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In cooperation with Iowa
Agriculture and Home
Economics Experiment
Station and Cooperative
Extension Service, Iowa
State University; and
Division of Soil
Conservation, Iowa
Department of Agriculture
and Land Stewardship

Soil Survey of Webster County, Iowa

Part II



Iowa Department of
Agriculture and
Land Stewardship

IOWA STATE UNIVERSITY

Iowa Agriculture and Home Economics
Experiment Station

IOWA STATE UNIVERSITY

University Extension



How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of soils called associations. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the soil associations on the color-coded map legend, and then refer to the section **General Soil Map Units** in Part I for a general description of the soils in your area.

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets** in Part III. Note the number of the map sheet, and turn to that sheet. Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. The **Contents** in Part I lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has information on a specific land use or soil property for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2006. Soil names and descriptions were approved in 2006. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2006. The most current official data are available through the NRCS Web Soil Survey (<http://soils.usda.gov>).

This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station and Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Webster County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Soybeans in an area of Nicollet loam, 1 to 3 percent slopes. Nicollet soils are very productive and are farmed intensively in Webster County.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Soil Survey of Webster County, Iowa

Introduction to Part II

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

This part of the soil survey includes interpretations for various uses of the soils and data on soil properties. This information can be used to plan the use and management of soils for crops and pasture or as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of gravel, sand, reclamation material, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The table "Classification of the Soils" is at the end of this section. Information about the system of soil taxonomy used by the Natural Resources Conservation Service is available in Part I of this publication. The extent of the map units in this survey area is shown in the table "Acreage and Proportionate Extent of the Soils."

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative 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 and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text in Part I for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Angus-----	Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs
Ankeny-----	Coarse-loamy, mixed, superactive, mesic Cumulic Hapludolls
Atkinson-----	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Aquolls-----	Aquolls
Belview-----	Fine-loamy, mixed, superactive, mesic Typic Calciudolls
Billett-----	Coarse-loamy, mixed, superactive, mesic Mollic Hapludalfs
Biscay-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Endoaquolls
Blue Earth-----	Fine-silty, mixed (calcareous), superactive, mesic Mollic Fluvaquents
Brownton-----	Fine, smectitic, calcareous, mesic Vertic Endoaquolls
Buckney-----	Sandy, mixed, mesic Typic Hapludolls
Calamine-----	Fine, mixed, superactive, mesic Typic Argiaquolls
Calcousta-----	Fine-silty, mixed, superactive, calcareous, mesic Typic Endoaquolls
Canisteo-----	Fine-loamy, mixed, superactive, calcareous, mesic Typic Endoaquolls
Clarion-----	Fine-loamy, mixed, superactive, mesic Typic Hapludolls
*Clarion-----	Fine-loamy, mixed, superactive, mesic Typic Eutrudepts
Cokato-----	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Coland-----	Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls
Collinwood-----	Fine, smectitic, mesic Aquertic Hapludolls
Copaston-----	Loamy, mixed, superactive, mesic Lithic Hapludolls
Cordova-----	Fine-loamy, mixed, superactive, mesic Typic Argiaquolls
Corvuso-----	Fine, smectitic, mesic Typic Calciaquolls
Cosmos-----	Fine, smectitic, mesic Vertic Epiaquolls
Crippin-----	Fine-loamy, mixed, superactive, mesic Aquic Hapludolls
Cylinder-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aquic Hapludolls
Dickinson-----	Coarse-loamy, mixed, superactive, mesic Typic Hapludolls
Dickman-----	Sandy, mixed, mesic Typic Hapludolls
Du Page-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Dundas-----	Fine-loamy, mixed, superactive, mesic Mollic Endoaqualls
Emeline-----	Loamy, mixed, superactive, mesic Lithic Hapludolls
Estherville-----	Sandy, mixed, mesic Typic Hapludolls

Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Faxon-----	Fine-loamy, mixed, superactive, mesic Typic Endoaquolls
Fluvaquents-----	Mesic Fluvaquents
Fort Dodge-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Garmore-----	Fine-loamy, mixed, superactive, mesic Typic Hapludolls
Gosport-----	Fine, illitic, mesic Oxyaquic Dystrudepts
Guckeen-----	Fine, smectitic, mesic Aquertic Hapludolls
Hanlon-----	Coarse-loamy, mixed, superactive, mesic Cumulic Hapludolls
Harps-----	Fine-loamy, mixed, superactive, mesic Typic Calciaquolls
Havelock-----	Fine-loamy, mixed, superactive, calcareous, mesic Cumulic Endoaquolls
Hawick-----	Sandy, mixed, mesic Entic Hapludolls
Jacwin-----	Fine-loamy over clayey, mixed, superactive, mesic Aquic Hapludolls
Joliet-----	Loamy, mixed, superactive, mesic Lithic Endoaquolls
Kamrar-----	Fine, smectitic, mesic Oxyaquic Hapludolls
Kanaranzi-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludolls
Kandiyohi-----	Fine, smectitic, mesic Aquertic Hapludolls
Kilkenny-----	Fine, smectitic, mesic Oxyaquic Vertic Hapludalfs
Klossner-----	Loamy, mixed, euic, mesic Terric Haplosaprists
Knoke-----	Fine, smectitic, calcareous, mesic Cumulic Vertic Endoaquolls
Lanyon-----	Fine, smectitic, mesic Typic Endoaquolls
Lawson-----	Fine-silty, mixed, superactive, mesic Aquic Cumulic Hapludolls
Le Sueur-----	Fine-loamy, mixed, superactive, mesic Aquic Argiudolls
Lerdal-----	Fine, smectitic, mesic Aeric Vertic Epiaqualfs
Lester-----	Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs
Luther-----	Fine-loamy, mixed, superactive, mesic Aeric Endoaqualfs
Malardi-----	Coarse-loamy, mixed, superactive, mesic Typic Argiudolls
Marna-----	Fine, smectitic, mesic Vertic Endoaquolls
Minnetonka-----	Fine, smectitic, mesic Vertic Argiaquolls
Moingona-----	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Nicollet-----	Fine-loamy, mixed, superactive, mesic Aquic Hapludolls
Okoboji-----	Fine, smectitic, mesic Cumulic Vertic Endoaquolls
Omsrud-----	Fine-loamy, mixed, superactive, mesic Typic Hapludolls
*Omsrud-----	Fine-loamy, mixed, superactive, mesic Typic Eutrudepts
Ridgeport-----	Coarse-loamy, mixed, superactive, mesic Typic Hapludolls
Ridgeton-----	Fine-loamy, mixed, superactive, mesic Pachic Hapludolls
Rockton-----	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Rolfe-----	Fine, smectitic, mesic Typic Argialbolls
Romeo-----	Loamy, mixed, superactive, mesic Lithic Endoaquolls
Round Lake-----	Sandy, mixed, mesic Typic Hapludolls
Sattre-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Mollic Hapludalfs
Shandep-----	Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolls
Shorewood-----	Fine, smectitic, mesic Aquertic Argiudolls
Spillville-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Storden-----	Fine-loamy, mixed, superactive, mesic Typic Eutrudepts
Sunburg-----	Coarse-loamy, mixed, superactive, mesic Typic Eutrudepts
Talcot-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, mesic Typic Endoaquolls
Terril-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Turlin-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Udifluvents-----	Udifluvents
Udorthents-----	Udorthents
Wacousta-----	Fine-silty, mixed, superactive, mesic Typic Endoaquolls
Wadena-----	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludolls
Wapsie-----	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Mollic Hapludalfs
Webster-----	Fine-loamy, mixed, superactive, mesic Typic Endoaquolls

