic and edaphic characteristics that control the selection and height growth of trees and shrubs.

In this table, the Conservation Tree and Shrub Grouping is expressed as a group index number. The group index for Conservation Tree and Shrub groups (CTSG) are a guide for species best suited for different kinds of soil and for prediction height, growth, and effectiveness. The groupings can be used when selection woody plants for windbreaks, wildlife plantings riparian buffers, reforestation, other environmental plantings, recreation, landscaping, wetland restoration or enhancement and critical area plantings. CTSG's are developed to assure satisfactory species selection and adaptation to specific conditions of soil, climate and physiography. CTSG's are a guide for selection species best suited for different kinds of soil and prediction height growth and effectiveness.

All soil series mapped in the state have been placed in 10 groups of similar soil characteristics. Groups 1, 2, 3, 4, 6, and 9 are further divided into subgroups. In addition, all groups provide information by Major Land Resource Areas.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters a tree or shrub may be well or poorly suited because of soil characteristics. Each tree or shrub also has definable potentials of height growth depending on the factors just mentioned. Accurate definitions of potential heights are necessary for proper windbreak planning and design.

Windbreaks protect livestock, buildings, roads and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low-growing and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Windbreaks are often planted on land that did not grow trees originally. Knowledge of how trees perform on such land can be gained only by observing and recording their performance where trees have been planted and survived. The problem is compounded by the fact that many favorite windbreak species are not indigenous to the areas in which they are planted.

The Kansas Field Office Technical Guide Notice KS-230, Conservation Tree and Shrub Plantings Suitability Groups shows the adapted species listing for each group index number. Showing the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates are based on measurements and observation of established plantings that have been given adequate care. This information should be used to determine the placement of a windbreak, the area protected and the arrangement of species.

A number of attributes are included in the CTSG species tables for each group number found in this section of the Field Office Technical Guide. These attributes were rated subjectively and assigned a relative value to further assist those unfamiliar with individual species characteristics or desirability for the intended use. Definitions and explanations can be found. 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. See part 537 of the National Forestry Manual for additional information.

In the Tree and Shrub Management table interpretive ratings are given for various aspects of forest and conservation tree and shrub management. Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. Well suited indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. Moderately well suited indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable and fair performance can be expected. Some maintenance is needed. Poorly suited indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. Unsited indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

The paragraphs that follow indicate the soil properties considered in rating the soils for forest and conservation tree and shrub management practices. 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 on the Internet. Also, in the Kansas Field Office Technical Guide Notice KS-230, Conservation Tree and Shrub Plantings Suitability Groups.

Ratings in the columns suitability for hand planting and suitability for 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. The soils are described as well suited, moderately well suited, poorly suited, or unsited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column suitability for 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 soils are described as well suited, poorly suited, or unsited to this management activity. The part of the soil from the surface to a depth of about 1-foot is considered in the ratings.

Ratings in the column suitability for mechanical site preparation (deep) are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column potential for seedling mortality 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. The soils are described as having a low, moderate, or high potential for seedling mortality. See the National Forestry Manual, Subpart B for criteria used in rating management concerns. Specific information on plants and yields can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

CONSERVATION TREE AND SHRUB MANAGEMENT  
Bourbon County,  
Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. Pines and spruces are prone to disease problems. See text for further explanation of ratings in this table.)

Map symbol and soil name	Wind break Group	Suitability for hand planting	Suitability for mechanical planting	Suitability for mechanical site preparation (surface)	Suitability for mechanical site preparation (deep)	Potential for seedling mortality
		Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
001CB: Catoosa-----	6D	Moderately suited Stickiness	Moderately suited Stickiness	Well suited	Poorly suited  Restrictive layer	Low
Rock Outcrop-----		Not rated	Not rated	Not rated	Not rated	Not rated
001CC: Collinsville-----	10	Well suited	Moderately suited Slope	Well suited	Well suited	Low
Bates-----	6D	Moderately suited Stickiness	Moderately suited Slope Stickiness Rock fragments	Well suited	Well suited	Low
037MD: Kanima-----	10	Poorly suited Stickiness	Poorly suited Stickiness Slope Rock fragments	Poorly suited Stickiness	Well suited	Low
107CM: Clareson-----	6D	Moderately suited Stickiness  Rock fragments	Unsuited  Rock fragments Stickiness  Slope	Poorly suited  Rock fragments Stickiness	Poorly suited  Rock fragments Restrictive layer	Low
Rock Outcrop-----		Not rated	Not rated	Not rated	Not rated	Not rated
107EF: Eram-----	4C	Poorly suited Stickiness	Poorly suited Stickiness Slope	Poorly suited Stickiness	Well suited	Low
Lebo-----	6D	Poorly suited Stickiness	Poorly suited Stickiness Slope Rock fragments	Poorly suited Stickiness	Well suited	Low
107SN: Summit-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	Low
107SO: Summit-----	4C	Poorly suited Stickiness	Poorly suited Stickiness Slope	Poorly suited Stickiness	Well suited	Low
107VC: Verdigris-----	1	Well suited	Well suited	Well suited	Well suited	Low
133EC: Eram-----	4C	Poorly suited Stickiness	Poorly suited Stickiness Slope	Poorly suited Stickiness	Well suited	Low
133SC: Shidler-----	10	Well suited	Moderately suited Slope  Rock fragments	Well suited	Unsuited  Restrictive layer	Low
Catoosa-----	6D	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Restrictive layer	Low
AED: Arents, Earthen Dam-		Not rated	Not rated	Not rated	Not rated	Not rated
Ba: Bates-----	6D	Well suited	Well suited	Well suited	Well suited	Low
Bc: Bates-----	6D	Well suited	Moderately suited Slope	Well suited	Well suited	Low
Bd: Bates-----	6D	Well suited	Moderately suited Slope	Well suited	Well suited	Low

CONSERVATION TREE AND SHRUB MANAGEMENT  
Bourbon County,  
Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. Pines and spruces are prone to disease problems. See text for further explanation of ratings in this table.)

Map symbol and soil name	Wind break Group	Suitability for hand planting	Suitability for mechanical planting	Suitability for mechanical site preparation (surface)	Suitability for mechanical site preparation (deep)	Potential for seedling mortality
		Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
Bh: Bolivar-----	6D	Well suited	Moderately suited Slope	Well suited	Well suited	Low
Hector-----	10	Well suited	Moderately suited Slope	Well suited	Well suited	Low
Ca: Catoosa-----	6D	Moderately suited Stickiness	Moderately suited Stickiness	Well suited	Poorly suited Restrictive layer	Low
Cs: Clareson-----	6D	Poorly suited Stickiness Rock fragments	Unsuited Rock fragments Stickiness	Poorly suited Rock fragments Stickiness	Poorly suited Rock fragments Restrictive layer	Low
De: Dennis-----	4C	Well suited	Well suited	Well suited	Well suited	High Wetness
DF: Dennis-----	4C	Well suited	Moderately suited Slope	Well suited	Well suited	High Wetness
Ec: Eram-----	4C	Poorly suited Stickiness	Poorly suited Stickiness Slope	Poorly suited Stickiness	Well suited	High Wetness
Collinsville-----	10	Well suited	Moderately suited Slope	Well suited	Well suited	Low
Ke: Kenoma-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	High Wetness
La: Lanton-----	1	Well suited	Well suited	Well suited	Well suited	Low
Le: Leanna-----	2	Moderately suited Stickiness	Moderately suited Stickiness	Well suited	Well suited	High Wetness
Ma: Mason-----	1	Well suited	Well suited	Well suited	Well suited	Low
No: Nowata-----	6D	Well suited	Well suited	Well suited	Poorly suited Rock fragments	Low
Or: Orthents-----	10	Moderately suited Rock fragments	Unsuited Slope Rock fragments	Poorly suited Slope Rock fragments	Poorly suited Slope	Low
Os: Osage-----	2	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	High Wetness
Pa: Parsons-----	4C	Well suited	Well suited	Well suited	Well suited	High Wetness
Pt: Pits, Quarries-----		Not rated	Not rated	Not rated	Not rated	Not rated
Rc: Ringo-----	4C	Poorly suited Stickiness	Poorly suited Stickiness Slope	Poorly suited Stickiness	Well suited	Low
Clareson-----	6D	Poorly suited Rock fragments Stickiness	Unsuited Rock fragments Stickiness	Poorly suited Rock fragments Stickiness	Unsuited Rock fragments Restrictive layer	Low
Ta: Tamaha-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	High Wetness
Ve: Verdigris-----	1	Well suited	Well suited	Well suited	Well suited	Low
VF: Verdigris, channeled	1	Well suited	Well suited	Well suited	Well suited	Low

CONSERVATION TREE AND SHRUB MANAGEMENT  
Bourbon County,  
Kansas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. Pines and spruces are prone to disease problems. See text for further explanation of ratings in this table.)

Map symbol and soil name	Wind break Group	Suitability for hand planting	Suitability for mechanical planting	Suitability for mechanical site preparation (surface)	Suitability for mechanical site preparation (deep)	Potential for seedling mortality
		Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features	Rating class and limiting features
W: Water-----		Not rated	Not rated	Not rated	Not rated	Not rated
Za: Zaar-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	Low
ZAA: Zaar-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	High Wetness
Zb: Zaar-----	4C	Poorly suited Stickiness	Poorly suited Stickiness	Poorly suited Stickiness	Well suited	Low

ENGINEERING INDEX PROPERTIES  
Bourbon County, Kansas

Engineering Index Properties table gives the engineering classifications and the range of index properties for the layers of each soil in the survey area. Depth to the upper and lower boundaries of each layer is indicated. Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. Loam, for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, 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, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998). The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-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 particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection. If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in Engineering Index Properties table.

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 oven-dry 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 particle-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 generally omitted in the table.

ENGINEERING INDEX PROPERTIES--Continued  
Bourbon County, Kansas

(Absence of an entry indicates that the data were not estimated.)

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		
					Pct	Pct						
001CB: Catoosa-----	In											
	0-11	Silt loam	ML, CL	A-7-6, A-4, A-6, A-7, A-7-5, A-5	0	0	100	100	96-100	65-97	25-45	7-20
	11-27	Silty clay loam	CL, ML	A-7-5, A-7, A-7-6, A-4, A-5, A-6	0	0	100	100	96-100	65-98	28-50	9-30
	27-31	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock Outcrop--- 001CC: Collinsville---	---	---	---	---	---	---	---	---	---	---	---	---
	0-7	Fine sandy loam	SC-SM, CL, SC, CL-ML, ML, SM	A-4, A-2, A-2-4	---	0-15	85-100	85-100	75-95	30-60	15-26	NP-9
	7-15	Gravelly fine sandy loam	SC, SC-SM, SM	A-4, A-2, A-2-4	---	0-45	55-100	55-100	50-95	15-45	15-30	NP-10
	15-17	Unweathered bedrock			---	---	---	---	---	---	---	---
Bates-----	0-8	Loam	ML, CL, CL-ML	A-6, A-4	0	0	90-100	85-100	80-100	55-90	20-40	3-15
	8-11	Loam	ML, SC, SM, CL	A-7, A-6, A-7-6, A-4, A-5, A-7-5	0	0	85-100	85-100	80-100	45-85	25-45	8-20
	11-32	Clay loam	SM, SC, ML, CL	A-2, A-4, A-6, A-5, A-7, A-7-5, A-7-6, A-2-7, A-2-6, A-2-4, A-2-5	0	0	65-100	60-100	50-100	25-85	20-45	8-30
	32-34	Weathered bedrock			---	---	---	---	---	---	---	---
037MD: Kanima-----	0-6	Channery silty clay loam	CH, ML, MH, SM, CL, SC	A-6, A-7, A-7-5, A-7-6	---	0-10	50-95	50-95	50-90	40-90	33-55	12-37
	6-60	Very channery silty clay loam	MH, SC, CH, SM, CL, ML	A-7-6, A-6, A-4, A-7-5, A-7, A-5, A-2-7, A-2-6, A-2-5, A-2-4, A-2	---	0-10	50-90	45-90	40-85	35-85	30-55	8-35
107CM: Clareson-----	0-11	Silty clay loam	ML, MH, CL, CH	A-4, A-7-6, A-7-5, A-7, A-6, A-5	---	0-25	90-100	90-100	85-100	85-100	30-60	8-35
	11-16	Flaggy silty clay loam	ML, MH, CL, CH	A-6, A-7-6, A-7-5, A-7	---	0-65	75-100	70-95	65-95	65-95	35-60	11-35
	16-33	Very flaggy silty clay	CH, ML, MH, CL	A-7-6, A-7-5, A-7	---	50-85	70-85	60-80	55-75	55-75	41-85	18-55
	33-37	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock Outcrop--- 107EF: Eram-----	---	---	---	---	---	---	---	---	---	---	---	---
	0-8	Silty clay loam	ML, MH, CL, CH	A-7, A-7-5, A-7-6, A-6	0	0	85-100	85-100	85-100	70-95	33-55	12-35
	8-27	Silty clay	CH, ML, MH, CL	A-7-5, A-7-6, A-6, A-7	0	0	95-100	95-100	90-100	80-98	37-65	15-40
	27-31	Weathered bedrock			---	---	---	---	---	---	---	---
Lebo-----	0-12	Silty clay	CH, CL, MH, ML	A-7, A-7-5, A-7-6, A-6	---	0-5	90-100	80-100	80-100	75-95	35-60	15-35
	12-28	Silty clay	MH, CH, CL, ML	A-7, A-7-5, A-7-6, A-6	---	0-5	90-100	80-100	80-100	75-98	35-55	15-35
	28-38	Extremely channery silty clay loam	CL, ML	A-7-6, A-7-5, A-7, A-6	---	0-5	90-100	80-100	80-100	75-95	35-50	15-25
	38-42	Weathered bedrock			---	---	---	---	---	---	---	---
107SN: Summit-----	0-11	Silty clay loam	CH, MH, CL, ML	A-7, A-7-5, A-7-6, A-6	0	0	90-100	85-100	80-100	70-99	35-60	11-30
	11-24	Silty clay	CH, MH, CL, ML	A-7-6, A-7, A-7-5	0	0	85-100	75-100	70-100	55-98	41-70	18-40
	24-33	Silty clay	CL, CH, ML, MH	A-7-6, A-7-5, A-7	0	0	85-100	75-100	70-100	55-98	41-70	18-40
	33-60	Silty clay	CL, CH, ML, MH	A-7, A-7-6, A-7-5	0	0	85-100	75-100	70-100	55-98	41-70	18-40
107SO: Summit-----	0-9	Silty clay loam	CH, ML, MH, CL	A-7, A-7-6, A-6, A-7-5	0	0	90-100	85-100	80-100	70-99	35-60	11-30
	9-22	Silty clay	CL, MH, ML, CH	A-7, A-7-5, A-7-6	0	0	85-100	75-100	70-100	55-98	41-70	18-40
	22-31	Silty clay	CH, ML, CL, MH	A-7, A-7-5, A-7-6	0	0	85-100	75-100	70-100	55-98	41-70	18-40
	31-60	Silty clay	CL, MH, CH, ML	A-7, A-7-6, A-7-5	0	0	85-100	75-100	70-100	55-98	41-70	18-40

ENGINEERING INDEX PROPERTIES--Continued  
Bourbon County, Kansas

(Absence of an entry indicates that the data were not estimated.)

