

BUILDING SITE DEVELOPMENT  
Washington 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  
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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
027GC: Geary-----	83	Somewhat limited Shrink-swell	0.96	Somewhat limited Shrink-swell	0.96	Somewhat limited Shrink-swell Slope	0.96 0.12
027SU: Sutphen-----	99	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00
117KA: Kennebec-----	95	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 0.82 0.50	Very limited Flooding Shrink-swell	1.00 0.50
117PB: Pawnee-----	88	Very limited Shrink-swell Depth to saturated zone	1.00 0.39	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Shrink-swell Slope  Depth to saturated zone	1.00 0.48  0.39
117PC: Pawnee, eroded-----	88	Very limited Shrink-swell Depth to saturated zone	1.00 0.39	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Shrink-swell Slope  Depth to saturated zone	1.00 0.48  0.39
117WA: Wabash-----	88	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00
117WB: Wymore-----	88	Very limited Shrink-swell Depth to saturated zone	1.00 0.39	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Shrink-swell Depth to saturated zone	1.00 0.39
117WC: Wymore, eroded-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 0.39	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Shrink-swell Depth to saturated zone Slope	1.00 0.39 0.12
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	
Be: Benfield-----	85	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.90	Very limited Shrink-swell Slope	1.00 0.12
Cg: Cass-----	89	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Ch: Cass-----	89	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Co: Colo-----	95	Very limited Flooding Shrink-swell  Depth to saturated zone	1.00 0.50  0.39	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Flooding Shrink-swell  Depth to saturated zone	1.00 0.50  0.39
Cr: Crete-----	99	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
Cs: Crete-----	95	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
Ct: Crete-----	88	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.12

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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
Cx: Crete, eroded-----	90	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.12
Ed: Edalgo-----	85	Very limited Shrink-swell	1.00	Very limited Shrink-swell Depth to soft bedrock	1.00 0.46	Very limited Shrink-swell Slope	1.00 0.12
Eu: Eudora-----	94	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Ho: Hobbs-----	83	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Kp: Kipson-----	90	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50
Ks: Kipson-----	70	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50
Sogn-----	15	Very limited Depth to hard bedrock Shrink-swell Slope	1.00 1.00 0.50 0.16	Very limited Depth to hard bedrock Shrink-swell Slope	1.00 1.00 0.50 0.16	Very limited Depth to hard bedrock Slope Shrink-swell	1.00 1.00 1.00 0.50
Lc: Lancaster-----	85	Somewhat limited Shrink-swell	0.27	Somewhat limited Depth to soft bedrock Shrink-swell	0.54 0.27	Somewhat limited Shrink-swell Slope	0.27 0.12
Lh: Lancaster-----	50	Somewhat limited Shrink-swell Slope	0.27 0.04	Somewhat limited Depth to soft bedrock Shrink-swell Slope	0.54 0.27 0.04	Very limited Slope Shrink-swell	1.00 0.27
Hedville-----	32	Very limited Depth to hard bedrock Slope	1.00 1.00	Very limited Depth to hard bedrock Slope	1.00 1.00	Very limited Depth to hard bedrock Slope	1.00 1.00
Lo: Longford-----	85	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.12
Lx: Longford, eroded---	90	Very limited Shrink-swell	1.00	Somewhat limited Shrink-swell	0.50	Very limited Shrink-swell Slope	1.00 0.12
Mc: Mayberry-----	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
Mh: Morrill-----	90	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell Slope	0.50 0.12
Mm: Morrill-----	85	Somewhat limited Shrink-swell Slope	0.50 0.16	Somewhat limited Shrink-swell Slope	0.50 0.16	Very limited Slope Shrink-swell	1.00 0.50
Mp: Morrill-----	50	Somewhat limited Shrink-swell Slope	0.50 0.37	Somewhat limited Shrink-swell Slope	0.50 0.37	Very limited Slope Shrink-swell	1.00 0.50
Jansen-----	45	Somewhat limited Slope Shrink-swell	0.96 0.50	Somewhat limited Slope Shrink-swell	0.96 0.50	Very limited Slope Shrink-swell	1.00 0.50