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
6	Okoboji silty clay loam, depressionnal, 0 to 1 percent slopes-----	20,664	4.5
27B	Terril loam, 1 to 5 percent slopes-----	1,624	0.4
34	Estherville sandy loam, 0 to 2 percent slopes-----	85	*
34B	Estherville sandy loam, 2 to 5 percent slopes-----	611	0.1
55	Nicollet loam, 1 to 3 percent slopes-----	54,948	12.0
62F	Storden loam, 18 to 25 percent slopes-----	795	0.2
90	Okoboji mucky silty clay loam, depressionnal, 0 to 1 percent slopes-----	1,961	0.4
95	Harps clay loam, 0 to 2 percent slopes-----	10,006	2.2
107	Webster silty clay loam, 0 to 2 percent slopes-----	85,316	18.6
108	Wadena loam, 0 to 2 percent slopes-----	2,041	0.4
108B	Wadena loam, 2 to 5 percent slopes-----	1,366	0.3
108C	Wadena loam, 5 to 9 percent slopes-----	121	*
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded-----	4,829	1.1
136	Ankeny fine sandy loam, 0 to 2 percent slopes, rarely flooded-----	241	*
138B	Clarion loam, 2 to 5 percent slopes-----	45,261	9.8
138C2	Clarion loam, 5 to 9 percent slopes, moderately eroded-----	8,299	1.8
201B	Coland-Terril complex, 1 to 5 percent slopes-----	875	0.2
203	Cylinder loam, 0 to 2 percent slopes-----	1,235	0.3
227	Wadena loam, loamy substratum, 0 to 2 percent slopes-----	485	0.1
227B	Wadena loam, loamy substratum, 2 to 5 percent slopes-----	760	0.2
228	Cylinder loam, loamy substratum, 0 to 2 percent slopes-----	906	0.2
236D	Lester loam, 9 to 14 percent slopes-----	172	*
236E	Lester loam, 14 to 18 percent slopes-----	181	*
236F	Lester loam, 18 to 25 percent slopes-----	466	0.1
259	Biscay clay loam, 0 to 2 percent slopes-----	629	0.1
262G	Lester-Belview complex, 25 to 70 percent slopes-----	15,666	3.4
274	Rolfe silt loam, depressionnal, 0 to 1 percent slopes-----	270	*
278	Biscay clay loam, loamy substratum, 0 to 2 percent slopes-----	911	0.2
307	Dundas silt loam, 0 to 2 percent slopes-----	193	*
315B	Udifluvents, loamy, 2 to 5 percent slopes, occasionally flooded-----	1,103	0.2
323B	Fort Dodge loam, 2 to 5 percent slopes-----	429	*
325	Le Sueur loam, 1 to 3 percent slopes-----	2,697	0.6
338	Garmore loam, 0 to 2 percent slopes-----	226	*
342	Estherville sandy loam, loamy substratum, 0 to 2 percent slopes-----	19	*
342B	Estherville sandy loam, loamy substratum, 2 to 5 percent slopes-----	460	0.1
344B	Copaston loam, 2 to 5 percent slopes-----	138	*
345	Copaston-Jacwin complex, 1 to 3 percent slopes-----	137	*
355	Luther loam, 1 to 3 percent slopes-----	998	0.2
383	Marna silty clay loam, 0 to 2 percent slopes-----	49,924	10.9
385	Guckeen silty clay loam, 1 to 3 percent slopes-----	8,106	1.8
386	Cordova clay loam, 0 to 2 percent slopes-----	1,228	0.3
387B	Kamrar silty clay loam, 2 to 5 percent slopes-----	687	0.1
413G	Gosport-Emeline-Ridgeton complex, 25 to 75 percent slopes-----	2,301	0.5
457	Du Page silt loam, 0 to 2 percent slopes, occasionally flooded-----	720	0.2
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded-----	1,215	0.3
485B	Spillville loam, 2 to 5 percent slopes, rarely flooded-----	1,169	0.3
506	Wacousta silty clay loam, depressionnal, 0 to 1 percent slopes-----	3,799	0.8
507	Canisteo clay loam, 0 to 2 percent slopes-----	49,709	10.8
511	Blue Earth mucky silt loam, depressionnal, 0 to 1 percent slopes-----	205	*
526	Wacousta mucky silt loam, depressionnal, 0 to 1 percent slopes-----	311	*
536	Hanlon fine sandy loam, 0 to 2 percent slopes, occasionally flooded-----	1,064	0.2
541C	Estherville-Hawick complex, 5 to 9 percent slopes-----	242	*
551B	Calamine silty clay loam, 2 to 5 percent slopes-----	150	*
551D	Calamine silty clay loam, 5 to 14 percent slopes-----	125	*
559	Talcot clay loam, 0 to 2 percent slopes-----	993	0.2
561	Talcot clay loam, loamy substratum, 0 to 2 percent slopes-----	1,196	0.3
566C	Moingona loam, 5 to 9 percent slopes-----	635	0.1
568D	Cokato loam, 9 to 14 percent slopes-----	590	0.1
568E	Cokato loam, 14 to 18 percent slopes-----	153	*
583	Minnetonka silty clay loam, 0 to 2 percent slopes-----	940	0.2
606	Lanyon silty clay loam, depressionnal, 0 to 1 percent slopes-----	668	0.1
625	Lerdal silt loam, 1 to 3 percent slopes-----	1,207	0.3
636	Buckney fine sandy loam, 0 to 2 percent slopes, rarely flooded-----	313	*

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
636B	Buckney fine sandy loam, 2 to 5 percent slopes, rarely flooded-----	151	*
638C2	Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded-----	981	0.2
650	Joliet-Faxon complex, 0 to 2 percent slopes-----	184	*
715	Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded-----	3,874	0.8
735	Havelock clay loam, 0 to 2 percent slopes, occasionally flooded-----	519	0.1
740D	Hawick coarse sandy loam, 9 to 14 percent slopes-----	186	*
775B	Billett fine sandy loam, 2 to 5 percent slopes-----	198	*
775C	Billett fine sandy loam, 5 to 9 percent slopes-----	173	*
777B	Wapsie loam, 2 to 5 percent slopes-----	318	*
835D2	Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded-----	1,594	0.3
835E2	Storden-Omsrud complex, 14 to 18 percent slopes, moderately eroded-----	482	0.1
836B	Kilkenny silt loam, 2 to 5 percent slopes-----	1,261	0.3
854D	Fens, Aquolls, 5 to 14 percent slopes-----	86	*
855	Shorewood silty clay loam, 1 to 3 percent slopes-----	1,934	0.4
956	Harps-Okoboji, depressional, complex, 0 to 2 percent slopes-----	1,563	0.3
1007	Cosmos clay loam, 0 to 3 percent slopes, bouldery-----	371	*
1055B	Kandiyohei clay loam, 2 to 5 percent slopes, bouldery-----	264	*
1138B	Clarion clay loam, 2 to 5 percent slopes-----	3,294	0.7
1236B	Angus loam, 2 to 5 percent slopes-----	3,420	0.7
1236C	Angus loam, 5 to 9 percent slopes-----	580	0.1
1259	Biscay clay loam, depressional, 0 to 1 percent slopes-----	129	*
1507	Brownton silty clay loam, 0 to 2 percent slopes-----	10,908	2.4
1555	Nicollet-Guckeen complex, 1 to 3 percent slopes-----	11,050	2.4
1836B	Kilkenny-Shorewood complex, 2 to 5 percent slopes-----	699	0.2
2700C	Ridgeton loam, 5 to 9 percent slopes-----	419	*
2700D	Ridgeton loam, 9 to 14 percent slopes-----	183	*
4000	Urban land-----	728	0.2
4055	Nicollet-Urban land complex, 1 to 3 percent slopes-----	493	0.1
4107	Webster-Urban land complex, 0 to 2 percent slopes-----	568	0.1
4138B	Clarion-Urban land complex, 2 to 5 percent slopes-----	517	0.1
4235B	Angus-Urban land complex, 2 to 5 percent slopes-----	618	0.1
4236D	Lester-Urban land complex, 9 to 14 percent slopes-----	309	*
4325	Le Sueur-Urban land complex, 1 to 3 percent slopes-----	9	*
4444	Jacwin-Urban land complex, 1 to 3 percent slopes-----	104	*
4507	Canisteo-Urban land complex, 0 to 2 percent slopes-----	417	*
4551B	Calamine-Urban land complex, 2 to 5 percent slopes-----	40	*
4551D	Calamine-Urban land complex, 5 to 14 percent slopes-----	52	*
4635	Buckney-Urban land complex, 0 to 2 percent slopes-----	87	*
4635B	Buckney-Urban land complex, 2 to 5 percent slopes-----	16	*
4946B	Udorthents-Highway complex, 0 to 5 percent slopes-----	1,052	0.2
5010	Pits, sand and gravel-----	883	0.2
5030	Pits, limestone quarries-----	236	*
5035	Pits, gypsum quarries-----	3,849	0.8
5040	Udorthents, loamy (cut and fill land)-----	1,869	0.4
5049	Aquolls, ponded-Udorthents, loamy, complex-----	18	*
5060	Pits, clay-----	353	*
5080	Udorthents, sanitary landfill-----	164	*
5457	Du Page silt loam, channeled, 0 to 2 percent slopes, frequently flooded--	204	*
5507	Corvuso-Brownton complex, 0 to 2 percent slopes-----	3,710	0.8
AW	Animal waste lagoon-----	25	*
SL	Sewage lagoon-----	191	*
W	Water-----	3,493	0.8
	Total-----	459,600	100.0

* Less than 0.1 percent.

Agronomy

This section provides some general information about managing the soils for crops and for hay and pasture. The Iowa corn suitability rating system and the system of land capability classification used by the Natural Resources Conservation Service are explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil. Prime farmland is described, and interpretations for agricultural waste management are provided.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Management Considerations

The management concerns affecting the use of the detailed soil map units in the county for crops are shown in the table “Cropland Management Considerations” at the end of this section. The main concerns in managing nonirrigated cropland are conserving moisture, controlling wind erosion and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control wind erosion and water erosion. Conservation tillage, stripcropping, field windbreaks, contour farming, conservation cropping systems, crop residue management, terraces, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining soil fertility include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the considerations shown in the table cannot be easily overcome. These are channels, flooding, gullies, and ponding.

Additional considerations are as follows:

Lime content, limited available water capacity, limited content of organic matter, potential poor tilth and compaction, and restricted permeability.—These limitations can be minimized by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Potential for ground-water contamination.—The proper use of nutrients and pesticides can reduce the risk of ground-water contamination.

Potential for surface-water contamination.—The risk of surface-water contamination can be reduced by the proper use of nutrients and pesticides and by conservation farming practices that reduce the runoff rate.

Surface crusting.—This limitation retards seedling development after periods of heavy rainfall.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Surface stones.—Stones or boulders on or near the surface can hinder normal tillage unless they are removed.

Salt content.—In areas where this is a limitation, only salt-tolerant crops should be grown.

On irrigated soils the main management concerns are efficient water use, nutrient management, control of erosion, pest and weed control, and timely planting and harvesting for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can increase wetness and soil salinity.

Explanation of Criteria

Acid soil.—The pH is less than 6.1.

Channeled.—The word “channeled” is included in the map unit name.

Dense layer.—The bulk density is 1.80 g/cc or greater within the soil profile.