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		
					Pct	Pct						
107VC: Verdigris-----	In											
	0-9	Silt loam	ML, CL-ML, CL	A-6, A-4	0	0	100	100	95-100	65-100	22-37	2-17
	9-32	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	100	100	95-100	65-100	22-37	2-17
	32-52	Silt loam	CL, ML	A-4, A-6, A-7-6, A-7-5, A-7, A-5	0	0	100	100	95-100	80-100	30-45	8-23
	52-60	Silt loam	ML, CL	A-6, A-5, A-7, A-7-5, A-7-6, A-4	0	0	100	100	95-100	80-100	30-45	8-23
133EC: Eram-----	0-10	Silty clay	CL, ML, CH, MH	A-7-6, A-7-5, A-6, A-7	0	0	85-100	85-100	85-100	70-95	33-65	12-40
	10-29	Silty clay	ML, MH, CH, CL	A-7-6, A-7-5, A-6, A-7	0	0	95-100	90-100	85-100	80-98	37-65	15-45
	29-31	Weathered bedrock			---	---	---	---	---	---	---	---
133SC: Shidler-----	0-12	Silt loam	ML, CL	A-6, A-4	---	0-25	75-100	75-100	70-100	50-97	30-37	8-15
	12-14	Unweathered bedrock			---	---	---	---	---	---	---	---
Catoosa-----	0-10	Silt loam	ML, CL	A-5, A-7-5, A-7-6, A-7, A-4, A-6	0	0	100	100	96-100	65-98	30-50	8-28
	10-31	Silty clay loam	CH, ML, CL, MH	A-7-6, A-7-5, A-6, A-7	0	0	85-100	85-100	85-100	70-98	33-77	12-50
	31-33	Unweathered bedrock			---	---	---	---	---	---	---	---
AED: Arents, Earthen Dam-----	---	---	---	---	---	---	---	---	---	---	---	---
Ba: Bates-----	0-12	Loam	CL, CL-ML, ML	A-4, A-6	0	0	90-100	85-100	80-100	51-90	20-40	3-15
	12-20	Loam	ML, CL, CL-ML	A-4, A-6	0	0	85-100	85-100	80-100	55-90	20-40	3-20
	20-28	Sandy clay loam	SM, CL, ML, SC	A-7, A-5, A-7-5, A-7-6, A-6, A-4	0	0	85-100	85-100	80-100	45-85	25-45	8-20
	28-35	Sandy loam	SC-SM, SC, SM	A-7-5, A-2-6, A-7-6, A-5, A-2, A-7, A-6, A-4, A-2-6, A-2-5, A-7, A-2-4, A-2-4	0	0-10	75-100	60-100	50-80	30-50	20-45	4-20
	35-37	Weathered bedrock			---	---	---	---	---	---	---	---
Bc: Bates-----	0-10	Loam	SC, SM, SC-SM, ML, CL-ML, CL	A-4, A-6	0	0	90-100	85-100	80-100	45-90	20-40	3-15
	10-16	Loam	SC-SM, CL, CL-ML, ML, SM, SC	A-6, A-4	0	0	85-100	85-100	80-100	45-90	20-40	3-20
	16-24	Sandy clay loam	ML, SC, SM, CL	A-5, A-7-5, A-7-6, A-7, A-6, A-4	0	0	85-100	85-100	80-100	45-85	25-45	8-20
	24-28	Sandy loam	SM, SC, SC-SM	A-7-5, A-7-6, A-5, A-2, A-7, A-6, A-4, A-2-5, A-2-7, A-2-4, A-2-6	0	0-10	75-100	60-100	50-80	30-50	20-45	4-20
	28-30	Unweathered bedrock			---	---	---	---	---	---	---	---
Bd: Bates-----	0-5	Loam	SC-SM, ML, SC, SM, CL-ML, CL	A-6, A-4	0	0	85-100	85-100	80-100	40-80	20-40	3-15
	5-23	Sandy clay loam	SM, SC	A-7-6, A-2-5, A-2-6, A-6, A-5, A-7-5, A-2-4, A-2-7, A-4, A-7	0	0-10	80-100	60-100	50-80	30-50	25-45	8-20
	23-25	Unweathered bedrock			---	---	---	---	---	---	---	---

ENGINEERING INDEX PROPERTIES--Continued  
Bourbon County, Kansas

(Absence of an entry indicates that the data were not estimated.)

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		
					Pct	Pct						
Bh: Bolivar-----	In											
	0-12	Fine sandy loam	SM, ML, SC-SM, CL-ML, SC, CL	A-4	0	0	100	90-100	70-100	36-75	15-30	NP-10
	12-17	Loam	CL, CL-ML, SC, SC-SM, SM, ML	A-6, A-4	0	0-10	95-100	90-100	70-100	40-70	15-30	NP-15
	17-26	Sandy clay loam	SC, CL, SM, ML	A-6	0	0-15	85-100	85-100	70-100	45-80	25-40	10-30
	26-34	Loam	CL, CL-ML, SC, SM, SC-SM, ML	A-6, A-4, A-2-6, A-2-4	0	0-15	80-100	60-100	60-95	15-65	25-40	NP-30
	34-36	Weathered bedrock			---	---	---	---	---	---	---	---
Hector-----	0-3	Fine sandy loam	CL, SM, SC, CL-ML, ML, SC-SM	A-4, A-2-4, A-2-6	0	0	80-100	50-100	70-100	25-55	15-30	NP-10
	3-7	Fine sandy loam	CL, CL-ML, ML, SC-SM, SM, SC	A-2-4, A-2-6, A-4	0	0	80-100	50-100	70-100	25-55	15-30	NP-10
	7-12	Fine sandy loam	SC, SC-SM, CL, CL-ML, SM, ML	A-6, A-2-6, A-2-4, A-2, A-4	0-5	0-10	55-100	50-100	50-95	10-45	15-30	NP-15
	12-14	Unweathered bedrock			---	---	---	---	---	---	---	---
Ca: Catoosa-----	0-11	Silt loam	ML, CL	A-6, A-4	0	0	100	100	96-100	90-100	30-60	8-20
	11-16	Silty clay loam	CH, ML, MH, CL	A-6, A-7-6, A-7, A-7-5	0	0	85-100	85-100	85-100	90-100	33-65	12-30
	16-27	Silty clay loam	CH, MH, ML, CL	A-7-6, A-7-5, A-6, A-7	0	0	75-100	70-100	70-100	60-100	36-65	16-35
	27-35	Unweathered bedrock			---	---	---	---	---	---	---	---
Cs: Clareson-----	0-10	Stony silty clay loam	ML, MH, CH, CL	A-7-5, A-5, A-7, A-7-6, A-4, A-6	10-50	0-50	75-100	70-95	65-95	60-90	30-60	8-35
	10-15	Very flaggy silty clay loam	CL, MH, ML, CH	A-6, A-7, A-7-5, A-7-6	20-80	0-50	70-100	70-98	70-98	60-95	35-65	11-45
	15-32	Extremely flaggy silty clay	ML, MH, CL, CH	A-7, A-7-6, A-7-5	20-95	0-40	70-100	70-97	65-95	60-95	41-85	18-60
	32-34	Unweathered bedrock			---	---	---	---	---	---	---	---
De: Dennis-----	0-15	Silt loam	CL, CL-ML, ML	A-6, A-4	0	0	100	100	94-100	65-97	20-37	1-15
	15-22	Silty clay loam	CL, ML	A-6, A-7, A-7-5, A-7-6	0	0	98-100	98-100	94-100	75-98	33-48	13-25
	22-48	Silty clay	ML, MH, CH, CL	A-7-6, A-6, A-7, A-7-5	0	0	98-100	98-100	94-100	75-98	37-65	15-42
	48-60	Silty clay loam	CL, MH, ML, CH	A-7-5, A-7-6, A-6, A-7	0	0	98-100	98-100	94-100	75-98	33-60	13-35
Df: Dennis-----	0-15	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	94-100	65-97	20-37	1-15
	15-22	Silty clay loam	CL, ML	A-6, A-7, A-7-6, A-7-5	0	0	98-100	98-100	94-100	75-98	33-48	13-25
	22-55	Silty clay	CL, CH, MH, ML	A-7-5, A-7-6, A-6, A-7	0	0	98-100	98-100	94-100	75-98	37-65	15-40
	55-60	Silty clay loam	CL, MH, ML, CH	A-7-5, A-7-6, A-6, A-7	0	0	98-100	98-100	94-100	75-98	33-60	13-35
Ec: Eram-----	0-10	Silty clay loam	CH, ML, MH, CL	A-7-5, A-6, A-7, A-7-6	0	0	85-100	85-100	85-100	70-95	33-60	12-35
	10-30	Silty clay	ML, MH, CH, CL	A-6, A-7, A-7-6, A-7-5	0	0	95-100	95-100	90-100	80-98	37-65	15-42
	30-32	Weathered bedrock			---	---	---	---	---	---	---	---
Collinsville---	0-14	Fine sandy loam	ML, SC-SM, SM, CL, SC, CL-ML	A-2, A-4, A-2-4	---	0-40	65-100	85-100	75-95	20-60	15-26	NP-7
	14-16	Unweathered bedrock			---	---	---	---	---	---	---	---
Ke: Kenoma-----	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	85-100	85-100	85-100	85-100	25-40	3-18
	8-24	Silty clay	CL, MH, CH	A-7, A-7-6, A-7-5	0	0	85-100	85-100	85-100	85-100	45-75	30-48
	24-50	Silty clay	CL, MH, CH	A-7-5, A-7-6, A-7	0	0	85-100	85-100	85-100	85-100	45-75	25-48
	50-60	Silty clay loam	CL, CH, MH	A-7-5, A-7-6, A-7	0	0	85-100	85-100	75-100	75-95	45-65	25-44

ENGINEERING INDEX PROPERTIES--Continued  
Bourbon County, Kansas

(Absence of an entry indicates that the data were not estimated.)

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		
					Pct	Pct						
La: Lanton-----	In											
	0-8	Silty clay loam	CL, ML	A-7, A-6, A-7-6	0	0	100	100	98-100	90-97	33-42	12-20
	8-36	Silty clay loam	CL, ML	A-7-6, A-6, A-7	0	0	100	100	98-100	90-98	33-42	12-25
	36-48	Silty clay	CH, ML, MH, CL	A-7-6, A-7-5, A-6, A-7	0	0	100	100	98-100	90-98	33-55	12-30
	48-60	Silty clay	ML, MH, CH, CL	A-7-5, A-7-6, A-7	0	0	100	100	98-100	90-98	40-80	20-45
Le: Leanna-----												
	0-6	Silt loam	ML, CL, CL-ML	A-7-5, A-6, A-4, A-7, A-5, A-7-6	0	0	100	100	95-100	85-100	25-50	5-20
	6-13	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-20
	13-38	Silty clay	CL, CH, MH	A-7-5, A-7-6, A-7	0	0	100	100	95-100	90-100	45-65	25-40
	38-60	Silty clay loam	ML, MH, CH, CL	A-7-6, A-7-5, A-6, A-7	0	0	100	100	95-100	90-100	35-55	20-35
Ma: Mason-----												
	0-17	Silt loam	CL, ML	A-4, A-6	0	0	100	100	96-100	65-98	30-37	8-15
	17-60	Silty clay loam	ML, CL	A-7, A-6, A-7-6, A-7-5, A-4, A-5	0	0	98-100	98-100	96-100	65-98	30-43	9-25
No: Nowata-----												
	0-15	Silt loam	SC, SM, ML, CL	A-4, A-6	0-10	0-15	70-100	60-100	70-95	40-95	30-37	8-13
	15-36	Extremely gravelly silty clay loam	SM, SC, ML, CL	A-7-6, A-6, A-7	0-15	0-65	70-95	65-90	50-85	40-80	20-42	12-19
	36-38	Unweathered bedrock			---	---	---	---	---	---	---	---
Or: Orthents-----												
	0-6	Extremely channery silty clay loam	ML, SM, CL, SC	A-6	---	0-10	50-80	50-75	50-75	40-75	33-40	12-20
	6-72	Extremely channery silty clay loam	SM, SC, ML, CL	A-2-6, A-2-4, A-2, A-4, A-6	---	0-10	50-75	40-65	38-63	32-57	20-40	8-18
Os: Osage-----												
	0-13	Silty clay	CH, MH	A-7, A-7-6, A-7-5	0	0	100	100	95-100	95-100	50-75	30-55
	13-60	Silty clay	ML, MH, CH, CL	A-7-5, A-7-6, A-7	0	0	100	100	95-100	90-100	40-80	20-50
Pa: Parsons-----												
	0-7	Silt loam	CL, ML, CL-ML	A-6, A-4	0	0	100	100	96-100	80-98	20-37	5-15
	7-15	Silt loam	CL, ML, CL-ML	A-6, A-4	0	0	100	100	96-100	85-98	20-37	5-15
	15-40	Silty clay	CL, MH, CH, ML	A-6, A-7-5, A-7, A-7-6	0	0	100	100	98-100	92-100	33-60	20-42
	40-60	Silty clay	CL, MH, CH, ML	A-7-5, A-7, A-7-6, A-6	0	0	100	100	95-100	82-100	33-60	20-42
Pt: Pits, Quarries-	0-60	Variable			---	---	---	---	---	---	---	---
Rc: Ringo-----												
	0-10	Silty clay	CH, CL, MH	A-7-6, A-7-5, A-7	---	0-5	90-100	90-100	85-100	85-100	35-60	25-40
	10-30	Silty clay	MH, CH, ML, CL	A-7-6, A-7, A-7-5	---	0-5	90-100	90-100	85-100	85-95	35-65	20-35
	30-31	Weathered bedrock			---	---	---	---	---	---	---	---
Clareson-----												
	0-10	Stony silty clay loam	CH, MH, ML, CL	A-6, A-4, A-7-6, A-5, A-7, A-7-5	10-50	0-50	75-98	70-95	65-95	60-92	30-60	8-35
	10-15	Very flaggy silty clay loam	ML, CL, MH, CH	A-7-5, A-7-6, A-6, A-7	20-80	0-50	70-98	70-98	70-98	60-97	35-65	11-45
	15-32	Extremely flaggy silty clay	CH, CL, MH, ML	A-7-6, A-7, A-7-5	20-95	0-40	75-98	70-97	65-97	60-97	41-85	18-60
	32-34	Unweathered bedrock			---	---	---	---	---	---	---	---
Ta: Tamaha-----												
	0-7	Silt loam	CL, CL-ML, ML	A-6, A-4	0	0	98-100	98-100	90-100	65-97	22-37	2-14
	7-12	Silty clay loam	ML, CL	A-4, A-5, A-7, A-6, A-7-6, A-7-5	0	0	95-100	95-100	90-100	75-98	30-42	8-25
	12-40	Silty clay	MH, ML, CH, CL	A-7-5, A-7-6, A-6, A-7	0	0	98-100	98-100	90-100	80-99	37-70	15-40
	40-60	Silty clay loam	ML, CL	A-7, A-6, A-4, A-7-5, A-7-6, A-5	0	0	95-100	95-100	90-100	70-98	30-45	8-30
Ve: Verdigris-----												
	0-22	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	95-100	65-100	22-35	2-15
	22-60	Silt loam	CL, ML	A-7-5, A-5, A-4, A-6, A-7, A-7-6	0	0	100	100	95-100	80-100	30-45	8-23

ENGINEERING INDEX PROPERTIES--Continued  
Bourbon County, Kansas

(Absence of an entry indicates that the data were not estimated.)

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		
					Pct	Pct						
Vf: Verdigris, channeled-----	In											
	0-22	Silt loam	CL-ML, ML, CL	A-4, A-6	0	0	100	100	95-100	65-100	22-35	2-15
	22-60	Silt loam	CL, ML	A-5, A-7-5, A-7-6, A-4, A-6, A-7	0	0	100	100	95-100	80-100	30-45	8-23
W: Water-----	---	---	---	---	---	---	---	---	---	---	---	---
Za: Zaar-----	0-15	Silty clay	CL, MH, CH	A-7-6, A-7, A-7-5	0	0	100	100	95-100	90-100	50-70	25-40
	15-48	Silty clay	CL, MH, CH	A-7-5, A-7, A-7-6	0	0	100	100	95-100	90-100	50-70	25-40
	48-60	Silty clay	MH, CH, CL, ML	A-7-6, A-7-5, A-7	0	0	100	100	95-100	90-100	40-65	15-40
ZAA: Zaar-----	0-16	Silty clay	MH, CL, CH	A-7-6, A-7-5, A-7	0	0	100	100	95-100	90-100	20-70	25-40
	16-38	Silty clay	CL, MH, CH	A-7, A-7-5, A-7-6	0	0	100	100	95-100	90-100	20-70	25-45
	38-53	Silty clay	CL, MH, CH	A-7-5, A-7-6, A-7	0	0	100	100	95-100	90-100	20-70	25-45
	53-60	Silty clay	CL, MH, CH	A-7-6, A-7-5, A-7	0	0	100	98-100	95-100	90-100	20-70	25-45
Zb: Zaar-----	0-15	Silty clay	CL, MH, CH	A-7-6, A-7-5, A-7	0	0	100	100	95-100	90-100	50-70	25-40
	15-48	Silty clay	CL, MH, CH	A-7-6, A-7-5, A-7	0	0	100	100	95-100	90-100	50-70	25-40
	48-60	Silty clay	ML, MH, CH, CL	A-7-6, A-7-5, A-7	0	0	100	100	95-100	90-100	40-65	15-40

Physical Properties table shows estimates of some physical 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.

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 this table, 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 this table, 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 this table, 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 earth moving operations.

Moist bulk density is the weight of soil (oven-dry) 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.

Permeability ( $K_{sat}$ ) 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 inches per hour, 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 Physical Properties 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 Physical Properties table as the K factor ( $K_w$  and  $K_f$ ) 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  $K_w$  indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor  $K_f$  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.