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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
Mu: Muir-----	97	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Sa: Sarpy-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Tu: Tully-----	90	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell Slope	1.00 0.12
Ty: Tully-----	85	Very limited Shrink-swell Slope	1.00 0.04	Very limited Shrink-swell Slope	1.00 0.04	Very limited Shrink-swell Slope	1.00 1.00
W: Water-----	100	Not rated		Not rated		Not rated	
We: Wells-----	83	Somewhat limited Shrink-swell	0.73	Not limited		Somewhat limited Shrink-swell Slope	0.73 0.12

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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
027GC: Geary-----	83	Very limited Frost action Low strength Shrink-swell	1.00 1.00 0.96	Somewhat limited Cutbanks cave	0.10	Not limited	
027SU: Sutphen-----	99	Very limited Flooding Shrink-swell	1.00 1.00	Somewhat limited Flooding Too clayey Cutbanks cave	0.60 0.32 0.10	Somewhat limited Flooding	0.60
117KA: Kennebec-----	95	Very limited Frost action Flooding Low strength Shrink-swell	1.00 1.00 1.00 0.50	Somewhat limited Depth to saturated zone Flooding Cutbanks cave	0.82 0.60 0.10	Somewhat limited Flooding	0.60
117PB: Pawnee-----	88	Very limited Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Somewhat limited Depth to saturated zone	0.19
117PC: Pawnee, eroded-----	88	Very limited Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Very limited Too clayey Depth to saturated zone	1.00 0.19
117WA: Wabash-----	88	Very limited Shrink-swell Depth to saturated zone Flooding Frost action	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Flooding Too clayey Cutbanks cave	1.00 0.60 0.50 0.10	Very limited Depth to saturated zone Flooding	1.00 0.60
117WB: Wymore-----	88	Very limited Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Somewhat limited Depth to saturated zone	0.19
117WC: Wymore, eroded-----	85	Very limited Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Somewhat limited Depth to saturated zone	0.19
AED: Arents, Earthen Dam-	100	Not rated		Not rated		Not rated	
Be: Benfield-----	85	Very limited Shrink-swell Low strength Frost action	1.00 1.00 0.50	Somewhat limited Depth to soft bedrock Cutbanks cave Too clayey	0.90 0.10 0.04	Somewhat limited Depth to bedrock Content of large stones	0.90 0.03
Cg: Cass-----	89	Very limited Flooding Frost action	1.00 0.50	Very limited Cutbanks cave Flooding	1.00 0.60	Somewhat limited Flooding	0.60
Ch: Cass-----	89	Very limited Flooding Frost action	1.00 0.50	Very limited Cutbanks cave Flooding	1.00 0.80	Very limited Flooding	1.00