Depth to rock.—The depth to bedrock is less than 40 inches.

Eroded.—The word “eroded” is included in the map unit name.

Excessive permeability.—Saturated hydraulic conductivity is 42 micrometers per second or more within the soil profile.

Flooding.—Flooding is occasional, frequent, or very frequent.

Gullied.—The word “gullied” is included in the map unit name.

High content of organic matter.—The surface layer has more than 20 percent organic matter.

Lime content.—The pH is 7.4 or more in the surface layer, or the wind erodibility group is 4L.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Limited content of organic matter.—The content of organic matter is 2 percent or less in the surface layer.

Ponding.—Ponding duration is assigned to the map unit component. Water is above the surface.

Potential poor tilth and compaction.—The content of clay is 27 percent or more in the surface layer.

Potential for ground-water contamination (by nutrients or pesticides).—The depth to a seasonal high water table is 4 feet or less, the saturated hydraulic conductivity of any layer is more than 42 micrometers per second, or the depth to bedrock is less than 60 inches.

Potential for surface-water contamination (by nutrients or pesticides).—The map unit component is occasionally, frequently, or very frequently flooded, is subject to ponding, is assigned to hydrologic group C or D and has a slope of more than 2 percent, is assigned to hydrologic group A and has a slope of more than 6 percent, or is assigned to hydrologic group B, has a slope of 3 percent or more, and has a K factor of more than 0.17.

Previously eroded.—The word “eroded” is included in the map unit name.

Restricted permeability.—Saturated hydraulic conductivity is less than 0.42 micrometer per second within the soil profile.

Salt content.—The electrical conductivity is 4 or more in the surface layer or 8 or more within a depth of 30 inches.

Slope (equipment limitation).—The slope is more than 15 percent.

Surface crusting.—The content of clay is 27 percent or more and the content of organic matter is 2 percent or less in the surface layer.

Surface rock fragments (equipment limitation).—The terms describing the texture of the surface layer include any rock fragment modifier, except for gravelly, channery, stony, very stony, extremely stony, bouldery, very bouldery, and extremely bouldery.

Surface stones (equipment limitation).—The word “stony” or “bouldery” is included in the description of the surface layer, or 0.01 to 0.1 percent of the surface is covered by stones or boulders.

Water erosion.—Either the slope is 6 percent or more, or the slope is more than 3 percent and less than 6 percent and the surface layer is not sandy.

Water table.—A water table is within 2.5 feet of the surface.

Wind erosion.—The wind erodibility group is 1, 2, 3, or 4L.

Hydrologic groups are described under the heading “Water Features.” Erosion factors (e.g., K factor) and wind erodibility groups are described under the heading “Physical Properties.”

Cropland Management Considerations

(See text for a description of the considerations listed in this table)

Map symbol and soil name	Pct. of map unit	Cropland management considerations
6: Okoboji, depressional, ponded	85	Ponding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
27B: Terril-----	85	Potential for ground-water contamination Potential for surface-water contamination Water erosion
34: Estherville-----	90	Excessive permeability Limited available water capacity Potential for ground-water contamination Wind erosion
34B: Estherville-----	85	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
55: Nicollet-----	75	Potential for ground-water contamination Water table
62F: Storden-----	80	Slope Lime content Potential for surface-water contamination Water erosion Wind erosion
90: Okoboji, mucky, depressional, ponded-----	85	Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
95: Harps-----	85	Lime content Potential for ground-water contamination Water table Wind erosion
107: Webster-----	80	Potential poor tilth and compaction Potential for ground-water contamination Water table
108: Wadena-----	85	Excessive permeability Potential for ground-water contamination

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
108B: Wadena-----	95	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion
108C: Wadena-----	75	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion
135: Coland, occasionally flooded	85	Flooding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
136: Ankeny, rarely flooded-----	80	Excessive permeability Potential for ground-water contamination Wind erosion
138B: Clarion-----	80	Potential for ground-water contamination Potential for surface-water contamination Water erosion
138C2: Clarion, moderately eroded---	80	Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion
201B: Coland-----	50	Potential poor tilth and compaction Potential for ground-water contamination Water erosion Water table
Terril-----	35	Potential for ground-water contamination Potential for surface-water contamination Water erosion
203: Cylinder-----	80	Excessive permeability Potential for ground-water contamination Water table
227: Wadena, loamy substratum----	70	Excessive permeability Potential for ground-water contamination
227B: Wadena, loamy substratum----	70	Excessive permeability Potential for ground-water contamination Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
228: Cylinder, loamy substratum---	70	Excessive permeability Potential for ground-water contamination Water table
236D: Lester-----	80	Potential for surface-water contamination Water erosion
236E: Lester-----	85	Slope Potential for surface-water contamination Water erosion
236F: Lester-----	80	Slope Potential for surface-water contamination Water erosion
259: Biscay-----	85	Excessive permeability Potential for ground-water contamination Water table
262G: Lester-----	60	Slope Potential for surface-water contamination Water erosion
Belview-----	20	Slope Lime content Potential for surface-water contamination Water erosion Wind erosion
274: Rolfe, depressional, ponded--	85	Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
278: Biscay, loamy substratum----	70	Excessive permeability Potential for ground-water contamination Water table
307: Dundas-----	80	Potential for ground-water contamination Water table
315B: Udifluents, occasionally flooded-----	80	Flooding Potential for ground-water contamination Potential for surface-water contamination Wind erosion
323B: Fort Dodge-----	90	Excessive permeability Potential for ground-water contamination Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
325: Le Sueur-----	90	Potential for ground-water contamination Water table
338: Garmore-----	100	Potential for ground-water contamination
342: Estherville, loamy substratum	70	Excessive permeability Limited available water capacity Potential for ground-water contamination Wind erosion
342B: Estherville, loamy substratum	70	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
344B: Copaston-----	80	Depth to rock Lime content Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
345: Copaston-----	35	Depth to rock Lime content Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Wind erosion
Jacwin-----	25	Depth to rock Potential for ground-water contamination Restricted permeability Water table
355: Luther-----	85	Potential for ground-water contamination Water table
383: Marna-----	80	Potential poor tilth and compaction Potential for ground-water contamination Water table
385: Guckeen-----	75	Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
386: Cordova-----	85	Potential poor tilth and compaction Potential for ground-water contamination Water table

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
387B: Kamrar-----	85	Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
413G: Gosport-----	25	Acid soil Slope Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
Emeline-----	25	Slope Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion
Ridgeton-----	25	Slope Potential for surface-water contamination Water erosion
457: Du Page, occasionally flooded	85	Flooding Potential for ground-water contamination Potential for surface-water contamination
485: Spillville, occasionally flooded-----	80	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
485B: Spillville, rarely flooded---	85	Potential for ground-water contamination Potential for surface-water contamination Water erosion
506: Wacousta, depressiona l, ponded-----	80	Ponding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
507: Canisteeo-----	75	Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table Wind erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
511: Blue Earth, depressiona l, ponded-----	85	High organic matter content Lime content Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
526: Wacousta, mucky, depressiona, ponded-----	90	Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
536: Hanlon, occasionally flooded	80	Flooding Potential for ground-water contamination Potential for surface-water contamination Wind erosion
541C: Estherville-----	45	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
Hawick-----	45	Excessive permeability Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
551B: Calamine-----	85	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
551D: Calamine-----	55	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Surface stones Water erosion Water table
559: Talcot-----	85	Excessive permeability Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table Wind erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
561: Talcot, loamy substratum-----	70	Excessive permeability Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table Wind erosion
566C: Moingona-----	90	Potential for ground-water contamination Potential for surface-water contamination Water erosion
568D: Cokato-----	80	Potential for surface-water contamination Water erosion
568E: Cokato-----	80	Slope Potential for surface-water contamination Water erosion
583: Minnetonka-----	90	Potential poor tilth and compaction Potential for ground-water contamination Water table
606: Lanyon, depressional, ponded	80	Ponding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
625: Lerdal-----	80	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water table
636: Buckney, rarely flooded-----	85	Excessive permeability Limited available water capacity Potential for ground-water contamination Wind erosion
636B: Buckney, rarely flooded-----	90	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
638C2: Clarion, moderately eroded---	50	Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion
Storden, moderately eroded---	35	Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
650: Joliet-----	45	Depth to rock Limited available water capacity Potential for ground-water contamination Water table
Faxon-----	45	Depth to rock Limited available water capacity Potential for ground-water contamination Water table
715: Fluvaquents, frequently flooded-----	65	Flooding Excessive permeability Potential for ground-water contamination Potential for surface-water contamination Water table Wind erosion
735: Havelock, occasionally flooded-----	85	Flooding Lime content Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table Wind erosion
740D: Hawick-----	80	Excessive permeability Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
775B: Billett-----	90	Excessive permeability Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
775C: Billett-----	85	Excessive permeability Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
777B: Wapsie-----	85	Acid soil Excessive permeability Potential for ground-water contamination Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
835D2: Storden, moderately eroded---	50	Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Omsrud, moderately eroded----	35	Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
835E2: Storden, moderately eroded---	50	Slope Lime content Potential for surface-water contamination Previously eroded Water erosion Wind erosion
Omsrud, moderately eroded----	35	Slope Potential for surface-water contamination Previously eroded Water erosion
836B: Kilkenny-----	65	Potential for ground-water contamination Potential for surface-water contamination Water erosion
854D: Fens, Aquolls-----	80	High organic matter content Potential for ground-water contamination Water erosion Water table Wind erosion
855: Shorewood-----	85	Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
956: Harps-----	45	Lime content Potential for ground-water contamination Water table Wind erosion
Okoboji, depression, ponded	35	Ponding Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
1007: Cosmos, bouldery-----	65	Dense layer Potential poor tilth and compaction Potential for ground-water contamination Surface stones Water table