Explanation of Wind Erodibility Groups

Soil erodibility by wind is directly related to the percentage of dry non-erodible surface soil aggregates larger than 0.84 mm in diameter. From this percentage, the wind erodibility index (I-factor) is determined. The I-factor is an expression of the stability of these soil aggregates against breakdown by tillage and abrasion from wind erosion. Soils are placed in Wind Erodibility Groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 mm as shown in the following table.

WEG	Properties of Soil Surface Layer	Dry Soil Aggregates >0.84mm Percent	Wind Erodibility Index T/AC/Yr (I)
1	Very fine sand, fine sand, sand, or coarse sand	1	310 1/
		2	250
		3	220
		5	180
		7	160
		10	134
		2	Loamy very fine sand, loamy fine sand, loamy sand, loamy coarse sand, organic soil materials.
3	Very fine sandy loam, fine sandy loam, sandy loam, or coarse sandy loam.	25	86
4	Clay, silty clay, non-calcareous clay loam, or silty clay loam with >35 percent clay content.	25	86
4L	Calcareous 2/ loam, silt loam, clay loam, or silty clay loam.	25	86
5	Non-calcareous loam and silt loam with <20 percent clay content, or sandy clay loam, sandy clay, and hemic 3/ organic soil materials.	40	56
6	Non-calcareous loam and silt loam with >20 percent clay content, or non-calcareous clay loam with <35 percent clay content.	45	48
7	Silt, non-calcareous silty clay loam with >35 percent clay content and fibric 3/ organic soil material.	50	38
8	Soils not suitable for cultivation due to coarse fragments or wetness; wind erosion is not a problem.	--	0

1/ The "I" values for WEG 1 vary from 160 for coarse sands to 310 for very fine sands. Use an "I" of 220 as an average figure. For coarser sand that has gravel, use a lower figure. For a soil that has no gravel and very fine sand, use a higher figure. (Modification for coarse fragments is preparation.)

2/ Calcareous is a strongly or violently effervescent reaction to cold dilute (1N) HCL.

3/ See Soil Taxonomy for definition.

PHYSICAL PROPERTIES OF THE SOILS--Continued  
Bourbon County, Kansas: Published

(Single entries under "Sand and Silt" are a representative percentage are calculated using an algorithm. 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)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	in/hr	In/in	Pct	Pct					
001CB: Catoosa-----	0-11 11-27 27-31	4 4	69 56	15-35 27-55	1.30-1.55 1.20-1.70	0.60-2.00 0.20-0.60	0.15-0.24 0.15-0.24	0.0-3.0 3.0-6.5	1.0-5.0 0.5-2.0	.37 .37	.37 .37	2	6	48
Rock Outcrop- 001CC: Collinsville-	0-7 7-15 15-17	67 67	20 20	5-20 5-20	1.30-1.60 1.40-1.70	2.00-6.00 2.00-6.00	0.09-0.15 0.07-0.20	0.0-2.9 0.0-2.9	1.0-3.0 0.5-2.0	.20 .20	.20 .20	1	3	86
Bates-----	0-8 8-11 11-32 32-34	44 41 39	37 35 25	15-27 18-35 18-39	1.40-1.50 1.40-1.60 1.40-1.50	0.60-2.00 0.60-2.00 0.60-2.00	0.15-0.22 0.15-0.19 0.14-0.16	0.0-2.9 0.0-2.9 0.0-2.9	1.0-3.0 1.0-3.0 0.5-1.0	.32 .32 .20	.32 .32 .43	3	5	56
037MD: Kanima-----	0-6 6-60	5 7	50 53	27-65 18-65	1.00-1.60 1.40-2.00	0.20-0.60 0.20-0.60	0.08-0.17 0.02-0.12	0.0-9.0 0.0-9.0	0.5-2.0 0.0-1.0	.28 .15	.37 .37	5	7	38
107CM: Clareson-----	0-11 11-16 16-33 33-37	3 3 2	58 58 31	27-40 27-40 35-70	1.25-1.35 1.30-1.40 1.10-1.30	0.60-2.00 0.20-0.60 0.20-0.60	0.16-0.22 0.09-0.21 0.04-0.07	3.0-6.5 3.0-5.9 6.0-8.9	1.0-5.0 0.5-2.0 0.0-1.0	.32 .24 .24	.32 .24 .64	2	7	38
Rock Outcrop- 107EF: Eram-----	0-8 8-27 27-31	19 8	48 37	27-40 35-55	1.30-1.60 1.35-1.65	0.20-0.60 0.20-0.60	0.15-0.20 0.10-0.18	3.0-5.9 6.0-8.9	1.0-4.0 0.1-3.0	.37 .37	.37 .37	3	7	38
Lebo-----	0-12 12-28 28-38 38-42	7 5 13	46 45 53	22-55 22-55 22-40	1.10-1.45 1.10-1.50 1.25-1.65	0.20-0.60 0.20-0.60 0.00-0.20	0.21-0.23 0.15-0.18 0.07-0.10	3.0-10.0 3.0-5.9 3.0-5.9	2.0-6.0 1.0-4.0 0.5-2.0	.32 .37 .24	.37 .37 .64	3	7	38
107SN: Summit-----	0-11 11-24 24-33 33-60	13 9 9 12	56 47 46 45	27-45 40-60 40-60 40-60	1.25-1.50 1.35-1.60 1.35-1.60 1.35-1.60	0.20-0.60 0.20-0.60 0.20-0.60 0.06-0.20	0.16-0.20 0.10-0.18 0.10-0.18 0.10-0.18	3.0-5.9 6.0-8.9 6.0-8.9 6.0-8.9	1.0-4.0 1.0-2.0 0.5-1.5 0.5-1.0	.37 .32 .32 .32	.37 .32 .32 .32	5	4	86
107SO: Summit-----	0-9 9-22 22-31 31-60	13 9 9 12	56 47 46 45	27-45 40-60 40-60 40-60	1.25-1.50 1.35-1.60 1.35-1.60 1.35-1.60	0.20-0.60 0.20-0.60 0.20-0.60 0.06-0.20	0.16-0.20 0.10-0.18 0.10-0.18 0.10-0.18	3.0-5.9 6.0-8.9 6.0-8.9 6.0-8.9	1.0-4.0 1.0-2.0 0.5-1.5 0.5-1.0	.37 .32 .32 .32	.37 .32 .32 .32	5	4	86
107VC: Verdigris----	0-9 9-32 32-52 52-60	14 19 20 15	63 58 56 59	15-27 15-27 18-35 18-35	1.30-1.60 1.30-1.65 1.40-1.65 1.40-1.65	0.60-2.00 0.60-2.00 0.20-0.60 0.20-0.60	0.20-0.24 0.20-0.24 0.17-0.20 0.17-0.20	0.0-2.9 0.0-2.9 2.0-5.9 2.0-5.9	2.0-5.0 1.5-4.0 1.0-3.0 0.5-2.0	.32 .32 .32 .32	.32 .32 .32 .32	5	6	48
133EC: Eram-----	0-10 10-29 29-31	10 8	43 38	27-50 35-55	1.20-1.60 1.35-1.65	0.20-0.60 0.06-0.20	0.15-0.20 0.10-0.18	3.0-10.0 5.0-10.0	1.0-3.0 0.5-2.0	.37 .37	.37 .37	3	7	38
133SC: Shidler-----	0-12 12-14	24	52	18-26	1.30-1.50	0.60-2.00	0.16-0.24	0.0-2.9	1.0-5.0	.32	.32	1	4L	86
Catoosa-----	0-10 10-31 31-33	4 7	70 52	15-48 27-56	1.30-1.55 1.10-1.50	0.60-2.00 0.20-0.60	0.15-0.24 0.15-0.22	0.0-8.0 3.0-10.0	1.0-5.0 0.5-3.0	.37 .32	.37 .32	2	6	48
AED: Arents, Earthen Dam- Ba: Bates-----	0-12 12-20 20-28 28-35 35-37	44 41 46 52	35 30 22 29	15-27 15-27 18-40 15-40	1.40-1.50 1.40-1.50 1.50-1.60 1.50-1.60	0.60-2.00 0.60-2.00 0.60-2.00 0.60-2.00	0.15-0.22 0.15-0.20 0.15-0.19 0.15-0.19	0.0-2.9 0.0-2.9 0.0-2.9 0.0-2.9	1.0-3.0 1.0-3.0 1.0-3.0 0.0-1.0	.32 .32 .32 .28	.32 .32 .32 .28	3	5	56
Bc: Bates-----	0-10 10-16 16-24 24-28 28-30	44 44 48 52	35 30 20 29	15-27 15-27 18-35 15-40	1.40-1.50 1.40-1.50 1.50-1.60 1.50-1.60	0.60-2.00 0.60-2.00 0.60-2.00 0.60-2.00	0.15-0.22 0.15-0.20 0.15-0.19 0.15-0.19	0.0-2.9 0.0-2.9 0.0-2.9 0.0-2.9	1.0-3.0 1.0-3.0 0.5-1.5 0.0-1.0	.32 .32 .32 .28	.32 .32 .32 .28	3	5	56
Bd: Bates-----	0-5 5-23 23-25	44 48	30 20	15-27 15-35	1.40-1.50 1.50-1.60	0.60-2.00 0.60-2.00	0.15-0.22 0.15-0.19	0.0-2.9 0.0-2.9	1.0-3.0 1.0-3.0	.32 .32	.32 .32	3	5	56
Bh: Bolivar-----	0-12 12-17 17-26 26-34 34-36	59 50 40 44	35 41 28 35	5-18 10-18 20-35 12-27	1.20-1.70 1.20-1.60 1.30-1.60 1.20-1.60	2.00-6.00 2.00-6.00 0.60-2.00 2.00-6.00	0.16-0.18 0.16-0.18 0.12-0.16 0.16-0.18	0.0-2.9 0.0-2.9 3.0-5.9 0.0-0.8	0.5-2.0 0.0-1.0 0.0-1.0 0.0-0.8	.24 .24 .32 .24	.24 .24 .32 .24	3	3	86
Hector-----	0-3 3-7 7-12 12-14	67 67 63	20 20 19	5-20 5-20 10-25	1.30-1.60 1.30-1.60 1.30-1.70	2.00-6.00 2.00-6.00 2.00-6.00	0.10-0.14 0.08-0.14 0.08-0.15	0.0-2.9 0.0-2.9 0.0-2.9	0.5-2.0 0.5-0.5 0.5-0.5	.24 .28 .17	.28 .28 .28	1	3	86

PHYSICAL PROPERTIES OF THE SOILS--Continued  
Bourbon County, Kansas: Published

(Single entries under "Sand and Silt" are a representative percentage are calculated using an algorithm. 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)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	in/hr	In/in	Pct	Pct					
Ca:														
Catoosa-----	0-11	11	68	15-26	1.30-1.55	0.60-2.00	0.15-0.24	0.0-4.0	1.0-3.0	.37	.37	2	6	48
	11-16	7	60	27-39	1.25-1.50	0.60-2.00	0.13-0.19	3.0-8.0	1.0-3.0	.32	.32			
	16-27	7	54	27-55	1.15-1.55	0.20-0.60	0.12-0.18	3.0-9.0	0.0-1.0	.32	.32			
	27-35													
Cs:														
Clareson-----	0-10	3	58	27-40	1.20-1.50	0.60-2.00	0.09-0.17	3.0-7.0	1.0-4.0	.24	.49	2	8	0
	10-15	2	59	27-60	1.10-1.40	0.20-2.00	0.09-0.21	3.0-7.0	0.5-2.0	.24	.43			
	15-32	3	32	35-78	1.05-1.40	0.06-0.20	0.04-0.07	6.0-14.0	0.0-1.0	.24	.64			
	32-34					0.00-0.60								
De:														
Dennis-----	0-15	18	66	10-27	1.30-1.55	0.60-2.00	0.15-0.20	0.0-5.0	1.0-3.0	.43	.43	5	6	48
	15-22	13	58	27-35	1.30-1.50	0.20-0.60	0.15-0.20	3.0-5.9	0.5-2.0	.37	.43			
	22-48	7	42	35-55	1.20-1.40	0.06-0.20	0.15-0.20	6.0-11.0	0.0-1.0	.37	.37			
	48-60	12	51	30-45	1.30-1.50	0.06-0.20	0.15-0.20	3.0-11.0	0.0-1.0	.37	.43			
Df:														
Dennis-----	0-15	15	66	10-27	1.30-1.55	0.60-2.00	0.15-0.20	0.0-5.0	1.0-3.0	.43	.43	5	6	48
	15-22	12	57	27-35	1.30-1.50	0.20-0.60	0.15-0.20	3.0-5.9	0.5-2.0	.37	.43			
	22-55	7	48	35-55	1.20-1.40	0.06-0.20	0.15-0.20	6.0-11.0	0.0-1.0	.37	.37			
	55-60	12	51	30-45	1.30-1.50	0.06-0.20	0.15-0.20	3.0-11.0	0.0-1.0	.37	.43			
Ec:														
Eram-----	0-10	17	48	27-40	1.20-1.60	0.20-0.60	0.15-0.20	3.0-10.0	1.0-3.0	.37	.37	3	7	38
	10-30	8	38	35-55	1.35-1.65	0.06-0.20	0.10-0.18	3.0-10.0	0.0-2.0	.37	.37			
	30-32					0.00-0.20								
Collinsville-	0-14	64	26	5-20	1.30-1.60	2.00-6.00	0.09-0.15	0.0-2.9	1.0-3.0	.20	.20	1	3	86
	14-16					0.21-1.98								
Ke:														
Kenoma-----	0-8	5	72	18-27	1.35-1.45	0.20-0.60	0.22-0.24	0.0-2.9	2.0-4.0	.43	.43	3	6	48
	8-24	3	47	40-60	1.20-1.50	0.00-0.06	0.10-0.15	6.0-8.9	1.0-3.0	.32	.32			
	24-50	5	55	36-60	1.35-1.60	0.00-0.06	0.10-0.15	6.0-8.9	0.0-1.0	.32	.32			
	50-60	12	50	30-50	1.35-1.60	0.06-0.20	0.18-0.20	6.0-8.9	0.0-1.0	.32	.32			
La:														
Lanton-----	0-8	6	63	27-35	1.30-1.60	0.20-0.60	0.18-0.22	0.0-4.0	1.0-5.0	.37	.37	5	7	38
	8-36	5	64	27-35	1.30-1.70	0.20-0.60	0.18-0.22	3.0-5.9	1.0-4.0	.37	.37			
	36-48	5	57	30-45	1.35-1.65	0.06-0.20	0.12-0.18	3.0-5.9	0.0-1.0	.32	.32			
	48-60	5	53	35-50	1.35-1.65	0.00-0.06	0.12-0.18	9.0-25.0	0.0-0.5	.32	.32			
Le:														
Leanna-----	0-6	4	68	15-30	1.05-1.35	0.20-0.60	0.22-0.24	0.0-6.0	1.0-4.0	.32	.32	3	6	48
	6-13	6	65	15-30	1.25-1.50	0.20-0.60	0.22-0.24	0.0-6.0	1.0-3.0	.32	.32			
	13-38	5	53	35-50	1.35-1.55	0.20-0.60	0.11-0.18	3.0-8.9	0.8-3.0	.37	.37			
	38-60	4	57	27-45	1.35-1.60	0.06-0.20	0.11-0.20	3.0-12.0	0.0-2.0	.37	.37			
Ma:														
Mason-----	0-17	11	69	12-27	1.30-1.50	0.60-2.00	0.16-0.20	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	17-60	7	65	20-35	1.40-1.70	0.20-0.60	0.16-0.20	3.0-5.9	0.0-1.0	.37	.37			
No:														
Nowata-----	0-15	26	53	15-27	1.30-1.50	0.60-2.00	0.15-0.22	0.0-2.9	1.0-3.0	.37	.37	2	6	48
	15-36	20	49	27-35	1.45-1.60	0.20-0.60	0.08-0.12	3.0-5.9	0.0-2.0	.32	.32			
	36-38					0.00-0.60								
Or:														
Orthents-----	0-6	20	49	27-35	1.30-1.60	0.60-2.00	0.08-0.17	0.0-2.9	0.5-2.0	.28	.28	5	7	38
	6-72	18	48	18-35	1.40-1.70	0.60-2.00	0.02-0.12	0.0-2.9	0.0-1.0	.15	.15			
Os:														
Osage-----	0-13	3	52	40-65	1.20-1.60	0.06-0.20	0.12-0.14	9.0-25.0	1.0-4.0	.28	.28	5	4	86
	13-60	4	49	35-65	1.30-1.70	0.00-0.06	0.08-0.12	9.0-25.0	0.5-1.0	.28	.28			
Pa:														
Parsons-----	0-7	12	76	12-25	1.20-1.40	0.60-2.00	0.19-0.21	0.0-2.9	1.4-4.0	.49	.49	3	5	56
	7-15	9	75	14-25	1.20-1.45	0.60-2.00	0.19-0.21	0.0-2.9	0.8-2.0	.49	.49			
	15-40	4	45	38-60	1.30-1.50	0.00-0.06	0.14-0.21	6.0-15.0	0.2-2.5	.43	.43			
	40-60	13	47	33-55	1.30-1.50	0.06-0.20	0.14-0.21	3.0-15.0	0.0-0.5	.43	.43			
Pt:														
Pits, Quarries----	0-60													0
Rc:														
Ringo-----	0-10	7	48	40-50	1.35-1.40	0.00-0.06	0.12-0.16	6.0-8.9	2.0-4.0	.28	.28	3	4	86
	10-30	8	49	35-50	1.35-1.50	0.00-0.06	0.15-0.21	6.0-8.9	1.0-3.0	.28	.28			
	30-31					0.00-0.20								
Clareson-----	0-10	3	58	27-40	1.20-1.50	0.60-2.00	0.09-0.17	3.0-7.0	1.0-4.0	.24	.49	2	8	0
	10-15	2	59	27-60	1.10-1.40	0.20-2.00	0.09-0.21	3.0-7.0	0.5-2.0	.24	.43			
	15-32	3	32	35-78	1.05-1.40	0.06-0.20	0.04-0.07	3.0-14.0	0.0-1.0	.24	.64			
	32-34													
Ta:														
Tamaha-----	0-7	27	55	10-25	1.30-1.55	0.60-2.00	0.15-0.24	0.0-2.9	1.0-3.0	.43	.43	5	5	56
	7-12	18	52	20-35	1.40-1.70	0.20-2.00	0.15-0.22	3.0-5.9	0.5-2.0	.49	.49			
	12-40	6	46	35-60	1.35-1.65	0.00-0.06	0.14-0.20	6.0-8.9	0.0-1.0	.43	.43			
	40-60	20	48	20-35	1.40-1.70	0.20-2.00	0.15-0.22	3.0-5.9	0.0-1.0	.49	.49			
Ve:														
Verdigris----	0-22	20	59	15-27	1.30-1.40	0.60-2.00	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	5	6	48
	22-60	13	61	18-35	1.40-1.65	0.60-2.00	0.17-0.22	0.0-5.9	1.0-3.0	.32	.32			
Vf:														
Verdigris, channeled----	0-22	14	63	15-27	1.30-1.60	0.60-2.00	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	5	6	48
	22-60	15	59	18-35	1.40-1.65	0.60-2.00	0.17-0.22	0.0-5.9	1.0-3.0	.32	.32			
W:														
Water-----	---													

