

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
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(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

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(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

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(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

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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

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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

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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

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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