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
1055B: Kandiyohi, bouldery-----	65	Dense layer Potential poor tilth and compaction Potential for ground-water contamination Surface stones Water erosion Water table
1138B: Clarion-----	65	Potential for ground-water contamination Potential for surface-water contamination Water erosion
1236B: Angus-----	85	Potential for surface-water contamination Water erosion
1236C: Angus-----	80	Potential for surface-water contamination Water erosion
1259: Biscay, depressional, ponded	80	Excessive permeability Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
1507: Brownton-----	80	Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table
1555: Niccollet-----	40	Potential for ground-water contamination Water table
Guckeen-----	25	Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water table
1836B: Kilkenny-----	65	Potential for ground-water contamination Potential for surface-water contamination Water erosion
Shorewood-----	25	Potential poor tilth and compaction Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
2700C: Ridgeton-----	75	Potential for surface-water contamination Water erosion
2700D: Ridgeton-----	80	Potential for surface-water contamination Water erosion

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
4000. Urban land		
4055: Nicollet-----	50	Potential for ground-water contamination Water table
Urban land.		
4107: Webster-----	60	Potential poor tilth and compaction Potential for ground-water contamination Water table
Urban land.		
4138B: Clarion-----	50	Potential for ground-water contamination Potential for surface-water contamination Water erosion
Urban land.		
4235B: Angus-----	60	Potential for surface-water contamination Water erosion
Urban land.		
4236D: Lester-----	50	Potential for surface-water contamination Water erosion
Urban land.		
4325: Le Sueur-----	60	Potential for ground-water contamination Water table
Urban land.		
4444: Jacwin-----	50	Depth to rock Potential for ground-water contamination Restricted permeability Water table
Urban land.		
4507: Canisteo-----	50	Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table Wind erosion
Urban land.		
4551B: Calamine-----	50	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
4551B: Urban land.		
4551D: Calamine-----	50	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
Urban land.		
4635: Buckney-----	50	Excessive permeability Limited available water capacity Potential for ground-water contamination Wind erosion
Urban land.		
4635B: Buckney-----	50	Excessive permeability Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Water erosion Wind erosion
Urban land.		
4946B: Udorthents-----	70	Onsite investigation required
Highway-----	30	Not applicable
5010. Pits, sand and gravel		
5030. Pits, limestone quarries		
5035. Pits, gypsum quarries		
5040: Udorthents, loamy-----	100	Onsite investigation required
5049: Aquolls, ponded-----	60	Onsite investigation required
Udorthents, loamy-----	30	Onsite investigation required
5060. Pits, clay		
5080: Udorthents-----	100	Onsite investigation required
5457: Du Page, channeled, frequently flooded-----	80	Flooding Channeled Potential for ground-water contamination Potential for surface-water contamination

Cropland Management Considerations--Continued

Map symbol and soil name	Pct. of map unit	Cropland management considerations
5507: Corvuso-----	55	Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table Wind erosion
Brownton-----	35	Lime content Potential poor tilth and compaction Potential for ground-water contamination Water table
AW. Animal waste lagoon		
SL. Sewage lagoon		
W. Water		

Crop Yield Estimates

The tables “Land Capability, Corn Suitability Rating, and Yields per Acre of Crops” and “Land Capability and Yields per Acre of Pasture” are described in this section. Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the

soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, or wildlife habitat.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

[Reference: United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. USDA Handbook 210.]

Corn Suitability Rating

The corn suitability rating (CSR) system was developed in Iowa to rate the productivity of each different kind of soil for row crops. CSRs provide a relative ranking of all soils mapped in the State of Iowa. They can be used to compare the potential yield production of one soil with that of other soils. Ratings range from 5 to 100. A rating of 5 indicates severe limitations for row crop production. Soil properties and weather conditions are the dominant factors that affect productivity.

Crop Yields

The average yields per acre that can be expected of the principal crops under a high level of management are shown in the table. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Pasture Yields

Some pasture yields are expressed in the table in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about forage yields other than those shown in the table.

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops

(The crop yield estimates were determined through recent research conducted by Iowa State University. They are based on a high level of management and are for nonirrigated areas. See text for additional information. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
6----- Okoboji, depressional, ponded	85	3w	62	136	35	76
27B----- Terril	85	2e	82	190	49	93
34----- Estherville	90	3s	37	79	25	34
34B----- Estherville	85	3s	32	51	16	33
55----- Nicollet	75	1	90	173	45	99
62F----- Storden	80	6e	22	---	---	---
90----- Okoboji, mucky, depressional, ponded	85	3w	67	140	36	79
95----- Harps	85	2w	67	143	36	79
107----- Webster	80	2w	82	163	42	92
108----- Wadena	85	2s	52	96	30	66
108B----- Wadena	95	2e	47	91	29	63
108C----- Wadena	75	3e	27	90	27	62
135----- Coland, occasionally flooded	85	2w	82	157	40	87
136----- Ankeny, rarely flooded	80	2s	52	104	32	69
138B----- Clarion	80	2e	82	176	45	99
138C2----- Clarion, moderately eroded	80	3e	65	163	42	92
201B----- Coland----- Terril-----	55 35	2w 2e	73	167	39	85

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
203----- Cylinder	80	2s	75	120	40	87
227----- Wadena, loamy substratum	70	2s	62	98	33	69
227B----- Wadena, loamy substratum	70	2e	57	95	31	65
228----- Cylinder, loamy substratum	70	2s	82	125	46	90
236D----- Lester	80	3e	52	139	39	85
236E----- Lester	85	4e	42	115	32	70
236F----- Lester	80	6e	22	---	---	---
259----- Biscay	85	2w	77	118	38	83
262G----- Lester----- Belview-----	60 20	6e 6e	11	---	---	---
274----- Rolfe, depressional, ponded	85	3w	55	104	30	67
278----- Biscay, loamy substratum	70	2w	72	113	33	78
307----- Dundas	80	2w	67	131	32	71
315B----- Udifluvents, occasionally flooded	80	5w	5	---	---	---
323B----- Fort Dodge	90	2e	77	110	35	76
325----- Le Sueur	90	1	85	182	47	103
338----- Garmore	100	1	87	169	44	96
342----- Estherville, loamy substratum	70	3s	47	82	28	37
342B----- Estherville, loamy substratum	70	3s	42	79	25	34
344B----- Copaston	80	4s	25	76	23	51

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
345----- Copaston----- Jacwin-----	35 25	4s 2w	45	115	25	53
355----- Luther	85	1	73	168	44	95
383----- Marna	80	2w	73	158	40	88
385----- Guckeen	75	1	87	139	44	97
386----- Cordova	85	2w	72	168	44	95
387B----- Kamrar	85	2e	82	136	42	91
413G----- Gosport----- Emeline----- Ridgeton-----	25 25 25	7e 7s 6e	5	---	---	---
457----- Du Page, occasionally flooded	85	2w	82	170	46	82
485----- Spillville, occasionally flooded	80	2w	87	189	52	110
485B----- Spillville, rarely flooded	85	2e	82	185	49	107
506----- Wacousta, depressiona l, ponded	80	3w	62	141	36	79
507----- Canisteo	75	2w	77	156	41	89
511----- Blue Earth, depressiona l, ponded	85	3w	57	94	30	65
526----- Wacousta, mucky, depressiona l, ponded	90	3w	62	147	38	84
536----- Hanlon, occasionally flooded	80	2s	57	129	33	72
541C----- Estherville----- Hawick-----	45 45	4s 4s	12	59	22	28
551B----- Calamine	85	3w	60	99	31	68

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
551D----- Calamine	55	4e	35	86	27	58
559----- Talcot	85	2w	67	113	36	79
561----- Talcot, loamy substratum	70	2w	62	108	31	74
566C----- Moingona	90	3e	73	157	40	87
568D----- Cokato	80	3e	52	159	35	70
568E----- Cokato	80	4e	42	135	32	65
583----- Minnetonka	90	2w	67	135	35	76
606----- Lanyon, depressionnal, ponded	80	3w	54	110	32	70
625----- Lerdal	80	2e	70	174	45	85
636----- Buckney, rarely flooded	85	3s	52	100	31	68
636B----- Buckney, rarely flooded	90	3e	47	98	30	66
638C2----- Clarion, moderately eroded-----	50	3e	63	149	40	90
Storden, moderately eroded-----	35	3e				
650----- Joliet----- Faxon-----	45 45	4w 3w	51	82	32	71
715----- Fluvaquents, frequently flooded	65	5w	5	---	---	---
735----- Havelock, occasionally flooded	85	2w	69	145	37	81
740D----- Hawick	80	4s	7	42	11	25
775B----- Billett	90	3s	43	97	32	69
775C----- Billett	85	3e	28	93	30	66