PHYSICAL PROPERTIES OF THE SOILS--Continued  
 Bourbon County, Kansas: Published

(Single entries under "Sand and Silt" are a representative percentage are calculated using an algorithm. 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)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										K	Kf	T		
	In	Pct	Pct	Pct	g/cc	in/hr	In/in	Pct	Pct					
Za:														
Zaar-----	0-15	5	52	40-60	1.20-1.40	0.06-0.20	0.12-0.14	6.0-13.0	2.0-4.0	.28	.28	5	4	86
	15-48	6	49	40-60	1.35-1.60	0.00-0.06	0.11-0.18	6.0-17.0	1.0-3.0	.28	.28			
	48-60	6	47	35-50	1.35-1.50	0.00-0.06	0.10-0.18	6.0-12.0	0.5-2.0	.28	.28			
ZAA:														
Zaar-----	0-16	6	53	40-60	1.10-1.30	0.06-0.20	0.12-0.14	6.0-12.0	2.0-4.0	.28	.28	5	4	86
	16-38	5	52	40-60	1.10-1.50	0.06-0.20	0.11-0.18	6.0-12.0	1.0-3.0	.28	.28			
	38-53	6	48	40-60	1.20-1.50	0.06-0.20	0.11-0.18	6.0-15.0	0.5-1.0	.28	.28			
	53-60	6	46	40-60	1.20-1.50	0.06-0.20	0.11-0.18	6.0-12.0	0.0-0.8	.28	.28			
Zb:														
Zaar-----	0-15	5	52	40-60	1.20-1.40	0.06-0.20	0.12-0.14	6.0-15.0	2.0-4.0	.28	.28	5	4	86
	15-48	5	50	40-60	1.35-1.50	0.00-0.06	0.11-0.18	6.0-17.0	1.0-3.0	.28	.28			
	48-60	6	46	35-50	1.35-1.50	0.00-0.06	0.10-0.18	6.0-12.0	0.5-2.0	.28	.28			

CHEMICAL PROPERTIES OF THE SOILS  
Bourbon County, Kansas

The Chemical Properties table shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils. 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. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

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

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

CHEMICAL PROPERTIES OF THE SOILS--Continued  
Bourbon County, Kansas

Map symbol and soil name	Depth	Cation-exchange capacity	Effective Cation Exchange Capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm		
001CB:								
Catoosa-----	0-11	8.0-31	---	5.6-6.5	0	0	0	0
	11-27	12-37	---	5.1-6.5	0	0	0	0
	27-31	---	---	---	---	---	---	---
Rock Outcrop----								
001CC:								
Collinsville----	0-7	4.0-18	---	5.1-6.5	0	0	0	0
	7-15	3.0-16	---	5.1-6.5	0	0	0	0
	15-17	---	---	---	---	---	---	---
Bates-----	0-8	8.0-22	---	5.6-6.5	0	0	0	0
	8-11	9.0-27	---	5.1-6.5	0	0	0	0
	11-32	8.0-25	---	5.1-6.5	0	0	0	0
	32-34	---	---	---	---	---	---	---
037MD:								
Kanima-----	0-6	12-43	---	5.6-8.4	---	---	---	---
	6-60	7.0-41	---	5.6-8.4	---	---	---	---
107CM:								
Clareson-----	0-11	13-34	---	5.6-7.3	0	0	0	0
	11-16	12-28	---	5.6-7.3	0	0	0	0
	16-33	14-44	---	5.6-7.3	0	0	0	0
	33-37	---	---	---	---	---	---	---
Rock Outcrop----								
107EF:								
Eram-----	0-8	13-32	---	5.6-6.5	---	---	0	---
	8-27	14-39	---	5.1-7.3	---	---	0	---
	27-31	---	---	---	---	---	---	---
Lebo-----	0-12	13-45	---	5.6-7.8	0	0	0	0
	12-28	11-41	---	5.6-7.8	0	0	0	0
	28-38	10-28	---	5.6-7.8	0	0	0	0
	38-42	---	---	---	---	---	---	---
107SN:								
Summit-----	0-11	13-35	---	5.6-7.3	---	---	---	---
	11-24	18-40	---	5.6-8.4	---	---	---	---
	24-33	17-39	---	5.6-8.4	---	---	---	---
	33-60	17-38	---	5.6-8.4	---	---	---	---
107SO:								
Summit-----	0-9	13-35	---	5.6-7.3	---	---	---	---
	9-22	18-40	---	5.6-8.4	---	---	---	---
	22-31	17-39	---	5.6-8.4	---	---	---	---
	31-60	17-38	---	5.6-8.4	---	---	---	---
107VC:								
Verdigris-----	0-9	10-26	---	5.6-7.3	---	---	---	---
	9-32	9.0-24	---	5.6-7.3	---	---	---	---
	32-52	9.0-27	---	5.6-7.3	---	---	---	---
	52-60	8.0-25	---	5.6-7.3	---	---	---	---
133EC:								
Eram-----	0-10	13-36	---	5.6-6.5	---	---	0	---
	10-29	15-37	---	5.1-7.3	---	---	0	---
	29-31	---	---	---	---	---	---	---
133SC:								
Shidler-----	0-12	9.0-26	---	5.6-8.4	---	---	---	---
	12-14	---	---	---	---	---	---	---
Catoosa-----	0-10	8.0-39	---	5.6-6.5	---	---	---	---
	10-31	12-40	---	5.1-7.3	---	---	---	---
	31-33	---	---	---	---	---	---	---
AED:								
Arents, Earthen Dam-----								
Ba:								
Bates-----	0-12	6.0-19	---	5.1-6.5	0	0	0	0
	12-20	6.0-19	---	5.1-6.5	0	0	0	0
	20-28	7.0-21	---	5.1-6.5	0	0	0	0
	28-35	7.0-21	---	5.1-6.5	0	0	0	0
	35-37	---	0.0-0.0	---	---	---	---	---
Bc:								
Bates-----	0-10	6.0-19	---	5.1-6.5	0	0	0	0
	10-16	6.0-19	---	5.1-6.5	0	0	0	0
	16-24	7.0-21	---	5.1-6.5	0	0	0	0
	24-28	7.0-21	---	5.1-6.5	0	0	0	0
	28-30	---	0.0-0.0	---	---	---	---	---
Bd:								
Bates-----	0-5	6.0-19	---	5.1-6.5	0	0	0	0
	5-23	7.0-21	---	5.1-6.5	0	0	0	0
	23-25	---	0.0-0.0	---	---	---	---	---
Bh:								
Bolivar-----	0-12	3.0-15	---	5.1-6.5	---	---	---	---
	12-17	---	4.0-13	4.5-6.0	---	---	---	---
	17-26	---	8.0-23	4.5-6.0	---	---	---	---
	26-34	---	5.0-18	4.5-6.0	---	---	---	---
	34-36	---	---	---	---	---	---	---
Hector-----	0-3	3.0-16	---	5.1-6.5	---	---	---	---
	3-7	---	3.0-13	4.5-5.5	---	---	---	---
	7-12	---	5.0-16	4.5-5.5	---	---	---	---
	12-14	---	---	---	---	---	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued  
Bourbon County, Kansas

Map symbol and soil name	Depth	Cation-exchange capacity	Effective Cation Exchange Capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm		
Ca:								
Catoosa-----	0-11	8.0-22	---	5.6-6.5	---	---	---	---
	11-16	13-29	---	5.1-7.3	---	---	---	---
	16-27	11-35	---	5.1-7.3	---	---	---	---
	27-35	---	0.0-0.0	---	---	---	---	---
Cs:								
Clareson-----	0-10	6.0-30	---	5.6-7.3	0	0	0	0
	10-15	10-35	---	5.6-7.3	0	0	0	0
	15-32	30-60	---	5.6-7.3	0	0	0	0
	32-34	---	0.0-0.0	---	---	---	---	---
De:								
Dennis-----	0-15	4.0-18	---	5.1-6.0	---	---	---	---
	15-22	11-23	10-21	5.1-6.0	---	---	---	---
	22-48	14-33	---	5.1-8.4	---	---	---	---
	48-60	14-33	10-21	5.1-7.8	---	---	---	---
Df:								
Dennis-----	0-15	4.0-18	---	5.1-6.0	---	---	---	---
	15-22	11-23	10-21	5.1-6.0	---	---	---	---
	22-55	14-33	---	5.1-8.4	---	---	---	---
	55-60	14-33	10-21	5.1-7.8	---	---	---	---
Ec:								
Eram-----	0-10	13-30	---	5.6-6.5	---	---	0	---
	10-30	14-37	---	5.1-7.3	---	---	0	---
	30-32	---	---	---	---	---	---	---
Collinsville----	0-14	4.0-18	---	5.1-6.5	---	---	---	---
	14-16	---	---	---	---	---	---	---
Ke:								
Kenoma-----	0-8	8.0-30	---	5.1-6.5	0	0	0.0-2.0	0
	8-24	16-36	---	5.1-7.8	0	0	0.0-2.0	0
	24-50	16-36	---	6.1-8.4	0	0	0.0-2.0	0
	50-60	12-30	---	6.1-8.4	0	0	0.0-4.0	0
La:								
Lanton-----	0-8	11-24	---	5.6-6.5	0	0	0	0
	8-36	10-21	---	5.6-6.5	0	0	0	0
	36-48	12-27	---	5.6-6.5	0	0	0	0
	48-60	14-36	---	6.6-7.3	0	0	0	0
Le:								
Leanna-----	0-6	8.0-24	---	5.1-6.5	---	---	---	---
	6-13	---	8.0-22	5.1-6.5	---	---	---	---
	13-38	16-36	---	5.1-7.3	---	---	---	---
	38-60	11-31	---	5.6-7.3	---	---	---	---
Ma:								
Mason-----	0-17	7.0-22	---	5.1-7.3	---	---	---	---
	17-60	8.0-23	---	5.1-7.8	---	---	---	---
No:								
Nowata-----	0-15	6.0-18	---	5.6-6.5	---	---	---	---
	15-36	10-21	---	5.6-7.3	---	---	---	---
	36-38	---	0.0-0.0	---	---	---	---	---
Or:								
Orthents-----	0-6	11-22	---	5.6-8.4	---	---	---	---
	6-72	7.0-21	---	5.6-8.4	---	---	---	---
Os:								
Osage-----	0-13	20-45	---	5.1-7.8	---	---	---	---
	13-60	20-45	---	5.6-7.8	---	---	---	---
Pa:								
Parsons-----	0-7	7.0-20	2.0-12	5.1-7.3	---	---	---	---
	7-15	7.0-20	3.3-9.3	5.1-7.3	---	---	---	---
	15-40	20-35	14-24	5.1-6.0	---	---	---	---
	40-60	20-35	8.3-16	5.1-7.8	---	---	---	---
Pt:								
Pits, Quarries--	0-60	---	---	---	---	---	---	---
Rc:								
Ringo-----	0-10	20-38	---	6.1-8.4	---	0	0	0
	10-30	16-36	---	6.1-8.4	---	0	0	0
	30-31	---	---	---	---	---	---	---
Clareson-----	0-10	13-32	---	5.6-7.3	0	0	0	0
	10-15	12-40	---	5.6-7.3	0	0	0	0
	15-32	14-49	---	5.6-7.3	0	0	0	0
	32-34	---	---	---	---	---	---	---
Ta:								
Tamaha-----	0-7	4.0-17	---	4.5-6.5	---	---	---	---
	7-12	15-30	8.0-21	5.1-6.0	---	---	---	---
	12-40	15-30	14-36	5.1-6.0	---	---	---	---
	40-60	10-25	8.0-21	5.6-7.3	---	---	---	---
Ve:								
Verdigris-----	0-22	6.0-19	---	5.6-7.3	---	---	---	---
	22-60	7.0-21	---	5.6-7.3	---	---	---	---
Vf:								
Verdigris, channeled-----	0-22	10-24	---	5.6-7.3	---	---	---	---
	22-60	9.0-27	---	5.6-7.3	---	---	---	---
W:								
Water-----	---	---	---	---	---	---	---	---

CHEMICAL PROPERTIES OF THE SOILS--Continued  
Bourbon County, Kansas

Map symbol and soil name	Depth	Cation-exchange capacity	Effective Cation Exchange Capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm		
Za:								
Zaar-----	0-15	20-44	---	5.6-7.3	---	---	---	---
	15-48	18-42	---	6.1-8.4	---	---	---	---
	48-60	15-34	---	6.6-8.4	---	---	---	---
ZAA:								
Zaar-----	0-16	20-44	---	5.6-7.3	---	---	---	---
	16-38	18-42	---	6.1-8.4	---	---	---	---
	38-53	17-38	---	6.6-8.4	---	---	---	---
	53-60	16-38	---	6.6-8.4	---	---	---	---
Zb:								
Zaar-----	0-15	20-44	---	5.6-7.3	---	---	---	---
	15-48	18-42	---	6.1-8.4	---	---	---	---
	48-60	15-34	---	6.6-8.4	---	---	---	---

WATER FEATURES  
Bourbon County, Kansas

The Water Features table 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.

The months in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The Water Features table 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 a water table. Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The Water Features table indicates surface water depth and the duration and frequency of ponding. Duration is expressed as very brief if less than 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, rare, occasional, and frequent. None means that ponding is not probable; rare that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); occasional that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and frequent that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, 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).

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.

