

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
Atchison 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
013PD: Padonia-----	20-40	In Bedrock (paralithic)	---	Noncemented	Moderate	High	Low
Martin-----	---	---	---	---	High	High	Low
013SG: Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
013SM: Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
085WB: Wymore-----	---	---	---	---	High	High	Moderate
085WC: Wymore, eroded--	---	---	---	---	High	High	Moderate
087MO: Martin-----	---	---	---	---	High	High	Low
Oska-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Moderate
087SC: Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
Pawnee-----	---	---	---	---	High	High	Low
601GC: Gosport-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	High
601GT: Grundy-----	---	---	---	---	High	High	Moderate
601KH: Knox-----	---	---	---	---	High	Low	Low
601LA: Ladoga-----	---	---	---	---	Moderate	Moderate	Moderate
601SH: Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
601SM: Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
Ab: Albaton-----	---	---	---	---	Moderate	High	Low
Ae: Aksarben-----	---	---	---	---	High	Moderate	Moderate
AED: Arents, Earthen Dam-----	---	---	---	---	---	---	---
Aq: Fluvaquents-----	---	---	---	---	---	---	---
Ar: Armster-----	---	---	---	---	Moderate	High	Moderate
As: Armster-----	---	---	---	---	Moderate	High	Moderate
Ch: Chase-----	---	---	---	---	High	High	Low
Go: Gosport-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	High
Gr: Grundy-----	---	---	---	---	High	High	Moderate
Gu: Grundy-----	---	---	---	---	High	High	Moderate
Gx: Grundy-----	---	---	---	---	High	High	Moderate
Hn: Haynie-----	---	---	---	---	High	Low	Low
Ho: Haynie-----	---	---	---	---	High	Low	Low
Onawa-----	---	---	---	---	None	High	Low
Ju: Judson-----	---	---	---	---	High	Moderate	Low
Ke: Kennebec-----	---	---	---	---	High	Moderate	Low
Kf: Kennebec, CHANNELED-----	---	---	---	---	High	Moderate	Low
Kg: Kennebec-----	---	---	---	---	High	Moderate	Low
Colo-----	---	---	---	---	High	High	Moderate
Kn: Knox-----	---	---	---	---	High	Low	Low
Ky: Knox-----	---	---	---	---	High	Low	Low
Gosport-----	20-40	Bedrock (paralithic)	---	---	Moderate	High	High
M-W: Miscellaneous Water-----	---	---	---	---	---	---	---
Mc: Martin-----	---	---	---	---	High	High	Low
Mw: Muscotah-----	---	---	---	---	Moderate	High	Low
No: Nodaway-----	---	---	---	---	High	Moderate	Low
Od: Onawa-----	---	---	---	---	None	High	Low

SOIL FEATURES--Continued
Atchison 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
On:		In	In				
Onawa, sicl, 0-2%, occ. flood-	---	---	---	---	None	High	Low
Waldron, sicl, 0-2%, occ. flooded-----	---	---	---	---	Moderate	High	Low
Ow:							
Onawet-----	---	---	---	---	High	Moderate	Low
Pa:							
Knox-----	---	---	---	---	High	Low	Low
Palermo-----	---	---	---	---	High	Low	Low
Pb:							
Palermo-----	---	---	---	---	High	Low	Low
Pc:							
Pawnee-----	---	---	---	---	High	High	Low
Pd:							
Pawnee, eroded--	---	---	---	---	High	High	Low
Pt:							
Pits, Quarries--	---	---	---	---	---	---	---
Re:							
Reading-----	---	---	---	---	High	Moderate	Low
Sb:							
Sharpsburg-----	---	---	---	---	High	Moderate	Moderate
Sc:							
Sharpsburg-----	---	---	---	---	High	Moderate	Moderate
Sh:							
Shelby-----	---	---	---	---	Moderate	Moderate	Moderate
Sm:							
Shelby, eroded--	---	---	---	---	Moderate	Moderate	Moderate
Ss:							
Shelby, eroded--	---	---	---	---	Moderate	Moderate	Moderate
Steinauer-----	---	---	---	---	Moderate	High	Low
Vr:							
Rock Outcrop----	0-0	Bedrock (lithic)	---	---	---	---	---
Vinland-----	10-20	Bedrock (paralithic)	---	Weakly cemented	Moderate	Low	Moderate
Vs:							
Vinland-----	10-20	Bedrock (paralithic)	---	Weakly cemented	Moderate	Low	Moderate
W:							
Water-----	---	---	---	---	Low	---	---
Wa:							
Wabash-----	---	---	---	---	High	High	Moderate
Wb:							
Wabash-----	---	---	---	---	Moderate	High	Moderate
Wg:							
Wamego-----	20-40	Bedrock (paralithic)	---	Noncemented	Moderate	Moderate	Moderate
Vinland-----	10-20	Bedrock (paralithic)	---	Noncemented	Moderate	Low	Moderate
Wh:							
Wathena-----	---	---	---	---	Low	Low	Low
Haynie-----	---	---	---	---	High	Low	Low
Wm:							
Wymore-----	---	---	---	---	High	High	Moderate
Wn:							
Wymore-----	---	---	---	---	High	High	Moderate