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
777B----- Wapsie	85	2e	51	82	25	55
835D2----- Storden, moderately eroded----- Omsrud, moderately eroded-----	50 35	3e 3e	52	149	38	84
835E2----- Storden, moderately eroded----- Omsrud, moderately eroded-----	50 35	4e 4e	42	139	33	73
836B----- Kilkenny	65	2e	67	122	36	80
854D----- Fens, Aquolls	80	5w	5	---	---	---
855----- Shorewood	85	2w	77	131	42	91
956----- Harps----- Okoboji, depressional, ponded-----	45 35	2w 3w	65	139	39	85
1007----- Cosmos, bouldery	65	2w	73	143	42	83
1055B----- Kandiyohi, bouldery	65	2e	77	156	37	75
1138B----- Clarion	65	2e	80	172	42	92
1236B----- Angus	85	2e	77	171	45	85
1236C----- Angus	80	2e	62	165	44	83
1259----- Biscay, depressional, ponded	80	3w	52	99	33	72
1507----- Brownton	80	2w	68	157	42	91
1555----- Nicollet----- Guckeen-----	40 25	1 1	86	157	45	99
1836B----- Kilkenny----- Shorewood-----	65 25	2e 2w	68	122	36	80
2700C----- Ridgeton	75	4e	62	154	38	83

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
2700D----- Ridgeton	80	4e	52	136	35	77
4000. Urban land						
4055----- Nicollet----- Urban land-----	50 50	1 ---	---	---	---	---
4107----- Webster----- Urban land-----	60 40	2w ---	---	---	---	---
4138B----- Clarion----- Urban land-----	50 30	2e ---	---	---	---	---
4235B----- Angus----- Urban land-----	60 40	2e ---	---	---	---	---
4236D----- Lester----- Urban land-----	50 50	3e ---	---	---	---	---
4325----- Le Sueur----- Urban land-----	60 40	1 ---	---	---	---	---
4444----- Jacwin----- Urban land-----	50 50	2w ---	---	---	---	---
4507----- Canisteo----- Urban land-----	50 50	2w ---	---	---	---	---
4551B----- Calamine----- Urban land-----	50 50	3w ---	---	---	---	---
4551D----- Calamine----- Urban land-----	50 50	4e ---	---	---	---	---
4635----- Buckney----- Urban land-----	50 50	3s ---	---	---	---	---
4635B----- Buckney----- Urban land-----	50 50	3e ---	---	---	---	---
4946B: Udorthents-Highway						
5010----- Pits, sand and gravel	100	8s	---	---	---	---
5030----- Pits, limestone quarries	100	8s	---	---	---	---

Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Corn suitability rating	Corn	Soybeans	Oats
				Bu	Bu	Bu
5035----- Pits, gypsum quarries	100	8s	---	---	---	---
5040. Udorthents, loamy						
5049. Aquolls, ponded- Udorthents, loamy						
5060. Pits, clay						
5080. Udorthents						
5457----- Du Page, channeled, frequently flooded	80	2w	67	172	42	80
5507----- Corvuso----- Brownton-----	55 35	2w 2w	61	160	37	82
AW. Animal waste lagoon						
SL. Sewage lagoon						
W. Water						

Land Capability and Yields per Acre of Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-	Smooth	Kentucky	Bromegrass-
			alfalfa hay	bromegrass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
6----- Okoboji, depressional, ponded	85	3w	3.3	4.5	2.7	5.5
27B----- Terril	85	2e	5.6	5.5	3.3	9.4
34----- Estherville	90	3s	2.0	2.0	1.2	5.5
34B----- Estherville	85	3s	1.7	1.7	1.0	2.8
55----- Nicollet	75	1	5.7	5.8	3.5	9.5
62F----- Storden	80	6e	2.5	3.1	1.8	3.7
90----- Okoboji, mucky, depressional, ponded	85	3w	3.4	4.6	2.8	5.7
95----- Harps	85	2w	3.4	4.6	2.8	5.7
107----- Webster	80	2w	3.9	5.4	3.2	6.5
108----- Wadena	85	2s	3.9	3.9	2.3	6.5
108B----- Wadena	95	2e	3.7	3.6	2.1	6.2
108C----- Wadena	75	3e	3.5	3.3	2.0	4.2
135----- Coland, occasionally flooded	85	2w	3.7	5.1	3.1	6.2
136----- Ankeny, rarely flooded	80	2s	4.2	4.1	2.4	8.1
138B----- Clarion	80	2e	5.6	5.8	3.5	9.2
138C2----- Clarion, moderately eroded	80	3e	5.5	5.4	3.2	8.5
201B----- Coland----- Terril-----	55 35	2w 2e	3.0	5.0	3.0	5.0

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Brome-grass-	Smooth	Kentucky	Brome-grass-
			alfalfa hay	brome-grass	blue-grass	alfalfa
			Tons	AUM*	AUM*	AUM*
203----- Cylinder	80	2s	4.9	5.0	3.0	8.2
227----- Wadena, loamy substratum	70	2s	4.2	4.2	2.6	6.8
227B----- Wadena, loamy substratum	70	2e	4.0	4.0	2.5	6.7
228----- Cylinder, loamy substratum	70	2s	5.1	5.2	3.4	8.3
236D----- Lester	80	3e	5.1	4.5	3.0	6.5
236E----- Lester	85	4e	4.2	4.1	2.5	6.0
236F----- Lester	80	6e	4.0	3.9	2.3	4.5
259----- Biscay	85	2w	3.6	4.9	2.9	6.0
262G----- Lester----- Belview-----	60 20	6e 6e	3.3	3.6	2.0	4.0
274----- Rolfe, depressional, ponded	85	3w	2.8	4.0	2.4	4.7
278----- Biscay, loamy substratum	70	2w	3.1	4.4	2.4	5.5
307----- Dundas	80	2w	3.0	4.2	2.5	5.0
315B----- Udifluvents, occasionally flooded	80	5w	---	---	---	---
323B----- Fort Dodge	90	2e	4.6	4.5	2.7	9.4
325----- Le Sueur	90	1	5.9	6.2	3.6	6.7
338----- Garmore	100	1	5.8	5.6	3.4	10.1
342----- Estherville, loamy substratum	70	3s	2.3	2.3	1.5	5.8
342B----- Estherville, loamy substratum	70	3s	2.1	1.9	1.2	5.7

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-	Smooth	Kentucky	Bromegrass-
			alfalfa hay	bromegrass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
344B----- Copaston	80	4s	3.1	2.6	1.5	6.1
345----- Copaston----- Jacwin-----	35 25	4s 2w	3.3	2.8	1.7	6.2
355----- Luther	85	1	5.4	5.6	3.3	9.1
383----- Marna	80	2w	3.8	5.2	3.1	5.9
385----- Guckeen	75	1	5.5	5.7	3.4	7.0
386----- Cordova	85	2w	4.1	5.6	3.3	6.0
387B----- Kamrar	85	2e	5.5	5.3	3.2	9.1
413G----- Gosport----- Emeline----- Ridgeton-----	25 25 25	7e 7s 6e	---	1.3	0.7	---
457----- Du Page, occasionally flooded	85	2w	5.7	5.6	3.3	6.0
485----- Spillville, occasionally flooded	80	2w	6.3	6.5	3.9	10.3
485B----- Spillville, rarely flooded	85	2e	6.1	6.3	3.8	10.2
506----- Wacousta, depressional, ponded	80	3w	3.5	4.8	2.9	5.8
507----- Canistee	75	2w	3.8	5.2	3.1	6.3
511----- Blue Earth, depressional, ponded	85	3w	4.2	5.6	3.4	7.0
526----- Wacousta, mucky, depressional, ponded	90	3w	3.4	4.9	3.0	4.8
536----- Hanlon, occasionally flooded	80	2s	4.3	4.2	2.5	8.4

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Brome-grass-	Smooth	Kentucky	Brome-grass-
			alfalfa hay	brome-grass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
541C----- Estherville----- Hawick-----	45 45	4s 4s	1.7	1.6	1.0	4.9
551B----- Calamine	85	3w	3.0	4.1	2.4	6.1
551D----- Calamine	55	4e	2.8	3.8	2.0	5.4
559----- Talcot	85	2w	3.4	4.6	2.8	5.7
561----- Talcot, loamy substratum	70	2w	2.9	4.1	2.3	5.2
566C----- Moingona	90	3e	5.2	5.1	3.1	9.5
568D----- Cokato	80	3e	5.5	5.4	3.4	7.7
568E----- Cokato	80	4e	4.6	5.3	3.1	7.1
583----- Minnetonka	90	2w	3.3	4.5	2.7	6.0
606----- Lanyon, depressiona, ponded	80	3w	3.0	4.1	2.5	5.0
625----- Lerdal	80	2e	6.0	4.1	3.1	7.5
636----- Buckney, rarely flooded	85	3s	4.1	4.0	2.4	6.6
636B----- Buckney, rarely flooded	90	3e	3.9	3.9	2.3	6.4
638C2----- Clarion, moderately eroded-----	50	3e	5.4	5.3	3.0	8.2
Storden, moderately eroded-----	35	3e				
650----- Joliet----- Faxon-----	45 45	4w 3w	2.3	2.9	1.3	3.9
715----- Fluvaquents, frequently flooded	65	5w	---	---	---	---
735----- Havelock, occasionally flooded	85	2w	3.4	4.7	2.8	5.7