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and 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	Hydro-logic group	Month	Soil Saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
001CB: Catoosa-----	B		Ft	Ft	Ft				
Rock Outcrop-----	D		---	---	---	---	---	---	---
001CC: Collinsville-----	D		---	---	---	---	---	---	---
Bates-----	B		---	---	---	---	---	---	---
037MD: Kanima-----	C		---	---	---	---	---	---	---
107CM: Clareson-----	C		---	---	---	---	---	---	---
Rock Outcrop-----	D		---	---	---	---	---	---	---
107EF: Eram-----	C	January	2.0-3.0	2.8-3.8	---	---	---	---	None
		February	2.0-3.0	2.8-3.8	---	---	---	---	None
		March	2.0-3.0	2.8-3.8	---	---	---	---	None
		April	2.0-3.0	2.8-3.8	---	---	---	---	None
		December	2.0-3.0	2.8-3.8	---	---	---	---	None
Lebo-----	B		---	---	---	---	---	---	---
107SN: Summit-----	C	January	2.0-3.0	2.0-3.0	---	---	---	---	None
		February	2.0-3.0	2.0-3.0	---	---	---	---	None
		March	2.0-3.0	2.0-3.0	---	---	---	---	None
		April	2.0-3.0	2.0-3.0	---	---	---	---	None
		December	2.0-3.0	2.0-3.0	---	---	---	---	None
107SO: Summit-----	C	January	2.0-3.0	2.0-3.0	---	---	---	---	None
		February	2.0-3.0	2.0-3.0	---	---	---	---	None
		March	2.0-3.0	2.0-3.0	---	---	---	---	None
		April	2.0-3.0	2.0-3.0	---	---	---	---	None
		December	2.0-3.0	2.0-3.0	---	---	---	---	None
107VC: Verdigris-----	B	January	---	---	---	---	---	Very brief	Frequent
		February	---	---	---	---	---	Very brief	Frequent
		March	---	---	---	---	---	Very brief	Frequent
		April	---	---	---	---	---	Very brief	Frequent
		May	---	---	---	---	---	Very brief	Frequent
		June	---	---	---	---	---	Very brief	Frequent
		July	---	---	---	---	---	Very brief	Occasional
		August	---	---	---	---	---	Very brief	Occasional
		September	---	---	---	---	---	Very brief	Occasional
		October	---	---	---	---	---	Very brief	Occasional
		November	---	---	---	---	---	Very brief	Occasional
		December	---	---	---	---	---	Very brief	Frequent
133EC: Eram-----	C	January	0.5-2.6	2.0-3.3	---	---	---	---	None
		February	0.5-2.6	2.0-3.3	---	---	---	---	None
		March	0.5-2.6	2.0-3.3	---	---	---	---	None
		April	0.5-2.6	2.0-3.3	---	---	---	---	None
		December	0.5-2.6	2.0-3.3	---	---	---	---	None
133SC: Shidler-----	D		---	---	---	---	---	---	---
Catoosa-----	B		---	---	---	---	---	---	---
Ba: Bates-----	B		---	---	---	---	---	---	---
Bc: Bates-----	B		---	---	---	---	---	---	---
Bd: Bates-----	B		---	---	---	---	---	---	---
Bh: Bolivar-----	B		---	---	---	---	---	---	---
Hector-----	D		---	---	---	---	---	---	---
Ca: Catoosa-----	B		---	---	---	---	---	---	---

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and 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	Hydro-logic group	Month	Soil Saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Cs: Clareson-----	C		---	---	---	---	---	---	---
De: Dennis-----	C	January	1.0-1.5	2.0-3.0	---	---	---	---	None
		February	1.0-1.5	2.0-3.0	---	---	---	---	None
		March	1.0-1.5	2.0-3.0	---	---	---	---	None
		April	1.0-1.5	2.0-3.0	---	---	---	---	None
		December	1.0-1.5	2.0-3.0	---	---	---	---	None
Df: Dennis-----	C	January	1.0-1.5	2.0-3.0	---	---	---	---	None
		February	1.0-1.5	2.0-3.0	---	---	---	---	None
		March	1.0-1.5	2.0-3.0	---	---	---	---	None
		April	1.0-1.5	2.0-3.0	---	---	---	---	None
		December	1.0-1.5	2.0-3.0	---	---	---	---	None
Ec: Eram-----	C	January	0.5-1.5	1.5-2.5	---	---	---	---	None
		February	0.5-1.5	1.5-2.5	---	---	---	---	None
		March	0.5-1.5	1.5-2.5	---	---	---	---	None
		April	0.5-1.5	1.5-2.5	---	---	---	---	None
		November	0.5-1.5	1.5-2.5	---	---	---	---	None
		December	0.5-1.5	1.5-2.5	---	---	---	---	None
Collinsville-----	D		---	---	---	---	---	---	---
Ke: Kenoma-----	D	January	0.5-1.5	1.0-1.5	---	---	---	---	None
		February	0.5-1.5	1.0-1.5	---	---	---	---	None
		March	0.5-1.5	1.0-1.5	---	---	---	---	None
		November	0.5-1.5	1.0-1.5	---	---	---	---	None
		December	0.5-1.5	1.0-1.5	---	---	---	---	None
La: Lanton-----	C	January	1.0-2.0	2.0-3.5	---	---	---	---	None
		February	1.0-2.0	2.0-3.5	---	---	---	---	None
		March	1.0-2.0	2.0-3.5	---	---	---	Very brief	Occasional
		April	1.0-2.0	2.0-3.5	---	---	---	Very brief	Occasional
		May	---	---	---	---	---	Very brief	Occasional
		June	---	---	---	---	---	Very brief	Occasional
		July	---	---	---	---	---	Very brief	Occasional
		August	---	---	---	---	---	Very brief	Occasional
		September	---	---	---	---	---	Very brief	Occasional
		October	---	---	---	---	---	Very brief	Occasional
		November	1.0-2.0	2.0-3.5	---	---	---	---	None
		December	1.0-2.0	2.0-3.5	---	---	---	---	None
Le: Leanna-----	D	January	0.5-2.0	1.0-2.0	---	---	---	---	None
		February	0.5-2.0	1.0-2.0	---	---	---	---	None
		March	0.5-2.0	1.0-2.0	---	---	---	Very brief	Occasional
		April	0.5-2.0	1.0-2.0	---	---	---	Very brief	Occasional
		May	0.5-2.0	1.0-2.0	---	---	---	Very brief	Occasional
		June	0.5-2.0	1.0-2.0	---	---	---	Very brief	Occasional
		July	---	---	---	---	---	Very brief	Occasional
		August	---	---	---	---	---	Very brief	Occasional
		September	---	---	---	---	---	Very brief	Occasional
		October	---	---	---	---	---	Very brief	Occasional
		December	0.5-2.0	1.0-2.0	---	---	---	---	None
Ma: Mason-----	B	January	---	---	---	---	---	---	Rare
		February	---	---	---	---	---	---	Rare
		March	---	---	---	---	---	---	Rare
		April	---	---	---	---	---	---	Rare
		May	---	---	---	---	---	---	Rare
		June	---	---	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	---	---	---	---	---	---	Rare
		December	---	---	---	---	---	---	Rare
No: Nowata-----	B		---	---	---	---	---	---	---
Or: Orthents-----	C		---	---	---	---	---	---	---
Os:			---	---	---	---	---	---	---

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and 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	Hydro-logic group	Month	Soil Saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
Osage-----	D	January	0.0-1.0	>6.0	---	Long	Occasional	---	Rare
		February	0.0-1.0	>6.0	---	Long	Occasional	---	Rare
		March	0.0-1.0	>6.0	---	Long	Occasional	Very brief	Occasional
		April	0.0-1.0	>6.0	---	Long	Occasional	Very brief	Occasional
		May	0.0-1.0	>6.0	---	Long	Occasional	Very brief	Occasional
		June	---	---	---	---	---	Very brief	Occasional
		July	---	---	---	---	---	Very brief	Occasional
		August	---	---	---	---	---	Very brief	Occasional
		September	---	---	---	---	---	Very brief	Occasional
		October	---	---	---	---	---	Very brief	Occasional
		November	0.0-1.0	>6.0	---	Long	Occasional	---	Rare
		December	0.0-1.0	>6.0	---	Long	Occasional	---	Rare
Pa: Parsons-----	D	January	0.5-1.5	1.0-2.0	---	---	---	None	
February		0.5-1.5	1.0-2.0	---	---	---	---	None	
March		0.5-1.5	1.0-2.0	---	---	---	---	None	
April		0.5-1.5	1.0-2.0	---	---	---	---	None	
November		0.5-1.5	1.0-2.0	---	---	---	---	None	
December		0.5-1.5	1.0-2.0	---	---	---	---	None	
Pt: Pits, Quarries-----	---		---	---	---	---	---	---	
Rc: Ringo-----	D		---	---	---	---	---	---	
Clareson-----	C		---	---	---	---	---	---	
Ta: Tamaha-----	D	January	1.0-2.0	1.0-3.6	---	---	---	None	
February		1.0-2.0	1.0-3.6	---	---	---	---	None	
March		1.0-2.0	1.0-3.6	---	---	---	---	None	
April		1.0-2.0	1.0-3.6	---	---	---	---	None	
November		1.0-2.0	1.0-3.6	---	---	---	---	None	
December		1.0-2.0	1.0-3.6	---	---	---	---	None	
Ve: Verdigris-----		B	January	---	---	---	---	---	Rare
February	---		---	---	---	---	---	Rare	
March	---		---	---	---	---	Very brief	Occasional	
April	---		---	---	---	---	Very brief	Occasional	
May	---		---	---	---	---	Very brief	Occasional	
June	---		---	---	---	---	Very brief	Occasional	
July	---		---	---	---	---	Very brief	Occasional	
August	---		---	---	---	---	Very brief	Occasional	
September	---		---	---	---	---	Very brief	Occasional	
October	---		---	---	---	---	Very brief	Occasional	
November	---		---	---	---	---	---	Rare	
December	---		---	---	---	---	---	Rare	
Vf: Verdigris, channeled-----	B	January	---	---	---	---	Very brief	Frequent	
February		---	---	---	---	---	Very brief	Frequent	
March		---	---	---	---	---	Very brief	Frequent	
April		---	---	---	---	---	Very brief	Frequent	
May		---	---	---	---	---	Very brief	Frequent	
June		---	---	---	---	---	Very brief	Frequent	
July		---	---	---	---	---	---	Rare	
August		---	---	---	---	---	---	Rare	
September		---	---	---	---	---	---	Rare	
October		---	---	---	---	---	---	Rare	
November		---	---	---	---	---	---	Rare	
December		---	---	---	---	---	Very brief	Frequent	
W: Water-----	---		---	---	---	---	---	---	
Za: Zaar-----	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	
ZAA: Zaar-----	D	January	1.2-1.8	2.5-3.8	---	---	---	None	
February		1.2-1.8	2.5-3.8	---	---	---	---	None	
March		1.2-1.8	2.5-3.8	---	---	---	---	None	
December		1.2-1.8	2.5-3.8	---	---	---	---	None	
Zb:									

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and 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	Hydro- logic group	Month	Soil Saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
Zaar-----	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

The following table 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 to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes 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 or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete 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 also is expressed as low, moderate, or high. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

SOIL FEATURES--Continued  
Bourbon County, Kansas

Map symbol and soil name	Restrictive layer				Potential for Frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated Steel	Concrete
		In					
001CB: Catoosa----- Rock Outcrop----	20-40 ----	Bedrock (lithic) ----	--- ---	Indurated ---	--- ---	Moderate ---	Moderate ---
001CC: Collinsville----	4-20	Bedrock (lithic)	---	Strongly cemented	---	Low	Moderate
Bates-----	20-40	Bedrock (paralithic)	---	Moderately cemented	---	Low	Moderate
037MD: Kanima-----	---	---	---	---	---	Moderate	Low
107CM: Clareson----- Rock Outcrop----	20-40 ----	Bedrock (lithic) ----	---	Indurated ---	---	High	Moderate
107EF: Eram-----	20-40	Bedrock (paralithic)	---	Weakly cemented	None	High	Moderate
Lebo-----	20-40	Bedrock (paralithic)	---	Weakly cemented	None	Moderate	Low
107SN: Summit-----	---	---	---	---	---	High	Low
107SO: Summit-----	---	---	---	---	---	High	Low
107VC: Verdigris-----	---	---	---	---	---	Low	Low
133EC: Eram-----	20-40	Bedrock (paralithic)	---	Weakly cemented	---	High	Moderate
133SC: Shidler----- Catoosa-----	4-20 20-40	Bedrock (lithic) Bedrock (lithic)	---	Indurated Indurated	---	Moderate Moderate	Low Moderate
AED: Arents, Earthen Dam-----	---	---	---	---	---	---	---
Ba: Bates-----	20-40	Bedrock (paralithic)	---	Moderately cemented	---	Low	Moderate
Bc: Bates-----	20-40	Bedrock (paralithic)	---	Moderately cemented	---	Low	Moderate
Bd: Bates-----	20-40	Bedrock (paralithic)	---	Moderately cemented	---	Low	Moderate
Bh: Bolivar-----	20-40	Bedrock (paralithic)	---	Moderately cemented	---	Low	Moderate
Hector-----	10-20	Bedrock (lithic)	---	Strongly cemented	---	Low	Moderate
Ca: Catoosa-----	20-40	Bedrock (lithic)	---	Indurated	---	Moderate	Moderate
Cs: Clareson-----	20-40	Bedrock (lithic)	---	Indurated	---	High	Moderate
De: Dennis-----	---	---	---	---	---	High	Moderate
Df: Dennis-----	---	---	---	---	---	High	Moderate
Ec: Eram-----	20-40	Bedrock (paralithic)	---	Weakly cemented	---	High	Moderate
Collinsville----	4-20	Bedrock (lithic)	---	Strongly cemented	---	Low	Moderate
Ke: Kenoma-----	---	---	---	---	---	High	Moderate
La: Lanton-----	---	---	---	---	None	High	Moderate
Le: Leanna-----	---	---	---	---	---	High	Moderate
Ma: Mason-----	---	---	---	---	---	Moderate	Moderate
No: Nowata-----	20-40	Bedrock (lithic)	---	Indurated	---	Moderate	Moderate
Or: Orthents-----	---	---	---	---	None	Moderate	Low
Os: Osage-----	---	---	---	---	---	High	Moderate
Pa: Parsons-----	---	---	---	---	None	High	Moderate
Pt: Pits, Quarries--	---	---	---	---	---	---	---
Rc: Ringo-----	20-40	Bedrock (paralithic)	---	Weakly cemented	---	High	Low
Clareson-----	20-40	Bedrock (lithic)	---	Indurated	---	High	Moderate
Ta: Tamaha-----	---	---	---	---	---	High	High
Ve: Verdigris-----	---	---	---	---	---	Low	Low
Vf: Verdigris, channeled-----	---	---	---	---	---	Low	Low

Map symbol and soil name	Restrictive layer				Potential for Frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated Steel	Concrete
W:		In	In				
Water-----	---	---	---	---	Low	---	---
Za:							
Zaar-----	---	---	---	---	---	High	Moderate
ZAA:							
Zaar-----	---	---	---	---	---	High	Moderate
Zb:							
Zaar-----	---	---	---	---	---	High	Moderate

WATER MANAGEMENT  
Bourbon County, Kansas

The soils of the survey area are rated in the Water Management table according to limitations that affect their suitability for water management. Soils are rated for pond reservoir areas, drainage, irrigation, terraces and diversions, and grassed waterways. Restrictive features that affect each soil for the specified use is also provided in the table.

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 generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to 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.