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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
Co: Colo-----	95	Very limited Frost action  Shrink-swell Flooding Depth to saturated zone	1.00  0.50 0.40 0.19	Very limited Depth to saturated zone Cutbanks cave	1.00  0.10	Somewhat limited Depth to saturated zone	0.19
Cr: Crete-----	99	Very limited Low strength Shrink-swell Frost action	1.00 1.00 1.00 0.50	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
Cs: Crete-----	95	Very limited Shrink-swell Low strength Frost action	1.00 1.00 1.00 0.50	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
Ct: Crete-----	88	Very limited Shrink-swell Low strength Frost action	1.00 1.00 1.00 0.50	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
Cx: Crete, eroded-----	90	Very limited Shrink-swell Frost action	1.00 0.50	Somewhat limited Too clayey Cutbanks cave	0.12 0.10	Not limited	
Ed: Edalgo-----	85	Very limited Shrink-swell Frost action	1.00 0.50	Somewhat limited Too clayey Depth to soft bedrock Cutbanks cave	0.50 0.46 0.10	Somewhat limited Depth to bedrock	0.46
Eu: Eudora-----	94	Very limited Frost action Flooding	1.00 1.00	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60
Ho: Hobbs-----	83	Very limited Flooding Low strength Frost action	1.00 1.00 1.00 0.50	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Somewhat limited Flooding	0.60
Kp: Kipson-----	90	Very limited Depth to soft bedrock Slope Shrink-swell Frost action	1.00 1.00 0.50 0.50	Very limited Depth to soft bedrock Slope Cutbanks cave	1.00 1.00 0.10	Very limited Depth to bedrock Slope Carbonate content Content of large stones Droughty	1.00 1.00 1.00 0.20 0.18
Ks: Kipson-----	70	Very limited Depth to soft bedrock Slope Shrink-swell Frost action	1.00 1.00 0.50 0.50	Very limited Depth to soft bedrock Slope Cutbanks cave	1.00 1.00 0.10	Very limited Depth to bedrock Slope Carbonate content Content of large stones Droughty	1.00 1.00 1.00 0.20 0.18
Sogn-----	15	Very limited Depth to hard bedrock Shrink-swell Frost action Slope	1.00 0.50 0.50 0.16	Very limited Depth to hard bedrock Slope Cutbanks cave	1.00 0.16 0.10	Very limited Depth to bedrock Droughty Slope Content of large stones	1.00 0.35 0.16 0.00
Lc: Lancaster-----	85	Very limited Low strength  Frost action Shrink-swell	1.00  0.50 0.27	Somewhat limited Depth to soft bedrock Cutbanks cave	0.54 0.10	Somewhat limited Depth to bedrock	0.54

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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
Lh: Lancaster-----	50	Very limited Low strength	1.00	Somewhat limited Depth to soft bedrock	0.54	Somewhat limited Depth to bedrock	0.54
		Frost action	0.50	Cutbanks cave	0.10	Slope	0.04
		Shrink-swell	0.27	Slope	0.04		
		Slope	0.04				
Hedville-----	32	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Cutbanks cave	0.10	Droughty	0.43
						Content of large stones	0.03
Lo: Longford-----	85	Very limited Shrink-swell	1.00	Somewhat limited Cutbanks cave	0.10	Not limited	
		Frost action	0.50				
Lx: Longford, eroded---	90	Very limited Shrink-swell	1.00	Somewhat limited Cutbanks cave	0.10	Not limited	
		Frost action	0.50				
Mc: Mayberry-----	85	Very limited Frost action	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Shrink-swell	1.00	Too clayey	0.12		
		Depth to saturated zone	1.00	Cutbanks cave	0.10		
Mh: Morrill-----	90	Somewhat limited Shrink-swell	0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
		Frost action	0.50				
Mm: Morrill-----	85	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope	0.16	Somewhat limited Slope	0.16
		Frost action	0.50	Cutbanks cave	0.10		
		Slope	0.16				
Mp: Morrill-----	50	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37
		Frost action	0.50	Cutbanks cave	0.10		
		Slope	0.37				
Jansen-----	45	Somewhat limited Slope	0.96	Very limited Cutbanks cave	1.00	Somewhat limited Slope	0.96
		Shrink-swell	0.50	Slope	0.96		
		Frost action	0.50				
		Low strength	0.22				
Mu: Muir-----	97	Somewhat limited Frost action	0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
		Flooding	0.40				
Sa: Sarpy-----	90	Somewhat limited Flooding	0.40	Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.69
Tu: Tully-----	90	Very limited Shrink-swell	1.00	Somewhat limited Too clayey	0.12	Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
Ty: Tully-----	85	Very limited Shrink-swell	1.00	Somewhat limited Too clayey	0.12	Somewhat limited Slope	0.04
		Frost action	0.50	Cutbanks cave	0.10		
		Slope	0.04	Slope	0.04		
W: Water-----	100	Not rated		Not rated		Not rated	
We: Wells-----	83	Somewhat limited Shrink-swell	0.73	Somewhat limited Cutbanks cave	0.10	Not limited	
		Frost action	0.50				