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Brome-grass-	Smooth	Kentucky	Brome-grass-
			alfalfa hay	brome-grass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
740D----- Hawick	80	4s	1.7	2.0	1.2	2.6
775B----- Billett	90	3s	4.2	4.1	2.4	6.1
775C----- Billett	85	3e	3.9	3.9	2.3	6.0
777B----- Wapsie	85	2e	3.3	3.2	1.9	6.5
835D2----- Storden, moderately eroded-----	50	3e	4.8	4.5	3.0	4.9
Omsrud, moderately eroded-----	35	3e				
835E2----- Storden, moderately eroded-----	50	4e	4.4	2.9	2.6	4.6
Omsrud, moderately eroded-----	35	4e				
836B----- Kilkenny	65	2e	4.8	4.7	2.8	6.7
854D----- Fens, Aquolls	80	5w	---	---	---	---
855----- Shorewood	85	2w	5.2	5.3	3.2	6.7
956----- Harps-----	45	2w	3.7	5.0	3.0	6.3
Okoboji, depressional, ponded-----	35	3w				
1007----- Cosmos, bouldery	65	2w	3.8	3.9	2.3	4.9
1055B----- Kandiyohi, bouldery	65	2e	3.8	3.9	2.3	5.8
1138B----- Clarion	65	2e	5.5	5.4	3.2	9.1
1236B----- Angus	85	2e	6.5	6.8	5.2	8.1
1236C----- Angus	80	2e	6.4	6.7	5.0	8.0
1259----- Biscay, depressional, ponded	80	3w	3.1	4.3	2.6	5.2
1507----- Brownton	80	2w	3.9	5.1	3.2	6.1

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-	Smooth	Kentucky	Bromegrass-
			alfalfa hay	bromegrass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
1555-----			5.7	5.8	3.5	9.5
Nicollet-----	40	1				
Guckeen-----	25	1				
1836B-----			4.8	4.7	2.8	6.7
Kilkenny-----	65	2e				
Shorewood-----	25	2w				
2700C-----	75	4e	3.2	3.3	1.7	4.1
Ridgeton						
2700D-----	80	4e	3.0	3.1	1.5	3.9
Ridgeton						
4000.						
Urban land						
4055-----			---	---	---	---
Nicollet-----	50	1				
Urban land-----	50	---				
4107-----			---	---	---	---
Webster-----	60	2w				
Urban land-----	40	---				
4138B-----			---	---	---	---
Clarion-----	50	2e				
Urban land-----	30	---				
4235B-----			---	---	---	---
Angus-----	60	2e				
Urban land-----	40	---				
4236D-----			---	---	---	---
Lester-----	50	3e				
Urban land-----	50	---				
4325-----			---	---	---	---
Le Sueur-----	60	1				
Urban land-----	40	---				
4444-----			---	---	---	---
Jacwin-----	50	2w				
Urban land-----	50	---				
4507-----			---	---	---	---
Canisteo-----	50	2w				
Urban land-----	50	---				
4551B-----			---	---	---	---
Calamine-----	50	3w				
Urban land-----	50	---				
4551D-----			---	---	---	---
Calamine-----	50	4e				
Urban land-----	50	---				
4635-----			---	---	---	---
Buckney, rarely flooded	50	3s				
Urban land-----	50	---				

See footnote at end of table.

Land Capability and Yields per Acre of Pasture--Continued

Map symbol and soil name	Pct. of map unit	Land capability	Bromegrass-	Smooth	Kentucky	Bromegrass-
			alfalfa hay	bromegrass	bluegrass	alfalfa
			Tons	AUM*	AUM*	AUM*
4635B----- Buckney, rarely flooded	50	3e	---	---	---	---
Urban land-----	50	---				
4946B. Udorthents-Highway						
5010----- Pits, sand and gravel	100	8s	---	---	---	---
5030----- Pits, limestone quarries	100	8s	---	---	---	---
5035----- Pits, gypsum quarries	100	8s	---	---	---	---
5040. Udorthents, loamy						
5049. Aquolls, ponded- Udorthents, loamy						
5060. Pits, clay						
5080. Udorthents						
5457----- Du Page, channeled, frequently flooded	80	2w	5.5	5.5	3.1	5.9
5507----- Corvuso-----	55	2w	3.6	3.7	2.1	4.7
Brownnton-----	35	2w				
AW. Animal waste lagoon						
SL. Sewage lagoon						
W. Water						

* Animal unit month: The amount of forage required to feed one mature cow, of approximately 1,000 pounds weight, with or without a calf, for 30 days.

Prime Farmland and Other Important Farmland

The table “Prime Farmland and Other Important Farmland” lists the map units in the survey area that are considered prime farmland and farmland of statewide importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation’s food supply.

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

For some soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

In some areas, land that does not meet the criteria for prime farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

Prime Farmland and Other Important Farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, such as "where drained," those conditions are specified)

Map symbol	Map unit name	Farmland classification
27B	Terril loam, 1 to 5 percent slopes	Prime farmland
55	Nicollet loam, 1 to 3 percent slopes	Prime farmland
95	Harps clay loam, 0 to 2 percent slopes	Prime farmland where drained
107	Webster silty clay loam, 0 to 2 percent slopes	Prime farmland where drained
108	Wadena loam, 0 to 2 percent slopes	Prime farmland
108B	Wadena loam, 2 to 5 percent slopes	Prime farmland
135	Coland clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained and either protected from flooding or not frequently flooded during the growing season
136	Ankeny fine sandy loam, 0 to 2 percent slopes, rarely flooded	Prime farmland
138B	Clarion loam, 2 to 5 percent slopes	Prime farmland
201B	Coland-Terril complex, 1 to 5 percent slopes	Prime farmland where drained
203	Cylinder loam, 0 to 2 percent slopes	Prime farmland
227	Wadena loam, loamy substratum, 0 to 2 percent slopes	Prime farmland
227B	Wadena loam, loamy substratum, 2 to 5 percent slopes	Prime farmland
228	Cylinder loam, loamy substratum, 0 to 2 percent slopes	Prime farmland
259	Biscay clay loam, 0 to 2 percent slopes	Prime farmland where drained
278	Biscay clay loam, loamy substratum, 0 to 2 percent slopes	Prime farmland where drained
307	Dundas silt loam, 0 to 2 percent slopes	Prime farmland where drained
323B	Fort Dodge loam, 2 to 5 percent slopes	Prime farmland
325	Le Sueur loam, 1 to 3 percent slopes	Prime farmland
338	Garmore loam, 0 to 2 percent slopes	Prime farmland
355	Luther loam, 1 to 3 percent slopes	Prime farmland
383	Marna silty clay loam, 0 to 2 percent slopes	Prime farmland where drained
385	Guckeen silty clay loam, 1 to 3 percent slopes	Prime farmland
386	Cordova clay loam, 0 to 2 percent slopes	Prime farmland where drained
387B	Kamrar silty clay loam, 2 to 5 percent slopes	Prime farmland
457	Du Page silt loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
485	Spillville loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland
485B	Spillville loam, 2 to 5 percent slopes, rarely flooded	Prime farmland
507	Canisteo clay loam, 0 to 2 percent slopes	Prime farmland where drained
536	Hanlon fine sandy loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where protected from flooding or not frequently flooded during the growing season
551B	Calamine silty clay loam, 2 to 5 percent slopes	Prime farmland where drained
559	Talcot clay loam, 0 to 2 percent slopes	Prime farmland where drained
561	Talcot clay loam, loamy substratum, 0 to 2 percent slopes	Prime farmland where drained
583	Minnetonka silty clay loam, 0 to 2 percent slopes	Prime farmland where drained
625	Lerdal silt loam, 1 to 3 percent slopes	Prime farmland
735	Havelock clay loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland where drained and either protected from flooding or not frequently flooded during the growing season
777B	Wapsie loam, 2 to 5 percent slopes	Prime farmland
836B	Kilkenny silt loam, 2 to 5 percent slopes	Prime farmland
855	Shorewood silty clay loam, 1 to 3 percent slopes	Prime farmland
956	Harps-Okoboji, depressional, complex, 0 to 2 percent slopes	Prime farmland where drained
1007	Cosmos clay loam, 0 to 3 percent slopes, bouldery	Prime farmland where drained
1055B	Kandiyohi clay loam, 2 to 5 percent slopes, bouldery	Prime farmland
1138B	Clarion clay loam, 2 to 5 percent slopes	Prime farmland
1236B	Angus loam, 2 to 5 percent slopes	Prime farmland
1507	Brownston silty clay loam, 0 to 2 percent slopes	Prime farmland where drained
1555	Nicollet-Guckeen complex, 1 to 3 percent slopes	Prime farmland
1836B	Kilkenny-Shorewood complex, 2 to 5 percent slopes	Prime farmland
5507	Corvuso-Brownston complex, 0 to 2 percent slopes	Prime farmland where drained
108C	Wadena loam, 5 to 9 percent slopes	Farmland of statewide importance
138C2	Clarion loam, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance

Prime Farmland and Other Important Farmland--Continued

Map symbol	Map unit name	Farmland classification
236D	Lester loam, 9 to 14 percent slopes	Farmland of statewide importance
236E	Lester loam, 14 to 18 percent slopes	Farmland of statewide importance
344B	Copaston loam, 2 to 5 percent slopes	Farmland of statewide importance
526	Wacousta mucky silt loam, depressional, 0 to 1 percent slopes	Farmland of statewide importance
551D	Calamine silty clay loam, 5 to 14 percent slopes	Farmland of statewide importance
566C	Moingona loam, 5 to 9 percent slopes	Farmland of statewide importance
568D	Cokato loam, 9 to 14 percent slopes	Farmland of statewide importance
568E	Cokato loam, 14 to 18 percent slopes	Farmland of statewide importance
638C2	Clarion-Storden complex, 5 to 9 percent slopes, moderately eroded	Farmland of statewide importance
650	Joliet-Faxon complex, 0 to 2 percent slopes	Farmland of statewide importance
740D	Hawick coarse sandy loam, 9 to 14 percent slopes	Farmland of statewide importance
835D2	Storden-Omsrud complex, 9 to 14 percent slopes, moderately eroded	Farmland of statewide importance
835E2	Storden-Omsrud complex, 14 to 18 percent slopes, moderately eroded	Farmland of statewide importance
1236C	Angus loam, 5 to 9 percent slopes	Farmland of statewide importance
1259	Biscay clay loam, depressional, 0 to 1 percent slopes	Farmland of statewide importance
2700C	Ridgeton loam, 5 to 9 percent slopes	Farmland of statewide importance
2700D	Ridgeton loam, 9 to 14 percent slopes	Farmland of statewide importance

Agricultural Waste Management

The table "Agricultural Waste Management" is described in this section.