Limitation class terms, such as very limited or limited, etc., limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil 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. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects traffic ability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditch banks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

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

Grassed waterways are natural or constructed channels, generally broad and shallow, which conduct surface water to outlets at a non-erosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Features affecting--			
	Drainage	Irrigation	Terraces and diversions	Grassed waterways
001CB: Catoosa-----	Limitation: deep to water	Limitation: erodes easily slope depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Rock Outcrop----	---	---	---	---
001CC: Collinsville----	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Bates-----	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: depth to rock
037MD: Kanima-----	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
107CM: Clareson-----	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock Outcrop----	---	---	---	---
107EF: Eram-----	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope wetness	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope wetness
Lebo-----	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
107SN: Summit-----	Limitation: percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly
107SO: Summit-----	Limitation: percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly
107VC: Verdigris-----	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
133EC: Eram-----	Limitation: percs slowly slope thin layer	Limitation: percs slowly slope thin layer	Limitation: area reclaim erodes easily wetness	Limitation: area reclaim erodes easily wetness
133SC: Shidler-----	Limitation: deep to water	Limitation: erodes easily slope thin layer	Limitation: area reclaim erodes easily	Limitation: area reclaim erodes easily depth to rock
Catoosa-----	Limitation: deep to water	Limitation: rooting depth thin layer	Limitation: area reclaim erodes easily	Limitation: area reclaim erodes easily depth to rock
AED: Arents, Earthen Dam-----	---	---	---	---
Ba: Bates-----	Limitation: deep to water	Limitation: depth to rock	Limitation: depth to rock	Limitation: depth to rock
Bc: Bates-----	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: depth to rock
Bd: Bates-----	Limitation: deep to water	Limitation: slope depth to rock	Limitation: depth to rock	Limitation: depth to rock
Bh: Bolivar-----	Limitation: deep to water	Limitation: slope soil blowing depth to rock	Limitation: slope soil blowing depth to rock	Limitation: slope depth to rock
Hector-----	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: slope soil blowing depth to rock	Limitation: slope depth to rock droughty

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Features affecting--			
	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ca: Catoosa-----	Limitation: deep to water	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock	Limitation: erodes easily depth to rock
Cs: Clareson-----	Limitation: deep to water	Limitation: large stones percs slowly droughty	Limitation: large stones percs slowly depth to rock	Limitation: large stones depth to rock droughty
De: Dennis-----	Limitation: percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
Df: Dennis-----	Limitation: percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
Ec: Eram-----	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope wetness	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope wetness
Collinsville----	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: slope soil blowing depth to rock	Limitation: slope depth to rock droughty
Ke: Kenoma-----	Limitation: percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
La: Lanton-----	Limitation: flooding percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily wetness	Limitation: erodes easily percs slowly wetness
Le: Leanna-----	Limitation: flooding percs slowly	Limitation: flooding percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
Ma: Mason-----	Limitation: deep to water	Limitation: erodes easily	Limitation: erodes easily	Limitation: erodes easily
No: Nowata-----	Limitation: deep to water	Limitation: large stones slope depth to rock	Limitation: erodes easily large stones depth to rock	Limitation: erodes easily large stones depth to rock
Or: Orthents-----	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope droughty
Os: Osage-----	Limitation: flooding percs slowly	Limitation: slow intake wetness droughty	Limitation: percs slowly wetness	Limitation: percs slowly wetness droughty
Pa: Parsons-----	Limitation: percs slowly	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
Pt: Pits, Quarries--	---	---	---	---
Rc: Ringo-----	Limitation: deep to water	Limitation: percs slowly slope slow intake	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope depth to rock
Clareson-----	Limitation: deep to water	Limitation: large stones percs slowly droughty	Limitation: large stones percs slowly depth to rock	Limitation: large stones depth to rock droughty
Ta: Tamaha-----	Limitation: percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly wetness
Ve: Verdigris-----	Limitation: deep to water	Limitation: flooding	Favorable	Favorable

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Features affecting--			
	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Vf: Verdigris, channeled-----	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
W: Water-----	---	---	---	---
Za: Zaar-----	Limitation: percs slowly	Limitation: percs slowly slow intake wetness	Limitation: percs slowly wetness	Limitation: percs slowly wetness
ZAA: Zaar-----	Limitation: percs slowly	Limitation: slow intake wetness	Limitation: percs slowly wetness	Limitation: percs slowly wetness
Zb: Zaar-----	Limitation: percs slowly slope	Limitation: slope slow intake wetness	Limitation: percs slowly wetness	Limitation: percs slowly wetness

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Pond Reservoir Area		Embankments, Dikes, and Levees		Excavated Ponds (Aquifer- fed)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Somewhat limited Depth to bedrock Seepage	0.93 0.05	Somewhat limited Thin layer	0.94	Very limited Deep to water	1.00
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer Seepage	1.00 0.09	Very limited Deep to water	1.00
Bates-----	40	Somewhat limited Seepage Depth to bedrock	0.70 0.08	Somewhat limited Thin layer	0.81	Very limited Deep to water	1.00
037MD: Kanima-----	100	Somewhat limited Seepage	0.05	Not limited		Very limited Deep to water	1.00
107CM: Clareson-----	60	Somewhat limited Depth to bedrock Seepage Slope	0.77 0.05 0.00	Very limited Hard to pack Thin layer Content of large stones	1.00 0.77 0.26	Very limited Deep to water	1.00
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Somewhat limited Depth to bedrock Seepage	0.19 0.05	Somewhat limited Hard to pack Depth to saturated zone Thin layer	0.98 0.93 0.93	Very limited Deep to water	1.00
Lebo-----	30	Somewhat limited Seepage Slope Depth to bedrock	0.05 0.02 0.02	Somewhat limited Thin layer	0.56	Very limited Deep to water	1.00
107SN: Summit-----	85	Somewhat limited Seepage	0.05	Somewhat limited Hard to pack Depth to saturated zone	0.91 0.86	Very limited Deep to water	1.00
107SO: Summit-----	85	Somewhat limited Seepage	0.05	Somewhat limited Hard to pack Depth to saturated zone	0.92 0.86	Very limited Deep to water	1.00
107VC: Verdigris-----	85	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.34	Very limited Deep to water	1.00
133EC: Eram-----	90	Somewhat limited Depth to bedrock	0.13	Very limited Depth to saturated zone Hard to pack Thin layer	1.00 0.98 0.88	Very limited Deep to water	1.00
133SC: Shidler-----	50	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer Piping	1.00 0.82	Very limited Deep to water	1.00
Catoosa-----	40	Somewhat limited Depth to bedrock Seepage	0.84 0.05	Somewhat limited Hard to pack Thin layer	0.88 0.84	Very limited Deep to water	1.00
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Pond Reservoir Area		Embankments, Dikes, and Levees		Excavated Ponds (Aquifer-fed)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba: Bates-----	90	Somewhat limited Seepage Depth to bedrock	0.70 0.04	Somewhat limited Thin layer Piping	0.70 0.38	Very limited Deep to water	1.00
Bc: Bates-----	85	Somewhat limited Seepage Depth to bedrock	0.70 0.18	Somewhat limited Thin layer Piping	0.92 0.30	Very limited Deep to water	1.00
Bd: Bates-----	85	Somewhat limited Seepage Depth to bedrock	0.70 0.34	Somewhat limited Thin layer	0.99	Very limited Deep to water	1.00
Bh: Bolivar-----	65	Very limited Seepage Depth to bedrock	1.00 0.05	Somewhat limited Piping Thin layer Seepage	0.99 0.74 0.05	Very limited Deep to water	1.00
Hector-----	20	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer Seepage	1.00 0.07	Very limited Deep to water	1.00
Ca: Catoosa-----	85	Somewhat limited Depth to bedrock Seepage	0.93 0.05	Somewhat limited Thin layer	0.94	Very limited Deep to water	1.00
Cs: Clareson-----	90	Somewhat limited Depth to bedrock Seepage	0.81 0.05	Very limited Hard to pack Thin layer Content of large stones	1.00 0.81 0.49	Very limited Deep to water	1.00
De: Dennis-----	85	Somewhat limited Seepage	0.05	Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Df: Dennis-----	85	Somewhat limited Seepage	0.05	Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Ec: Eram-----	75	Somewhat limited Depth to bedrock	0.11	Very limited Depth to saturated zone Hard to pack Thin layer	1.00 0.88 0.86	Very limited Deep to water	1.00
Collinsville-----	15	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer Seepage	1.00 0.08	Very limited Deep to water	1.00
Ke: Kenoma-----	90	Not limited		Very limited Depth to saturated zone Hard to pack	1.00 0.55	Very limited Deep to water	1.00
La: Lanton-----	85	Somewhat limited Seepage	0.05	Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Le: Leanna-----	85	Somewhat limited Seepage	0.05	Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Ma: Mason-----	90	Somewhat limited Seepage	0.05	Somewhat limited Piping	0.02	Very limited Deep to water	1.00

WATER MANAGEMENT--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Pond Reservoir Area		Embankments, Dikes, and Levees		Excavated Ponds (Aquifer-fed)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
No: Nowata-----	85	Somewhat limited Depth to bedrock Seepage	0.66 0.05	Somewhat limited Thin layer	0.66	Very limited Deep to water	1.00
Or: Orthents-----	100	Somewhat limited Seepage Slope	0.70 0.36	Not limited		Very limited Deep to water	1.00
Os: Osage-----	90	Not limited		Very limited Ponding Depth to saturated zone Hard to pack	1.00 1.00 0.87	Very limited Slow refill Cutbanks cave	1.00 0.10
Pa: Parsons-----	90	Not limited		Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Pt: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
Rc: Ringo-----	70	Somewhat limited Depth to bedrock Slope	0.11 0.00	Somewhat limited Thin layer Hard to pack	0.86 0.50	Very limited Deep to water	1.00
Clareson-----	15	Somewhat limited Depth to bedrock	0.81	Very limited Content of large stones Hard to pack Thin layer	1.00 1.00 0.81	Very limited Deep to water	1.00
Ta: Tamaha-----	85	Somewhat limited Seepage	0.57	Very limited Depth to saturated zone	1.00	Very limited Deep to water	1.00
Ve: Verdigris-----	95	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.50	Very limited Deep to water	1.00
Vf: Verdigris, channeled	90	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.28	Very limited Deep to water	1.00
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Not limited		Very limited Depth to saturated zone Hard to pack	1.00 0.82	Very limited Deep to water	1.00
ZAA: Zaar-----	96	Not limited		Very limited Depth to saturated zone Hard to pack	1.00 0.79	Very limited Deep to water	1.00
Zb: Zaar-----	90	Not limited		Very limited Depth to saturated zone Hard to pack	1.00 0.73	Very limited Deep to water	1.00

SANITARY FACILITIES  
Bourbon County, Kansas

Sanitary Facilities

The following tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. 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 these uses. 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. Somewhat 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. 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 tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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, depth to 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 become contaminated.

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, depth to 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, the 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, depth to 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.

SANITARY FACILITIES  
Bourbon County, Kansas

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, depth to 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, depth to 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.

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Restricted permeability	1.00	Slope	0.19
Rock Outcrop-----	30	Not rated		Not rated	
001CC: Collinsville-----	50	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Slope	0.04	Seepage	1.00
				Slope	1.00
Bates-----	40	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock	1.00
		Restricted permeability	0.50	Slope	0.67
				Seepage	0.50
037MD: Kanima-----	100	Very limited Restricted permeability	1.00	Somewhat limited Slope	0.67
107CM: Clareson-----	60	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Restricted permeability	1.00	Slope	1.00
		Slope	0.37	Content of large stones	0.00
		Content of large stones	0.26		
Rock Outcrop-----	20	Not rated		Not rated	
107EF: Eram-----	50	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Restricted permeability	1.00	Depth to saturated zone	0.64
		Slope	0.04		
Lebo-----	30	Very limited Restricted permeability	1.00	Very limited Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.96		
107SN: Summit-----	85	Very limited Restricted permeability	1.00	Somewhat limited Depth to saturated zone	0.81
		Depth to saturated zone	1.00	Slope	0.09
107SO: Summit-----	85	Very limited Restricted permeability	1.00	Somewhat limited Slope	0.91
		Depth to saturated zone	1.00	Depth to saturated zone	0.81
107VC: Verdigris-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00
		Restricted permeability	1.00	Seepage	0.50
133EC: Eram-----	90	Very limited Restricted permeability	1.00	Very limited Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.67
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
133SC: Shidler-----	50	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
				Slope	0.91
Catoosa-----	40	Very limited		Very limited	

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AED: Arents, Earthen Dam-	100	Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Restricted permeability	1.00	Slope	0.00
Ba: Bates-----	90	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock	1.00
		Restricted permeability	0.50	Seepage	0.50
Bc: Bates-----	85	Very limited Depth to bedrock	1.00	Slope	0.00
Bd: Bates-----	85	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock	1.00
				Slope	0.91
				Seepage	0.50
Bh: Bolivar-----	65	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock	1.00
		Restricted permeability	0.50	Seepage	1.00
		Slope	0.16	Slope	1.00
Hector-----	20	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Slope	0.16	Slope	1.00
Ca: Catoosa-----	85	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.00
Cs: Clareson-----	90	Very limited Restricted permeability	1.00	Very limited Depth to hard bedrock	1.00
		Depth to bedrock	1.00	Content of large stones	1.00
		Content of large stones	0.49	Seepage	0.32
				Slope	0.03
De: Dennis-----	85	Very limited Restricted permeability	1.00	Somewhat limited Slope	0.00
		Depth to saturated zone	1.00		
Df: Dennis-----	85	Very limited Restricted permeability	1.00	Somewhat limited Slope	0.67
		Depth to saturated zone	1.00		
Ec: Eram-----	75	Very limited Restricted permeability	1.00	Very limited Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
		Depth to saturated zone	1.00		
		Slope	0.04		
Collinsville-----	15	Very limited Depth to bedrock	1.00	Very limited Depth to hard bedrock	1.00
		Slope	0.04	Slope	1.00
				Seepage	0.02
Ke: Kenoma-----	90	Very limited		Somewhat limited	

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
La: Lanton-----	85	Restricted permeability	1.00	Slope	0.03
		Depth to saturated zone	1.00		
Le: Leanna-----	85	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.00
		Restricted permeability Depth to saturated zone	1.00		
Ma: Mason-----	90	Very limited Flooding	1.00	Somewhat limited Flooding	0.40
		Restricted permeability Depth to saturated zone	1.00		
No: Nowata-----	85	Very limited Flooding	1.00	Somewhat limited Flooding	0.40
		Restricted permeability Depth to saturated zone	1.00		
Or: Orthents-----	100	Very limited Slope	1.00	Very limited Slope Seepage	1.00 0.50
		Restricted permeability	0.50		
Os: Osage-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00 1.00
		Restricted permeability Ponding	1.00		
Pa: Parsons-----	90	Depth to saturated zone	1.00	Somewhat limited Seepage	0.50
		Very limited Restricted permeability	1.00		
Pt: Pits, Quarries----	100	Not rated		Not rated	
Rc: Ringo-----	70	Very limited Restricted permeability	1.00	Very limited Depth to soft bedrock Slope	1.00 1.00
		Depth to bedrock	1.00		
Clareson-----	15	Slope	0.63	Very limited Depth to hard bedrock Content of large stones Seepage	1.00 1.00 0.32
		Very limited Restricted permeability Depth to bedrock	1.00		
Ta: Tamaha-----	85	Content of large stones	1.00	Somewhat limited Seepage Slope	0.32 0.19
		Very limited Restricted permeability Depth to saturated zone	1.00		
Ve: Verdigris-----	95	Very limited Flooding	1.00	Very limited Flooding Seepage	1.00 0.50
		Restricted permeability	0.50		
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Very limited Flooding	1.00

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W: Water-----	100	Restricted permeability	0.50	Seepage	0.50
		Not rated		Slope	0.00
Za: Zaar-----	90	Not rated		Not rated	
		Very limited Restricted permeability	1.00	Somewhat limited Depth to saturated zone	0.00
ZAA: Zaar-----	96	Depth to saturated zone	1.00		
		Very limited Restricted permeability	1.00	Somewhat limited Slope	0.00
Zb: Zaar-----	90	Depth to saturated zone	1.00		
		Very limited Restricted permeability	1.00	Somewhat limited Slope	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	0.00

