SOIL FEATURES
Mercer County, North Dakota

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
Mercer County, North Dakota

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				
1:							
Parnell---------	---	---	---	---	High	High	Low
2:							
Tonka----------	---	---	---	---	High	High	Low
3D:							
Seroco----------	---	---	---	---	Low	Low	Low
Telfer----------	---	---	---	---	Low	Moderate	Low
3E:							
Seroco----------	---	---	---	---	Low	Low	Low
Dune Land-------	---	---	---	---	Low	Moderate	Low
5:							
Dimmick---------	---	---	---	---	Moderate	High	Low
7:							
Straw----------	---	---	---	---	Moderate	High	Low
8:							
Grail----------	---	---	---	---	Moderate	High	Low
8B:							
Grail----------	---	---	---	---	Moderate	High	Low
8C:							
Grail----------	---	---	---	---	Moderate	High	Low
9B:							
Regent----------	20-40	Bedrock (paralithic)	---	---	Low	High	Moderate
9C:							
Regent----------	20-40	Bedrock (paralithic)	---	---	Low	High	Moderate
10:							
Savage----------	---	---	---	---	Low	High	Low
11C:							
Cherry----------	---	---	---	---	Moderate	High	Low
14:							
Havrelon--------	---	---	---	---	Moderate	High	Low
15:							
Lawther---------	---	---	---	---	Low	High	High
17:							
Heil----------	---	---	---	---	Moderate	High	Moderate
20:							
Lohler----------	---	---	---	---	Moderate	High	Low
21B:							
Lihen----------	---	---	---	---	Low	High	Low
21D:							
Telfer----------	---	---	---	---	Low	Moderate	Low
22B:							
Krem----------	---	---	---	---	Moderate	High	Low
22D:							
Krem----------	---	---	---	---	Moderate	High	Low
27:							
Mandan----------	---	---	---	---	Moderate	Moderate	Low
27B:							
Mandan----------	---	---	---	---	Moderate	Moderate	Low
28:							
Wilton----------	---	---	---	---	Moderate	Moderate	Low
28B:							
Temvik----------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
28C:							
Temvik----------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
35C:							
Amor----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
Werner----------	7-20	Bedrock (paralithic)	---	---	Moderate	High	Low
35D:							
Amor----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
Werner----------	7-20	Bedrock (paralithic)	---	---	Moderate	High	Low
36:							
Williams--------	---	---	---	---	Moderate	High	Low

SOIL FEATURES--Continued
Mercer County, North Dakota

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				
36B:							
Williams--------	---	---	---	---	Moderate	High	Low
36C:							
Williams--------	---	---	---	---	Moderate	High	Low
38C:							
Williams--------	---	---	---	---	Moderate	High	Low
Zahl----------	---	---	---	---	Moderate	Moderate	Low
38D:							
Zahl----------	---	---	---	---	Moderate	Moderate	Low
Williams--------	---	---	---	---	Moderate	High	Low
38E:							
Zahl----------	---	---	---	---	Moderate	Moderate	Low
40:							
Shambo----------	---	---	---	---	Moderate	Moderate	Low
40B:							
Shambo----------	---	---	---	---	Moderate	Moderate	Low
41B:							
Parshall--------	---	---	---	---	Moderate	Moderate	Low
43:							
Colvin----------	---	---	---	---	High	High	Low
44:							
Arnegard--------	---	---	---	---	Moderate	High	Low
44B:							
Arnegard--------	---	---	---	---	Moderate	High	Low
44C:							
Arnegard--------	---	---	---	---	Moderate	High	Low
47:							
Havrelon--------	---	---	---	---	Moderate	High	Low
51:							
Straw----------	---	---	---	---	Moderate	High	Low
53:							
Banks----------	---	---	---	---	Low	Moderate	Low
54B:							
Lihen----------	---	---	---	---	Low	High	Low
55B:							
Vebar----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
55C:							
Vebar----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
56B:							
Lefor----------	20-40	Bedrock (paralithic)	---	---	Moderate	Moderate	Low
56D:							
Lefor----------	20-40	Bedrock (paralithic)	---	---	Moderate	Moderate	Low
57B:							
Flaxton---------	---	---	---	---	Moderate	High	Low
57C:							
Flaxton---------	---	---	---	---	Moderate	High	Low
58B:							
Flaxton---------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
58C:							
Flaxton---------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
58D:							
Flaxton---------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
59B:							
Parshall--------	---	---	---	---	Moderate	Moderate	Low
62B:							
Velva----------	---	---	---	---	Moderate	High	Low
67:							
Channel---------	---	---	---	---	---	---	---
Straw----------	---	---	---	---	Moderate	High	Low
71B:							
Searing---------	---	---	---	---	Moderate	High	Moderate