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

This table shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops. The ratings 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 agricultural waste management. *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. *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 0.01 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).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a

cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erosion factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

A soil feature considered in the ratings for application of manure, sewage sludge, and wastewater is depth to the top of a water table (saturated zone). During August, September, and October, this depth is generally more than 60 cm in normal years. For soils that are limited by wetness, “Nov-Jul” indicates the most problematic months of the year for application of manure, sewage sludge, and wastewater. These soils may be slow to drain and can become waterlogged and boggy during periods of heavy precipitation.

Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Leaching	0.70	Slow water movement	0.22	Slow water movement	0.22
27B: Terril-----	85	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
34: Estherville-----	90	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Droughty	0.30	Droughty	0.30	Droughty	0.30
34B: Estherville-----	85	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Droughty	0.30	Droughty	0.30	Droughty	0.30
						Too steep for surface application	0.08
55: Nicollet-----	75	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
62F: Storden-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for sprinkler application	1.00
						Too steep for surface application	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone (Nov-Jul) Ponding Leaching	1.00 1.00 0.70	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22
95: Harps-----	85	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
107: Webster-----	80	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
108: Wadena-----	85	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
108B: Wadena-----	95	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application	1.00 0.08
108C: Wadena-----	75	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application	1.00 0.92 0.02
135: Coland, occasionally flooded-----	85	Very limited Depth to saturated zone (Nov-Jul) Leaching Flooding	1.00 0.70 0.60	Very limited Depth to saturated zone (Nov-Jul) Flooding	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Flooding	1.00 0.60

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
136: Ankeny, rarely flooded-----	80	Very limited Filtering capacity	1.00	Very limited Filtering capacity Flooding	1.00 0.40	Very limited Filtering capacity	1.00
138B: Clarion-----	80	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
138C2: Clarion, moderately eroded-----	80	Not limited		Not limited		Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.02
201B: Coland-----	50	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Terril-----	35	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
203: Cylinder-----	80	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00
227: Wadena, loamy substratum-----	70	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
227B: Wadena, loamy substratum-----	70	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application	1.00 0.08

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
228: Cylinder, loamy substratum-----	70	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
236D: Lester-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Too steep for surface application	1.00
						Too steep for sprinkler application	0.78
236E: Lester-----	85	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
236F: Lester-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for sprinkler application	1.00
						Too steep for surface application	1.00
259: Biscay-----	85	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Leaching	0.70				
262G: Lester-----	60	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for sprinkler application	1.00
						Too steep for surface application	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
262G: Belview-----	20	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for sprinkler application Too steep for surface application	1.00 1.00
274: Rolfe, depressional, ponded-----	85	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Ponding	1.00 1.00 1.00
278: Biscay, loamy substratum-----	70	Very limited Filtering capacity Depth to saturated zone (Nov-Jul) Leaching	1.00 1.00 0.70	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00
307: Dundas-----	80	Very limited Depth to saturated zone (Nov-Jul) Leaching Slow water movement	1.00 0.70 0.30	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22
315B: Udifluents, occasionally flooded-----	80	Somewhat limited Flooding Leaching	0.60 0.45	Very limited Flooding Filtering capacity	1.00 0.01	Somewhat limited Flooding Filtering capacity	0.60 0.01
323B: Fort Dodge-----	90	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application	1.00 0.08
325: Le Sueur-----	90	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.02	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.07	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.07

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
338: Garmore-----	100	Somewhat limited Too acid	0.02	Somewhat limited Too acid	0.07	Somewhat limited Too acid	0.07
342: Estherville, loamy substratum-----	70	Very limited Filtering capacity Droughty	1.00 0.15	Very limited Filtering capacity Droughty	1.00 0.15	Very limited Filtering capacity Droughty	1.00 0.15
342B: Estherville, loamy substratum-----	70	Very limited Filtering capacity Droughty	1.00 0.15	Very limited Filtering capacity Droughty	1.00 0.15	Very limited Filtering capacity Droughty Too steep for surface application	1.00 0.15 0.08
344B: Copaston-----	80	Very limited Droughty Depth to bedrock Runoff	1.00 1.00 0.40	Very limited Droughty Low adsorption Depth to bedrock	1.00 1.00 1.00	Very limited Droughty Depth to bedrock Filtering capacity	1.00 1.00 0.01
345: Copaston-----	35	Very limited Droughty Depth to bedrock Runoff	1.00 1.00 0.40	Very limited Droughty Low adsorption Depth to bedrock	1.00 1.00 1.00	Very limited Droughty Depth to bedrock Filtering capacity	1.00 1.00 0.01
Jacwin-----	25	Very limited Slow water movement Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul)	1.00 1.00
355: Luther-----	85	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.30	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22
383: Marna-----	80	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Leaching	1.00 1.00 0.50	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
385: Guckeen-----	75	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.30	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22
386: Cordova-----	85	Very limited Depth to saturated zone (Nov-Jul) Leaching Slow water movement	1.00 0.50 0.30	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22
387B: Kamrar-----	85	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.30	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Too steep for surface application	1.00 0.22 0.08
413G: Gosport-----	25	Very limited Slope Slow water movement Depth to saturated zone (Nov-Jul)	1.00 1.00 1.00	Very limited Slow water movement Slope Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Too steep for sprinkler application Too steep for surface application	1.00 1.00 1.00 1.00
Emeline-----	25	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Droughty Depth to bedrock	1.00 1.00	Very limited Droughty Too steep for sprinkler application	1.00 1.00
Ridgeton-----	25	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for sprinkler application Too steep for surface application	1.00 1.00
457: Du Page, occasionally flooded-----	85	Somewhat limited Flooding	0.60	Very limited Flooding	1.00	Somewhat limited Flooding	0.60

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
485: Spillville, occasionally flooded-----	80	Very limited Depth to saturated zone (Nov-Jul) Flooding	1.00 0.60	Very limited Depth to saturated zone (Nov-Jul) Flooding	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Flooding	1.00 0.60
485B: Spillville, rarely flooded-----	85	Not limited		Somewhat limited Flooding	0.40	Not limited	
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone (Nov-Jul) Ponding Leaching	1.00 1.00 0.70	Very limited Depth to saturated zone (Nov-Jul) Ponding	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Ponding	1.00 1.00
507: Canistee-----	75	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone (Nov-Jul) Ponding Leaching	1.00 1.00 0.70	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone (Nov-Jul) Ponding Leaching	1.00 1.00 0.70	Very limited Depth to saturated zone (Nov-Jul) Ponding	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Ponding	1.00 1.00
536: Hanlon, occasionally flooded-----	80	Somewhat limited Flooding Filtering capacity	0.60 0.01	Very limited Flooding Filtering capacity	1.00 0.01	Somewhat limited Flooding Filtering capacity	0.60 0.01

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
541C: Estherville-----	45	Very limited Filtering capacity Droughty	1.00 0.30	Very limited Filtering capacity Droughty	1.00 0.30	Very limited Filtering capacity Too steep for surface application Droughty	1.00 0.92 0.30
Hawick-----	45	Very limited Filtering capacity Droughty Leaching	1.00 0.74 0.45	Very limited Filtering capacity Droughty	1.00 0.74	Very limited Filtering capacity Too steep for surface application Droughty	1.00 0.92 0.74
551B: Calamine-----	85	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Runoff	1.00 1.00 0.40	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Too steep for surface application	1.00 1.00 0.08
551D: Calamine-----	55	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Runoff	1.00 1.00 0.40	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Too steep for surface application	1.00 1.00 1.00
559: Talcot-----	85	Very limited Filtering capacity Depth to saturated zone (Nov-Jul) Leaching	1.00 1.00 0.70	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00
561: Talcot, loamy substratum-----	70	Very limited Filtering capacity Depth to saturated zone (Nov-Jul) Leaching	1.00 1.00 0.70	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
566C: Moingona-----	90	Not limited		Not limited		Somewhat limited Too steep for surface application	0.92
						Too steep for sprinkler application	0.02
568D: Cokato-----	80	Somewhat limited Slope	0.04	Somewhat limited Slope	0.04	Very limited Too steep for surface application	1.00
						Too steep for sprinkler application	0.22
568E: Cokato-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
583: Minnetonka-----	90	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Runoff	0.40	Too acid	0.07	Too acid	0.07
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
625: Lerdal-----	80	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
		Too acid	0.03	Too acid	0.14	Too acid	0.14