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Very limited Depth to bedrock Seepage Too clayey	1.00 1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Very limited Depth to bedrock Seepage Slope	1.00 1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Seepage Slope	1.00 0.50 0.04
Bates-----	40	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
037MD: Kanima-----	100	Somewhat limited Too clayey	0.50	Not limited		Somewhat limited Too clayey Gravel content	0.50 0.00
107CM: Clareson-----	60	Very limited Depth to bedrock Too clayey Seepage Slope Content of large stones	1.00 1.00 1.00 0.37 0.26	Very limited Depth to bedrock Slope	1.00 0.37	Very limited Depth to bedrock Too clayey Hard to compact Slope Content of large stones	1.00 1.00 1.00 0.37 0.26
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Very limited Depth to bedrock Too clayey  Depth to saturated zone Slope	1.00 1.00  0.93 0.04	Very limited Depth to bedrock Depth to saturated zone Slope	1.00 0.36 0.04	Very limited Depth to bedrock Too clayey  Hard to compact Depth to saturated zone Slope	1.00 1.00  1.00 0.62 0.04
Lebo-----	30	Very limited Depth to bedrock Too clayey Slope	1.00 1.00 0.96	Very limited Depth to bedrock Slope	1.00 0.96	Very limited Depth to bedrock Too clayey Hard to compact Slope	1.00 1.00 1.00 0.96
107SN: Summit-----	85	Very limited Too clayey  Depth to saturated zone	1.00  0.86	Somewhat limited Depth to saturated zone	0.19	Very limited Too clayey  Hard to compact Depth to saturated zone	1.00  1.00 0.47
107SO: Summit-----	85	Very limited Too clayey  Depth to saturated zone	1.00  0.86	Somewhat limited Depth to saturated zone	0.19	Very limited Too clayey  Hard to compact Depth to saturated zone	1.00  1.00 0.47
107VC: Verdigris-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
133EC: Eram-----	90	Very limited Depth to bedrock Too clayey  Depth to saturated zone	1.00 1.00 1.00	Very limited Depth to bedrock Depth to saturated zone	1.00 0.75	Very limited Depth to bedrock Too clayey  Hard to compact Depth to saturated zone	1.00 1.00 1.00 0.86
133SC: Shidler-----	50	Very limited Depth to bedrock Seepage	1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Catoosa-----	40	Very limited Depth to bedrock Seepage Too clayey	1.00 1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Hard to compact Too clayey	1.00 1.00 0.50
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ba: Bates-----	90	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Bc: Bates-----	85	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Bd: Bates-----	85	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00
Bh: Bolivar-----	65	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Seepage Depth to bedrock Slope	1.00 1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16
Hector-----	20	Very limited Depth to bedrock Seepage Slope	1.00 1.00 0.16	Very limited Depth to bedrock Slope	1.00 0.16	Very limited Depth to bedrock Seepage Slope	1.00 0.50 0.16
Ca: Catoosa-----	85	Very limited Depth to bedrock Seepage Too clayey	1.00 1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Hard to compact Too clayey	1.00 1.00 0.50
Cs: Clareson-----	90	Very limited Depth to bedrock Too clayey Content of large stones	1.00 1.00 0.49	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact Content of large stones	1.00 1.00 1.00 0.49
De: Dennis-----	85	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Df: Dennis-----	85	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Ec: Eram-----	75	Very limited Depth to saturated zone Depth to bedrock Too clayey Slope	1.00 1.00 1.00 0.04	Very limited Depth to saturated zone Depth to bedrock Slope	1.00 1.00 0.04	Very limited Depth to bedrock Too clayey Depth to saturated zone Hard to compact Slope	1.00 1.00 1.00 0.04
Collinsville-----	15	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Slope	1.00 0.04	Very limited Depth to bedrock Seepage Slope	1.00 0.50 0.04
Ke: Kenoma-----	90	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone	1.00 1.00
La: Lanton-----	85	Very limited Flooding Depth to saturated zone Too clayey	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Le: Leanna-----	85	Very limited Flooding Depth to saturated zone Too clayey	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Ma: Mason-----	90	Somewhat limited Too clayey Flooding	0.50 0.40	Somewhat limited Flooding	0.40	Somewhat limited Too clayey	0.50

SANITARY FACILITIES--Continued  
Bourbon County, Kansas

(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	Pct of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
No: Nowata-----	85	Very limited Depth to bedrock Too clayey	1.00 0.50	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey	1.00 0.50
Or: Orthents-----	100	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Gravel content Too clayey	1.00 0.80 0.50
Os: Osage-----	90	Very limited Flooding Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00 1.00	Very limited Flooding Ponding Depth to saturated zone	1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00 1.00
Pa: Parsons-----	90	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Pt: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
Rc: Ringo-----	70	Very limited Depth to bedrock Too clayey Slope	1.00 1.00 0.63	Very limited Depth to bedrock Slope	1.00 0.63	Very limited Depth to bedrock Too clayey Hard to compact Slope	1.00 1.00 1.00 0.63
Clareson-----	15	Very limited Depth to bedrock Too clayey Content of large stones Seepage	1.00 1.00 1.00 1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Too clayey Hard to compact Content of large stones	1.00 1.00 1.00 1.00
Ta: Tamaha-----	85	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Ve: Verdigris-----	95	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Not limited	
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Hard to compact Depth to saturated zone	1.00 1.00 1.00
ZAA: Zaar-----	96	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Depth to saturated zone Hard to compact	1.00 1.00 1.00
Zb: Zaar-----	90	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Too clayey Hard to compact Depth to saturated zone	1.00 1.00 1.00

AGRICULTURAL WASTE MANAGEMENT  
Bourbon County, Kansas

The nature of the soil is also important in the application of organic wastes and wastewater to land as fertilizers and irrigation; it is also important when the soil is used as a medium for treatment and disposal of these wastes. Favorable soil properties are required to prevent environmental damage.

The use of organic wastes and wastewater as production resources will result in energy conservation, prevent the waste of these important resources, and prevent problems associated with their disposal. Where disposal is the goal, and a maximum amount is disposed in a minimum area to hold costs to a minimum, risk of environmental damage is the principal constraint. Where the reuse goal is pursued, and a minimum amount is applied to a maximum area to obtain the greatest benefit, environmental damage is unlikely.

Interpretations developed for waste management may include ratings for (1) manure and food processing wastes; (2) municipal sewage sludge; (3) irrigation use of wastewater; or (4) treatment of wastewater by the slow rate process, overland flow process, or rapid infiltration process. If available, these should be located in this subsection.

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.

The Ag-Waste tables show 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 these tables, 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 milligrams per liter. 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 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, phosphorus, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables 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 by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

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 agricultural waste management. 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 generally favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. Somewhat 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. 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 tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve 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, depth to 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 that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve 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.

AGRICULTURAL WASTE MANAGEMENT  
Bourbon County, Kansas

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, depth to 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 that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve 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, depth to 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, depth to 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. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

See the National Soil Handbook, September 1992, Part 620, for criteria used in rating soils for sanitary facilities and waste management.

AGRICULTURAL WASTE MANAGEMENT--Continued  
Bourbon County, Kansas

(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 0.00 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	Pct of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
001CB: Catoosa-----	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.74	Depth to bedrock	0.74	Depth to bedrock	0.74
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
		Droughty	0.07	Too acid	0.14	Too acid	0.14
		Too acid	0.03	Droughty	0.07	Droughty	0.07
						Too steep for surface application	0.02
Rock Outcrop-----	30	Not rated		Not rated		Not rated	
001CC: Collinsville-----	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff limitation	0.40	Too acid	0.85	Too steep for surface application	1.00
		Too acid	0.27	Slope	0.04	Too acid	0.85
		Slope	0.04	Filtering capacity	0.00	Too steep for sprinkler application	0.22
Bates-----	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.29	Depth to bedrock	0.29	Too steep for surface application	0.31
		Droughty	0.10	Droughty	0.10	Depth to bedrock	0.29
		Too acid	0.02	Too acid	0.07	Droughty	0.10
						Too acid	0.07
037MD: Kanima-----	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.43	Droughty	0.43	Droughty	0.43
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	0.31
		Too acid	0.02	Too acid	0.07	Restricted permeability	0.22
						Too acid	0.07
107CM: Clareson-----	60	Somewhat limited		Somewhat limited		Very limited	
		Droughty	0.80	Droughty	0.80	Too steep for surface application	1.00
		Slope	0.37	Slope	0.37	Droughty	0.80
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for sprinkler application	0.59
		Depth to bedrock	0.20	Depth to bedrock	0.20	Restricted permeability	0.22
						Depth to bedrock	0.20
Rock Outcrop-----	20	Not rated		Not rated		Not rated	
107EF: Eram-----	50	Somewhat limited		Somewhat limited		Very limited	
		Depth to saturated zone	0.93	Depth to saturated zone	0.93	Too steep for surface application	1.00
		Depth to bedrock	0.71	Depth to bedrock	0.71	Depth to saturated zone	0.93
		Droughty	0.69	Droughty	0.69	Depth to bedrock	0.71
		Restricted permeability	0.30	Restricted permeability	0.22	Droughty	0.69
		Slope	0.04	Too acid	0.14	Restricted permeability	0.22
Lebo-----	30	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Slope	0.96	Slope	0.96	Restricted permeability	1.00
		Depth to bedrock	0.01	Depth to bedrock	0.01	Too steep for sprinkler application	0.97

AGRICULTURAL WASTE MANAGEMENT--Continued  
Bourbon County, Kansas

(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 0.00 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	Pct of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107SN: Summit-----	85					Depth to bedrock	0.01
		Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.86	Depth to saturated zone	0.86	Depth to saturated zone	0.86
						Too steep for surface application	0.00
107SO: Summit-----	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.86	Depth to saturated zone	0.86	Depth to saturated zone	0.86
						Too steep for surface application	0.66
						Too steep for sprinkler application	0.00
107VC: Verdigris-----	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
133EC: Eram-----	90	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to bedrock	0.54	Depth to bedrock	0.54	Depth to bedrock	0.54
		Droughty	0.47	Droughty	0.47	Droughty	0.47
		Too acid	0.03	Too acid	0.14	Too steep for surface application	0.31
133SC: Shidler-----	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff limitation	0.40	Cobble content	0.02	Too steep for surface application	0.66
		Cobble content	0.02	Too acid	0.01	Cobble content	0.02
		Too acid	0.00			Too acid	0.01
Catoosa-----	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.39	Depth to bedrock	0.39	Depth to bedrock	0.39
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
		Droughty	0.08	Too acid	0.14	Too acid	0.14
		Too acid	0.03	Droughty	0.08	Droughty	0.08
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	
Ba: Bates-----	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.11	Too acid	0.42	Too acid	0.42
		Depth to bedrock	0.10	Depth to bedrock	0.10	Depth to bedrock	0.10
Bc: Bates-----	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.68	Depth to bedrock	0.68	Depth to bedrock	0.68
		Droughty	0.17	Too acid	0.42	Too steep for surface application	0.66
		Too acid	0.11	Droughty	0.17	Too acid	0.42
						Droughty	0.17
						Too steep for sprinkler application	0.00
Bd: Bates-----	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.95	Depth to bedrock	0.95	Depth to bedrock	0.95
		Droughty	0.73	Droughty	0.73	Droughty	0.73

AGRICULTURAL WASTE MANAGEMENT--Continued  
Bourbon County, Kansas

(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 0.00 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	Pct of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Bh: Bolivar-----	65	Too acid	0.11	Too acid	0.42	Too steep for surface application	0.66
						Too acid	0.42
						Too steep for sprinkler application	0.00
		Somewhat limited Too acid	0.18	Somewhat limited Too acid	0.67	Very limited Too steep for surface application	1.00
Hector-----	20	Slope	0.16	Slope	0.16	Too acid	0.67
		Depth to bedrock	0.16	Depth to bedrock	0.16	Too steep for sprinkler application	0.39
		Droughty Filtering capacity	0.04 0.00	Droughty Filtering capacity	0.04 0.00	Depth to bedrock	0.16
		Very limited Depth to bedrock	1.00	Very limited Droughty Depth to bedrock	1.00 1.00	Droughty Depth to bedrock	1.00
Ca: Catoosa-----	85	Droughty	0.38	Droughty	0.38	Too steep for sprinkler application	0.39
		Restricted permeability	0.30	Restricted permeability	0.22	Too acid	0.42
		Too acid	0.03	Too acid	0.14	Too steep for surface application	1.00
		Somewhat limited Depth to bedrock	0.74	Somewhat limited Depth to bedrock	0.74	Too acid	0.42
Cs: Clareson-----	90	Droughty	0.38	Droughty	0.38	Too steep for sprinkler application	0.39
		Restricted permeability	0.30	Restricted permeability	0.22	Too acid	0.42
		Too acid	0.03	Too acid	0.14	Too steep for surface application	1.00
		Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Too acid	0.42
De: Dennis-----	85	Large stones on the surface	1.00	Large stones on the surface	1.00	Too steep for surface application	1.00
		Droughty	1.00	Droughty	1.00	Too acid	0.42
		Depth to bedrock	0.29	Depth to bedrock	0.29	Too steep for surface application	1.00
		Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Too acid	0.42
Df: Dennis-----	85	Restricted permeability	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too acid	0.18	Too acid	0.67	Too acid	0.67
		Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Too steep for surface application	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Too acid	0.67
Ec: Eram-----	75	Too acid	0.18	Too acid	0.67	Too steep for surface application	1.00
		Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Too acid	0.67
		Restricted permeability	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Depth to bedrock	0.46	Depth to bedrock	0.46	Too acid	0.67
Collinsville-----	15	Droughty	0.40	Droughty	0.40	Too steep for surface application	1.00
		Slope	0.04	Too acid	0.14	Depth to bedrock	0.46
		Very limited Depth to bedrock	1.00	Very limited Droughty Depth to bedrock	1.00 1.00	Droughty	0.40
		Droughty	1.00	Too acid	0.77	Too steep for surface application	1.00
		Runoff limitation	0.40	Too acid	0.77	Too steep for surface application	1.00

AGRICULTURAL WASTE MANAGEMENT--Continued  
Bourbon County, Kansas

(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 0.00 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	Pct of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Ke: Kenoma-----	90	Too acid	0.22	Slope	0.04	Too acid	0.77
		Slope	0.04	Filtering capacity	0.00	Too steep for sprinkler application	0.22
La: Lanton-----	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff limitation	0.40	Too acid	0.42	Too acid	0.42
Le: Leanna-----	85	Too acid	0.11	Too acid	0.14	Too acid	0.14
		Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Flooding	1.00	Depth to saturated zone	1.00
Ma: Mason-----	90	Flooding	0.60	Depth to saturated zone	1.00	Flooding	0.60
		Too acid	0.03	Too acid	0.14	Too acid	0.14
		Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Flooding	1.00	Depth to saturated zone	1.00
No: Nowata-----	85	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Flooding	0.60	Restricted permeability	1.00	Flooding	0.60
		Runoff limitation	0.40	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Too acid	0.07	Too acid	0.07
Or: Orthents-----	100	Somewhat limited	0.30	Somewhat limited	0.40	Somewhat limited	0.22
		Restricted permeability	0.02	Flooding	0.22	Restricted permeability	0.07
		Too acid	0.02	Restricted permeability	0.07	Too acid	0.07
		Too acid	0.02	Too acid	0.07	Too acid	0.07
Os: Osage-----	90	Somewhat limited	0.30	Somewhat limited	0.22	Somewhat limited	0.22
		Restricted permeability	0.22	Restricted permeability	0.22	Restricted permeability	0.22
		Droughty	0.06	Droughty	0.14	Droughty	0.14
		Depth to bedrock	0.03	Too acid	0.06	Too acid	0.08
Pa: Parsons-----	90	Too acid	0.03	Depth to bedrock	0.06	Too steep for surface application	0.06
		Very limited		Very limited		Depth to bedrock	0.06
		Restricted permeability	1.00	Slope	1.00	Too steep for surface application	1.00
		Depth to saturated zone	1.00	Droughty	0.06	Too steep for sprinkler application	1.00
Pt: Pits, Quarries-----	100	Runoff limitation	0.40	Droughty	0.06	Too steep for sprinkler application	0.06
		Too acid	0.01	Very limited		Droughty	0.06
		Very limited		Restricted permeability	1.00	Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
Pt: Pits, Quarries-----	100	Depth to saturated zone	0.40	Too acid	0.03	Depth to saturated zone	1.00
		Runoff limitation	0.01	Too acid	0.03	Too acid	0.03
		Too acid	0.01	Not rated		Not rated	
		Not rated		Not rated		Not rated	

AGRICULTURAL WASTE MANAGEMENT--Continued  
Bourbon County, Kansas

(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 0.00 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	Pct of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Rc: Ringo-----	70	Very limited Restricted permeability Slope	1.00 0.63	Very limited Restricted permeability Slope	1.00 0.63	Very limited Restricted permeability Too steep for surface application	1.00 1.00
		Depth to bedrock	0.46	Depth to bedrock	0.46	Too steep for sprinkler application	0.77
		Runoff limitation	0.40	Droughty	0.19	Depth to bedrock	0.46
Clareson-----	15	Droughty Very limited Restricted permeability	0.19 1.00	Droughty Very limited Restricted permeability	0.19 1.00	Droughty Very limited Restricted permeability	0.19 1.00
		Large stones on the surface	1.00	Large stones on the surface	1.00	Large stones on the surface	1.00
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Depth to bedrock	0.29	Depth to bedrock	0.29	Depth to bedrock	0.29
Ta: Tamaha-----	85	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff limitation	0.40	Too acid	0.77	Too acid	0.77
		Too acid	0.22			Too steep for surface application	0.02
Ve: Verdigris-----	95	Somewhat limited Flooding	0.60	Very limited Flooding	1.00	Somewhat limited Flooding	0.60
Vf: Verdigris, channeled	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
W: Water-----	100	Not rated		Not rated		Not rated	
Za: Zaar-----	90	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff limitation	0.40				
ZAA: Zaar-----	96	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Runoff limitation	0.40	Too acid	0.07	Too acid	0.07
Zb: Zaar-----	90	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00	Very limited Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff limitation	0.40			Too steep for surface application	0.17