SOIL FEATURES--Continued
Mercer County, North Dakota

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				
71C:							
Searing---------	---	---	---	---	Moderate	High	Moderate
Ringling--------	---	---	---	---	Low	Moderate	Low
73:							
Belfield--------	---	---	---	---	Low	High	Moderate
74B:							
Regent----------	20-40	Bedrock (paralithic)	---	---	Low	High	Moderate
Rhoades---------	---	---	---	---	Low	High	Moderate
74C:							
Regent----------	20-40	Bedrock (paralithic)	---	---	Low	High	Moderate
Rhoades---------	---	---	---	---	Low	High	Moderate
75:							
Belfield--------	---	---	---	---	Low	High	Moderate
Daglum----------	---	---	---	---	Moderate	High	Moderate
75B:							
Belfield--------	---	---	---	---	Low	High	Moderate
Daglum----------	---	---	---	---	Moderate	High	Moderate
75C:							
Belfield--------	---	---	---	---	Low	High	Moderate
Daglum----------	---	---	---	---	Moderate	High	Moderate
76B:							
Sen----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
Rhoades---------	---	---	---	---	Low	High	Moderate
76C:							
Sen----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
Rhoades---------	---	---	---	---	Low	High	Moderate
77:							
Bowdle----------	---	---	---	---	Moderate	Moderate	Low
77B:							
Bowdle----------	---	---	---	---	Moderate	Moderate	Low
77C:							
Bowdle----------	---	---	---	---	Moderate	Moderate	Low
Wabek----------	---	---	---	---	Low	Moderate	Low
78B:							
Noonan----------	---	---	---	---	Moderate	High	Moderate
Flaxton---------	---	---	---	---	Moderate	High	Low
79B:							
Moreau----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
79C:							
Moreau----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
79D:							
Wayden----------	10-20	Bedrock (paralithic)	---	---	Low	High	Moderate
Moreau----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
81D:							
Cabba----------	10-20	Bedrock (paralithic)	---	---	Moderate	High	Low
81E:							
Cabba----------	10-20	Bedrock (paralithic)	---	---	Moderate	High	Low
82E:							
Cabba----------	10-20	Bedrock (paralithic)	---	---	Moderate	High	Low
Badland---------	0-5	Bedrock (paralithic)	---	---	Low	High	High
83C:							
Vebar----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
Cohagen---------	4-20	Bedrock (paralithic)	---	---	Moderate	Moderate	Low

SOIL FEATURES--Continued
Mercer County, North Dakota

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				
83E:							
Cohagen---------	4-20	Bedrock (paralithic)	---	---	Moderate	Moderate	Low
Vebar----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
84E:							
Cohagen---------	4-20	Bedrock (paralithic)	---	---	Moderate	Moderate	Low
Vebar----------	20-40	Bedrock (paralithic)	---	---	Low	Moderate	Low
Rock Outcrop----	0-1	Bedrock (lithic)	---	---	Low	Moderate	Low
85:							
Harriet---------	---	---	---	---	High	High	High
86E:							
Wabek----------	---	---	---	---	Low	Moderate	Low
87C:							
Rhoades---------	---	---	---	---	Low	High	Moderate
Daglum----------	---	---	---	---	Moderate	High	Moderate
88:							
Harriet---------	---	---	---	---	High	High	Moderate
89E:							
Ustorthents-----	---	---	---	---	Moderate	High	Low
90C:							
Williams--------	---	---	---	---	Moderate	High	Low
Mine Sinks------	---	---	---	---	---	---	---
91:							
Straw----------	---	---	---	---	Moderate	High	Low
91B:							
Straw----------	---	---	---	---	Moderate	High	Low
92B:							
Noonan----------	---	---	---	---	Moderate	High	Moderate
Williams--------	---	---	---	---	Moderate	High	Low
93:							
Falkirk---------	---	---	---	---	Moderate	Moderate	Low
94:							
Makoti----------	---	---	---	---	Moderate	High	Low
95:							
Flaxton---------	---	---	---	---	Moderate	High	Low
Williams--------	---	---	---	---	Moderate	High	Low
96:							
Grassna---------	---	---	---	---	Moderate	High	Low
96B:							
Grassna---------	---	---	---	---	Moderate	High	Low
97B:							
Sen----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
97C:							
Sen----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
98E:							
Ringling--------	---	---	---	---	Low	Moderate	Low
Cabba----------	10-20	Bedrock (paralithic)	---	---	Moderate	High	Low
100B:							
Amor----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
100C:							
Amor----------	20-40	Bedrock (paralithic)	---	---	Moderate	High	Moderate
101C:							
Parshall--------	---	---	---	---	Moderate	Moderate	Low
102:							
Bowbells--------	---	---	---	---	Moderate	High	Low
104:							
Magnus----------	---	---	---	---	Moderate	High	Low
108:							
Belfield--------	---	---	---	---	Low	High	Moderate
Straw----------	---	---	---	---	Moderate	High	Low

SOIL FEATURES--Continued
Mercer County, North Dakota

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				
109B:							
Bowbells--------	---	---	---	---	Moderate	High	Low
Zahl----------	---	---	---	---	Moderate	Moderate	Low
110B:							
Belfield--------	---	---	---	---	Low	High	Moderate
111:							
Pits----------	---	---	---	---	None	Low	Low