

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.

Map symbol and soil name	Restrictive layer				Potential for Frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated Steel	Concrete
		In	In				
061BE: Benfield-----	20-40	Bedrock (paralithic)	---	Moderately cemented	Low	High	Low
Florence-----	40-60	Bedrock (lithic)	---	Indurated	Low	Moderate	Low
061KA: Kahola-----	---	---	---	---	Moderate	Low	Low
061KB: Kahola-----	---	---	---	---	Moderate	Low	Low
061KO: Konza-----	---	---	---	---	Moderate	High	Moderate
061TO: Tully-----	---	---	---	---	Low	High	Low
111CD: Clime-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
Sogn-----	4-20	Bedrock (lithic)	---	Indurated	Moderate	Low	Low
111EA: Elmont-----	40-60	Bedrock (paralithic)	---	Weakly cemented	High	Moderate	Low
111IB: Ivan-----	---	---	---	---	Moderate	Low	Low
111KA: Kenoma-----	---	---	---	---	---	High	Moderate
111KB: Kenoma-----	---	---	---	---	---	High	Moderate
111KC: Kenoma-----	---	---	---	---	---	High	Moderate
111KD: Kenoma-----	---	---	---	---	---	High	Moderate
111LA: Labette-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Low
111MB: Martin-----	---	---	---	---	High	High	Low
111MC: Martin-----	---	---	---	---	High	High	Low
111RA: Reading-----	---	---	---	---	High	Moderate	Low
111TA: Tully-----	---	---	---	---	Moderate	High	Low
111TB: Tully-----	---	---	---	---	Moderate	High	Low
127IE: Irwin-----	---	---	---	---	Moderate	High	Low
127RD: Reading-----	---	---	---	---	High	Moderate	Low
127TS: Tully-----	---	---	---	---	Moderate	High	Low
139CS: Clime-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
Sogn-----	4-20	Bedrock (lithic)	---	Indurated	Moderate	Low	Low
139EN: Eram-----	20-40	Bedrock (paralithic)	---	Weakly cemented	None	High	Moderate
139KE: Kenoma-----	40-60	Bedrock (paralithic)	---	Weakly cemented	---	High	Moderate
139LS: Lebo-----	20-40	Bedrock (paralithic)	---	Weakly cemented	None	Moderate	Low
Summit-----	---	---	---	---	---	High	Low
139MB: Mason-----	---	---	---	---	---	Moderate	Moderate
139SO: Summit-----	---	---	---	---	---	High	Low
139VB: Verdigris-----	---	---	---	---	---	Low	Low
139VC: Verdigris-----	---	---	---	---	---	Low	Low
149HS: Haynie-----	---	---	---	---	High	Low	Low
Sarpy-----	---	---	---	---	Low	Low	Low
149SF: Sarpy-----	---	---	---	---	Low	Low	Low
161EM: Elmont-----	40-60	Bedrock (paralithic)	---	Weakly cemented	High	Moderate	Low
161IC: Irwin-----	40-60	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
161TT: Tully, eroded---	---	---	---	---	Moderate	High	Low
161TU: Tully-----	---	---	---	---	Moderate	High	Low
177AN: Kennebec-----	---	---	---	---	High	Moderate	Low

Map symbol and soil name	Restrictive layer				Potential for Frost action	Risk of corrosion	
	Kind	Depth to top In	Thickness In	Hardness		Uncoated Steel	Concrete
177BK:							
Martin-----	---	---	---	---	High	High	Low
Kennebec-----	---	---	---	---	High	Moderate	Low
177GM:							
Gymer-----	---	---	---	---	Moderate	Moderate	Moderate
177KB:							
Kennebec-----	---	---	---	---	High	Moderate	Low
177LD:							
Ladysmith-----	---	---	---	---	Moderate	High	Low
177LM:							
Ladysmith-----	---	---	---	---	Moderate	High	Low
177MB:							
Martin-----	---	---	---	---	High	High	Low
177MH:							
Martin, eroded--	---	---	---	---	High	High	Low
177PA:							
Pawnee-----	---	---	---	---	High	High	Low
177SE:							
Sarpy-----	---	---	---	---	Low	Low	Low
Eudora-----	---	---	---	---	High	Low	Low
177SV:							
Sogn-----	4-20	Bedrock (lithic)	---	Indurated	Moderate	Low	Low
Vinland-----	10-20	Bedrock (paralithic)	---	Weakly cemented	Moderate	Low	Moderate
AED:							
Arents, Earthen Dam-----	---	---	---	---	---	---	---
Ce:							
Chase-----	---	---	---	---	High	High	Low
Cm:							
Clime-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
Cr:							
Clime-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
Cs:							
Clime-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
Sogn-----	4-20	Bedrock (lithic)	---	Indurated	Moderate	Low	Low
Bo:							
Elmont-----	40-60	Bedrock (paralithic)	---	Weakly cemented	High	Moderate	Low
Eu:							
Eudora-----	---	---	---	---	High	Low	Low
Ex:							
Eudora-----	---	---	---	---	High	Low	Low
Kimo-----	---	---	---	---	High	High	Low
Fl:							
Florence-----	40-60	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Low
Labette-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Low
FLL:							
Florence-----	40-60	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Low
Labette-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Low
Gy:							
Gymer-----	---	---	---	---	Moderate	Moderate	Moderate
He:							
Haynie-----	---	---	---	---	High	Low	Low
Ib:							
Irwin-----	---	---	---	---	Moderate	High	Low
Id:							
Irwin-----	---	---	---	---	Moderate	High	Low
Iv:							
Ivan-----	---	---	---	---	Moderate	Low	Low
Ix:							
Ivan-----	---	---	---	---	Moderate	Low	Low
La:							
Labette-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Low
LBB:							
Labette-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Low
Lm:							
Ladysmith-----	---	---	---	---	Moderate	High	Low
M-W:							
Miscellaneous Water-----	---	---	---	---	---	---	---
Mb:							
Martin-----	---	---	---	---	High	High	Low
Mc:							
Martin, eroded--	---	---	---	---	High	High	Low
Mr:							
Morrill-----	---	---	---	---	Moderate	Moderate	Moderate
Ms:							
Morrill-----	---	---	---	---	Moderate	Moderate	Moderate
Pa:							
Pawnee-----	---	---	---	---	High	High	Low
Pn:							
Pawnee-----	---	---	---	---	High	High	Low

Map symbol and soil name	Restrictive layer				Potential for Frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated Steel	Concrete
Po:		In	In				
Pawnee, eroded--	---	---	---	---	High	High	Low
Px:							
Paxico-----	---	---	---	---	High	High	Low
Rb:							
Reading-----	---	---	---	---	High	Moderate	Low
Re:							
Reading-----	---	---	---	---	High	Moderate	Low
Sa:							
Sarpy-----	---	---	---	---	Low	Low	Low
Sc:							
Sarpy-----	---	---	---	---	Low	Low	Low
Haynie-----	---	---	---	---	High	Low	Low
Tz:							
Tuttle-----	40-60	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Low
W:							
Water-----	---	---	---	---	Low	---	---
Wb:							
Wabash-----	---	---	---	---	Moderate	High	Moderate
We:							
Wamego-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	Moderate	Moderate
Wf:							
Wamego-----	20-40	Bedrock (paralithic)	---	Weakly cemented	Moderate	Moderate	Moderate
Wy:							
Wymore-----	---	---	---	---	High	High	Moderate