WIN-PST SPISP II  
SOIL SENSITIVITY TO PESTICIDE LOSS RATING REPORT

Soils Data Table: SOIL\_KS Sort Order: MUSYM

Bourbon County, Kansas: KS011

MUSYM/SEQ#	COMPONENT/TEXTURE/MU%	HYD	KFACT	SURFACE DEPTH	% OM	SPISP II Ratings		
						Leaching (SLP)	Solution Runoff (SSRP)	Adsorbed Runoff (SARP)
001CB 1	CATOOSA SIL 58%	B	0.37	11"	2.0%	I	I	I
001CB 2	ROCK OUTCROP 29%	D	0.00	0"	0.0%	V	H	L
001CC 1	COLLINSVILLE FSL 50%	D	0.20	7"	2.0%	V	H	H
001CC 2	BATES L 41%	B	0.32	8"	2.0%	I	I	I
037MD 1	MINE PITS AND DUMPS CNV- SICL 100%	C	0.28	6"	1.3%	L	H	H (s)
133EC 1	ERAM SIC 90%	C	0.37	10"	2.0%	H (w)	H	H
133SC 1	SHIDLER SIL 50%	D	0.32	12"	3.0%	V	H	H
133SC 2	CATOOSA SIL 40%	B	0.37	10"	3.0%	I	I	I
602CM 1	CLARESON SICL 60%	C	0.32	11"	2.5%	L	H	H
602CM 2	ROCK OUTCROP 20%	D	0.00	0"	0.0%	V	H	L
602EF 1	ERAM SICL 55%	C	0.37	8"	2.0%	H (w)	H	H
602EF 2	Lebo SICL 35%	B	0.32	12"	2.5%	I	I	H (s)
602SN 1	SUMMIT SICL 85%	C	0.37	11"	2.5%	H (w)	H	H
602SO 1	SUMMIT SICL 85%	C	0.37	9"	2.5%	H (w)	H	H
602VC 1	VERDIGRIS SIL 85%	B	0.32	9"	3.0%	I	I	I
AED 1	ARENTS, EARTHEN DAM 100%		0.00	0"	0.0%	?	?	?
Ba 1	BATES L 90%	B	0.32	12"	2.0%	I	I	I
Bc 1	BATES L 85%	B	0.32	10"	2.0%	I	I	I
Bd 1	BATES L 85%	B	0.32	5"	2.0%	I	I	I
Bh 1	BOLIVAR FSL 65%	B	0.24	12"	1.3%	I	I	I
Bh 2	HECTOR FSL 20%	D	0.24	3"	1.3%	V	H	H
Ca 1	CATOOSA SIL 85%	B	0.37	11"	2.0%	I	I	I
Cs 1	CLARESON ST-SICL 90%	C	0.24	10"	2.5%	L	H	H
De 1	DENNIS SIL 85%	C	0.43	15"	2.0%	H (w)	H	H
Df 1	DENNIS SIL 85%	C	0.43	15"	2.0%	H (w)	H	H
Ec 1	ERAM SICL 75%	C	0.37	10"	2.0%	H (w)	H	H
Ec 2	COLLINSVILLE FSL 15%	D	0.20	14"	2.0%	V	H	H

WIN-PST SPISP II  
SOIL SENSITIVITY TO PESTICIDE LOSS RATING REPORT

Soils Data Table: SOIL\_KS Sort Order: MUSYM

Bourbon County, Kansas: KS011

Ke 1	KENOMA SIL 90%	D	0.43	8"	3.0% H (w)	H	H
La 1	LANTON SICL 85%	C	0.37	8"	3.0% H (w)	H	H
Le 1	LEANNA SIL 85%	D	0.32	6"	2.5% H (w)	H	H
Ma 1	MASON SIL 90%	B	0.37	17"	2.0% I	I	I
No 1	NOWATA SIL 85%	B	0.37	15"	2.0% I	I	I
Or 1	ORTHENTS CNX-SICL 100%	C	0.28	6"	1.3% L	H	H (s)
Os 1	OSAGE SIC 90%	D	0.28	13"	2.5% H (w)	H	H
Pa 1	PARSONS sil 90%	D	0.49	7"	2.7% H (w)	H	H
Pt 1	Pits, quarries VAR 100%		0.00	60"	0.0% ?	?	?
Rc 1	RINGO SIC 70%	D	0.28	10"	3.0% V	H	H
Rc 2	CLARESON ST-SICL 15%	C	0.24	10"	2.5% L	H	H
Ta 1	TAMAHA SIL 85%	D	0.43	7"	2.0% H (w)	H	H
Ve 1	VERDIGRIS SIL 95%	B	0.32	22"	3.0% L	I	I
Vf 1	VERDIGRIS SIL 90%	B	0.32	22"	3.0% L	I	I
W 1	WATER 100%		0.00	0"	0.0% ?	?	?
Za 1	ZAAR SIC 90%	D	0.28	15"	3.0% H (w)	H	H
ZAA 1	ZAAR SIC 96%	D	0.28	16"	3.0% H (w)	H	H
Zb 1	ZAAR SIC 90%	D	0.28	15"	3.0% H (w)	H	H

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H -- High  
I -- Intermediate  
L -- Low  
V -- Very Low

Conditions that affect ratings:

- m -- There are macropores in the surface horizon deeper than 24"
- w -- The high water table comes within 24" of the surface during the growing season
- s -- The field slope is greater than 15%

SPISP II S-Ratings:

- SLP -- Soil Leaching Potential
- SSRP -- Soil Solution Runoff Potential
- SARP -- Soil Adsorbed Runoff Potential

HYDRIC SOIL INTERPRETATIONS  
HYDRIC SOILS LIST  
Bourbon County, Kansas

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In this section, hydric soils are defined and described and the hydric soils in the survey area are listed. The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (USDA, 1999) and "Keys to Soil Taxonomy" (USDA, 1998) and in the "Soil Survey Manual" (USDA, 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1996).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units in the Hydric Soil Interpretations table meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 1996).

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

These map units, in general, do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

HYDRIC SOIL INTERPRETATIONS  
 HYDRIC SOILS LIST  
 Bourbon County, Kansas

All mapunits are displayed regardless of hydric status and are listed in alpha-numeric order by mapunit symbol. The "Hydric Soils Criteria" columns indicate the conditions that caused the mapunit component to be classified as "Hydric" or "Non-Hydric". These criteria are defined in "Hydric Soils of the United States" (USDA Miscellaneous Publication No. 1491, June, 1991). See the "Criteria for Hydric Soils" endnote to determine the meaning of these columns. Spot symbols are footnoted at the end of the table.

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
001CB: CATOOSA-ROCK OUTCROP COMPLEX, 1 TO 8 PERCENT SLOPES	CATOOSA	No	hillslope	---	---	---	---
	ROCK OUTCROP ERAM	Unranked No	hillslope hillslope	---	---	---	---
001CC: COLLINSVILLE-BATES COMPLEX, 2 TO 15 PERCENT SLOPES	COLLINSVILLE	No	hillslope	---	---	---	---
	BATES	No	hillslope	---	---	---	---
	CATOOSA	No	hillslope	---	---	---	---
	DENNIS	No	hillslope	---	---	---	---
037MD: KANIMA SILTY CLAY LOAM, 3 TO 50 PERCENT SLOPES	ERAM	No	hillslope	---	---	---	---
	KANIMA	No	hillslope	---	---	---	---
107CM: CLARESON-ROCK OUTCROP COMPLEX, 2 TO 15 PERCENT SLOPES	CLARESON	No	hillslope, ridge	---	---	---	---
	ROCK OUTCROP CATOOSA	Unranked No	ridge hillslope, ridge	---	---	---	---
	ERAM	No	hillslope, ridge	---	---	---	---
	LEBO	No	hillslope	---	---	---	---
	SUMMIT	No	hillslope	---	---	---	---
107EF: ERAM-LEBO SILTY CLAY LOAMS, 5 TO 20 PERCENT SLOPES	ERAM	No	hillslope	---	---	---	---
	LEBO	No	hillslope	---	---	---	---
	CLARESON	No	hillslope, ridge	---	---	---	---
	DENNIS	No	hillslope	---	---	---	---
107SN: SUMMIT SILTY CLAY LOAM, 1 TO 4 PERCENT SLOPES	SUMMIT	No	hillslope	---	---	---	---
	CATOOSA	No	hillslope, ridge	---	---	---	---
	SUMMIT	No	hillslope	---	---	---	---
107SO: SUMMIT SILTY CLAY LOAM, 4 TO 8 PERCENT SLOPES	CATOOSA	No	hillslope, ridge	---	---	---	---
	DENNIS	No	hillslope	---	---	---	---
	VERDIGRIS	No	flood plain	---	---	---	---
	OSAGE	Yes No	flood plain hillslope	2B3 ---	YES ---	NO ---	NO ---
133EC: ERAM SILTY CLAY LOAM, 3 TO 7 PERCENT SLOPES	ERAM	No	hillslope	---	---	---	---
	BATES	No	hillslope	---	---	---	---
	LEBO	No	hillslope	---	---	---	---
133SC: SHIDLER-CATOOSA SILT LOAMS, 1 TO 8 PERCENT SLOPES	SHIDLER	No	drainageway	---	---	---	---
	CATOOSA	No	ridge	---	---	---	---
	LEBO	No	hillslope	---	---	---	---
	ROCK OUTCROP	Unranked	hillslope	---	---	---	---
AED: ARENTS, EARTHEN DAM	ARENTS, EARTHEN DAM	Unranked	---	---	---	---	
Ba: BATES LOAM, 1 TO 4 PERCENT SLOPES	BATES	No	hillslope	---	---	---	---
	KENOMA	No	divide, terrace	---	---	---	---
Bc: BATES LOAM, 4 TO 7 PERCENT SLOPES	BATES	No	hillslope	---	---	---	---
	DENNIS	No	hillslope	---	---	---	---
	KENOMA	No	divide, terrace	---	---	---	---

HYDRIC SOIL INTERPRETATIONS  
 HYDRIC SOILS LIST  
 Bourbon County, Kansas

All mapunits are displayed regardless of hydric status and are listed in alpha-numeric order by mapunit symbol. The "Hydric Soils Criteria" columns indicate the conditions that caused the mapunit component to be classified as "Hydric" or "Non-Hydric". These criteria are defined in "Hydric Soils of the United States" (USDA Miscellaneous Publication No. 1491, June, 1991). See the "Criteria for Hydric Soils" endnote to determine the meaning of these columns. Spot symbols are footnoted at the end of the table.

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
Bd: BATES LOAM, 4 TO 7 PERCENT SLOPES, ERODED	BATES	No	hillslope	---	---	---	---
	DENNIS KENOMA	No No	hillslope divide, terrace	---	---	---	---
Bh: BOLIVAR-HECTOR FINE SANDY LOAMS, 5 TO 15 PERCENT SLOPES	BOLIVAR	No	hillslope	---	---	---	---
	HECTOR	No	ridge	---	---	---	---
	DENNIS KENOMA	No No	hillslope divide, terrace	---	---	---	---
Ca: CATOOSA SILT LOAM, 0 TO 2 PERCENT SLOPES	CATOOSA	No	ridge	---	---	---	---
	CLARESON KENOMA	No No	hillslope paleoterrace, ridge	---	---	---	---
	CLARESON	No	hillslope	---	---	---	---
Cs: CLARESON STONY SILTY CLAY LOAM, 1 TO 4 PERCENT SLOPES	CLARESON	No	hillslope	---	---	---	---
	RINGO	No	hillslope	---	---	---	---
De: DENNIS SILT LOAM, 1 TO 3 PERCENT SLOPES	DENNIS	No	hillslope	---	---	---	---
	ERAM VERDIGRIS	No No	--- flood plain	---	---	---	---
Df: DENNIS SILT LOAM, 3 TO 6 PERCENT SLOPES	DENNIS	No	hillslope	---	---	---	---
	BATES VERDIGRIS	No No	hillslope flood plain	---	---	---	---
Ec: ERAM-COLLINSVILLE COMPLEX, 5 TO 12 PERCENT SLOPES	ERAM	No	hillslope	---	---	---	---
	COLLINSVILLE	No	ridge	---	---	---	---
	BATES DENNIS	No No	hillslope hillslope	---	---	---	---
Ke: KENOMA SILT LOAM, 1 TO 3 PERCENT SLOPES	KENOMA	No	ridge	---	---	---	---
	PARSONS	No	divide, paleoterrace, ridge	---	---	---	---
La: LANTON SILTY CLAY LOAM, OCCASIONALLY FLOODED	LANTON	No	flood plain	---	---	---	---
	MASON OSAGE	No Yes	flood plain flood plain	---	---	---	---
Le: LEANNA SILT LOAM, OCCASIONALLY FLOODED	LEANNA	No	flood plain	---	---	---	---
Ma: MASON SILT LOAM, RARELY FLOODED	MASON	No	flood plain	---	---	---	---
	MASON	No	flood plain	---	---	---	---
	LANTON	No	flood plain	---	---	---	---
No: NOWATA SILT LOAM, 3 TO 5 PERCENT SLOPES	NOWATA	No	ridge	---	---	---	---
	KENOMA	No	divide, terrace	---	---	---	---
Or: ORTHENTS, HILLY	ORTHENTS	No	hillslope	---	---	---	---
Os: OSAGE SILTY CLAY, OCCASIONALLY FLOODED	OSAGE	Yes	flood plain	2B3	YES	NO	NO
	LANTON	No	flood plain	---	---	---	---
Pa: PARSONS SILT LOAM, 0 TO 2 PERCENT SLOPES	PARSONS	No	paleoterrace, ridge	---	---	---	---
	BATES	No	hillslope	---	---	---	---
	CATOOSA	No	ridge	---	---	---	---
Pt: PITS, QUARRIES	Pits, quarries	Unranked	---	---	---	---	

All mapunits are displayed regardless of hydric status and are listed in alpha-numeric order by mapunit symbol. The "Hydric Soils Criteria" columns indicate the conditions that caused the mapunit component to be classified as "Hydric" or "Non-Hydric". These criteria are defined in "Hydric Soils of the United States" (USDA Miscellaneous Publication No. 1491, June, 1991). See the "Criteria for Hydric Soils" endnote to determine the meaning of these columns. Spot symbols are footnoted at the end of the table.

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria			
				Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
Rc: RINGO-CLARESON COMPLEX, 9 TO 15 PERCENT SLOPES	RINGO	No	hillslope	---	---	---	---
	CLARESON	No	ridge	---	---	---	---
	CATOOSA ZAAR	No No	ridge hillslope	---	---	---	---
Ta: TAMAHA SILT LOAM, 1 TO 5 PERCENT SLOPES	TAMAHA	No	hillslope	---	---	---	---
	KENOMA	No	divide, terrace	---	---	---	---
Ve: VERDIGRIS SILT LOAM, OCCASIONALLY FLOODED	OSAGE	Yes	flood plain	2B3	YES	NO	NO
	VERDIGRIS	No	flood plain	---	---	---	---
Vf: VERDIGRIS SILT LOAM, CHANNELED	OSAGE	Yes	flood plain	2B3	YES	NO	NO
	VERDIGRIS	No	flood plain	---	---	---	---
W: WATER	DENNIS	No	hillslope	---	---	---	---
	WATER	Yes	---	4,3	NO	YES	YES
Za: ZAAR SILTY CLAY, 0 TO 2 PERCENT SLOPES	ZAAR	No	hillslope	---	---	---	---
	KENOMA	No	divide, terrace	---	---	---	---
ZAA: ZAAR SILTY CLAY, 1 TO 3 PERCENT SLOPES	ZAAR	No	hillslope	---	---	---	---
	DENNIS	No	hillslope	---	---	---	---
	LULA	No	hillslope	---	---	---	---
	PARSONS	No	---	---	---	---	---
	RINGO	No	---	---	---	---	---
Zb: ZAAR SILTY CLAY, 2 TO 6 PERCENT SLOPES	ZAAR	No	hillslope	---	---	---	---
	CLARESON RINGO	No No	hillslope hillslope	---	---	---	---

FOOTNOTE: There may be small areas of included soils or miscellaneous areas that are significant to use and management of the soil; yet are too small to delineate on the soil map at the map's original scale. These may be designated as spot symbols and are defined in the published Soil Survey Report or the USDA-NRCS Technical Guide, Part II. Areas mapped as water or any map unit that contains one of the following conventional symbols is considered a hydric soil map unit: marshes or swamps; wet spots; depressions; streams, lakes and ponds.

1. All Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:
  - a. Somewhat poorly drained with a water table equal to 0.0 foot (ft) from the surface during the growing season, or
  - b. poorly drained or very poorly drained and have either:
    - (1) water table equal to 0.0 ft during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches (in), or for other soils
    - (2) water table at less than or equal to 0.5 ft from the surface during the growing season if permeability is equal to or greater than 6.0 in/hour (h) in all layers within 20 in, or
    - (3) water table at less than or equal to 1.0 ft from the surface during the growing season if permeability is less than 6.0 in/h in any layer within 20 in, or
3. Soils that are frequently ponded for long duration or very long duration during the growing season, or
4. Soils that are frequently flooded for long duration or very long duration during the growing season.