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
636: Buckney, rarely flooded-----	85	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty Flooding	1.00 0.92 0.40	Very limited Filtering capacity Droughty	1.00 0.92
636B: Buckney, rarely flooded-----	90	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty Flooding	1.00 0.92 0.40	Very limited Filtering capacity Droughty Too steep for surface application	1.00 0.92 0.08
638C2: Clarion, moderately eroded-----	50	Not limited		Not limited		Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.02
Storden, moderately eroded-----	35	Not limited		Not limited		Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.02
650: Joliet-----	45	Very limited Depth to saturated zone (Nov-Jul) Depth to bedrock Droughty	1.00 1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Low adsorption Depth to bedrock	1.00 1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Depth to bedrock Droughty	1.00 1.00 1.00
Faxon-----	45	Very limited Depth to saturated zone (Nov-Jul) Leaching Depth to bedrock	1.00 0.70 0.42	Very limited Depth to saturated zone (Nov-Jul) Low adsorption Depth to bedrock	1.00 1.00 0.42	Very limited Depth to saturated zone (Nov-Jul) Depth to bedrock Droughty	1.00 0.42 0.01
715: Fluvaquents, frequently flooded	65	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Filtering capacity Depth to saturated zone (Nov-Jul)	1.00 1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
735: Havelock, occasionally flooded-----	85	Very limited Depth to saturated zone (Nov-Jul) Leaching Flooding	1.00 0.70 0.60	Very limited Depth to saturated zone (Nov-Jul) Flooding Filtering capacity	1.00 1.00 0.01	Very limited Depth to saturated zone (Nov-Jul) Flooding Filtering capacity	1.00 0.60 0.01
740D: Hawick-----	80	Very limited Filtering capacity Droughty Slope	1.00 0.74 0.63	Very limited Filtering capacity Droughty Slope	1.00 0.74 0.63	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.78
775B: Billett-----	90	Very limited Filtering capacity Too acid	1.00 0.02	Very limited Filtering capacity Too acid	1.00 0.07	Very limited Filtering capacity Too acid	1.00 0.07
775C: Billett-----	85	Very limited Filtering capacity Too acid Slope	1.00 0.02 0.01	Very limited Filtering capacity Too acid Slope	1.00 0.07 0.01	Very limited Filtering capacity Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.10
777B: Wapsie-----	85	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity Too steep for surface application	1.00 0.08
835D2: Storden, moderately eroded-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Too steep for surface application Too steep for sprinkler application	1.00 0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835D2: Omsrud, moderately eroded-----	35	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Too steep for surface application Too steep for sprinkler application	1.00 0.78
835E2: Storden, moderately eroded-----	50	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for surface application Too steep for sprinkler application	1.00 1.00
Omsrud, moderately eroded-----	35	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Too steep for surface application Too steep for sprinkler application	1.00 1.00
836B: Kilkenny-----	65	Somewhat limited Slow water movement Too acid	0.30 0.05	Somewhat limited Slow water movement Too acid	0.22 0.21	Somewhat limited Slow water movement Too acid Too steep for surface application	0.22 0.21 0.08
854D: Fens, Aquolls-----	80	Very limited Depth to saturated zone (Nov-Jul) Leaching Slope	1.00 0.90 0.16	Very limited Depth to saturated zone (Nov-Jul) Slope	1.00 0.16	Very limited Depth to saturated zone (Nov-Jul) Too steep for surface application Too steep for sprinkler application	1.00 1.00 0.40
855: Shorewood-----	85	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.89	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.78	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 0.78

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
956: Harps-----	45	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone (Nov-Jul) Ponding Leaching	1.00 1.00 0.70	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22	Very limited Depth to saturated zone (Nov-Jul) Ponding Slow water movement	1.00 1.00 0.22
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Leaching	1.00 1.00 0.50	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 1.00
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Leaching	1.00 1.00 0.50	Very limited Depth to saturated zone (Nov-Jul) Slow water movement	1.00 1.00	Very limited Depth to saturated zone (Nov-Jul) Slow water movement Too steep for surface application	1.00 1.00 0.08
1138B: Clarion-----	65	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
1236B: Angus-----	85	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
1236C: Angus-----	80	Not limited		Not limited		Somewhat limited Too steep for surface application Too steep for sprinkler application	0.92 0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1259: Biscay, depressional, ponded-----	80	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00	Very limited Filtering capacity	1.00
		Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00	Depth to saturated zone (Nov-Jul)	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
1507: Brownton-----	80	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Leaching	0.50				
1555: Nicollet-----	40	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Guckeen-----	25	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.30	Slow water movement	0.22	Slow water movement	0.22
1836B: Kilkenny-----	65	Somewhat limited Slow water movement	0.30	Somewhat limited Slow water movement	0.22	Somewhat limited Slow water movement	0.22
		Too acid	0.05	Too acid	0.21	Too acid	0.21
						Too steep for surface application	0.08
Shorewood-----	25	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	0.89	Slow water movement	0.78	Slow water movement	0.78
2700C: Ridgeton-----	75	Not limited		Not limited		Somewhat limited Too steep for surface application	0.92
						Too steep for sprinkler application	0.02

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2700D: Ridgeton-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Too steep for surface application Too steep for sprinkler application	1.00 0.78
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4107: Webster-----	60	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4138B: Clarion-----	50	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
Urban land-----	30	Not rated		Not rated		Not rated	
4235B: Angus-----	60	Not limited		Not limited		Somewhat limited Too steep for surface application	0.08
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Too steep for surface application Too steep for sprinkler application	1.00 0.78
Urban land-----	50	Not rated		Not rated		Not rated	

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4325: Le Sueur-----	60	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.02	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.07	Very limited Depth to saturated zone (Nov-Jul) Too acid	1.00 0.07
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Very limited Slow water movement Depth to saturated zone (Nov-Jul)	1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul)	1.00 1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canistee-----	50	Very limited Depth to saturated zone (Nov-Jul) Leaching	1.00 0.70	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Runoff	1.00 1.00 0.40	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Too steep for surface application	1.00 1.00 0.08
Urban land-----	50	Not rated		Not rated		Not rated	
4551D: Calamine-----	50	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Runoff	1.00 1.00 0.40	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Low adsorption	1.00 1.00 1.00	Very limited Slow water movement Depth to saturated zone (Nov-Jul) Too steep for surface application	1.00 1.00 1.00
Urban land-----	50	Not rated		Not rated		Not rated	

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4635:							
Buckney-----	50	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty	1.00 0.92
Urban land-----	50	Not rated		Not rated		Not rated	
4635B:							
Buckney-----	50	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty	1.00 0.92	Very limited Filtering capacity Droughty	1.00 0.92
Urban land-----	50	Not rated		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010:							
Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled, frequently flooded	80	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00

Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food- processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5507:							
Corvuso-----	55	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Leaching	0.50				
Brownton-----	35	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00	Very limited Depth to saturated zone (Nov-Jul)	1.00
		Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
		Leaching	0.50				
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W:							
Water-----	100	Not rated		Not rated		Not rated	

Recreational Development

The titles of the tables described in this section are:

- “Camp Areas, Picnic Areas, and Playgrounds”
- “Paths, Trails, and Golf Fairways”

In the tables described in this section, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. The ratings 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 the recreational uses. *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. *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 0.01 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).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in these tables can be supplemented by other information in this survey, for example, interpretations for dwellings without basements, for local roads and streets, and for septic tank absorption fields.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the

surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. 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. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15
27B: Terril-----	85	Not limited		Not limited		Somewhat limited Slope	0.50
34: Estherville-----	90	Not limited		Not limited		Somewhat limited Gravel content	0.37
34B: Estherville-----	85	Not limited		Not limited		Somewhat limited Slope Gravel content	0.50 0.37
55: Nicollet-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Gravel content	1.00 0.01
62F: Storden-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.15
95: Harps-----	85	Not rated		Not rated		Not rated	
107: Webster-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
108: Wadena-----	85	Not limited		Not limited		Not limited	

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
108B: Wadena-----	95	Not limited		Not limited		Somewhat limited Slope	0.50
108C: Wadena-----	75	Not limited		Not limited		Very limited Slope	1.00
135: Coland, occasionally flooded-----	85	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
136: Ankeny, rarely flooded-----	80	Very limited Flooding	1.00	Not limited		Not limited	
138B: Clarion-----	80	Not limited		Not limited		Somewhat limited Slope	0.50
138C2: Clarion, moderately eroded-----	80	Not limited		Not limited		Very limited Slope	1.00
201B: Coland-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Slope	1.00 0.12
Terril-----	35	Not limited		Not limited		Somewhat limited Slope	0.50
203: Cylinder-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
227: Wadena, loamy substratum-----	70	Not limited		Not limited		Not limited	
227B: Wadena, loamy substratum-----	70	Not limited		Not limited		Somewhat limited Slope	0.50
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
236D: Lester-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
236E: Lester-----	85	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
236F: Lester-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
259: Biscay-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
262G: Lester-----	60	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Belview-----	20	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
274: Rolfe, depressional, ponded-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slow water movement	0.94	Slow water movement	0.94	Slow water movement	0.94
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
307: Dundas-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
315B: Udifluvents, occasionally flooded-----	80	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding Slope	0.60 0.12
323B: Fort Dodge-----	90	Not limited		Not limited		Somewhat limited Slope	0.50

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
325: Le Sueur-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
338: Garmore-----	100	Not limited		Not limited		Not limited	
342: Estherville, loamy substratum-----	70	Not limited		Not limited		Somewhat limited Gravel content	0.37
342B: Estherville, loamy substratum-----	70	Not limited		Not limited		Somewhat limited Slope Gravel content	0.50 0.37
344B: Copaston-----	80	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Gravel content Slope	1.00 0.27 0.12
345: Copaston-----	35	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock	1.00	Very limited Depth to bedrock Gravel content Slope	1.00 0.27 0.12
Jacwin-----	25	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00
355: Luther-----	85	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15
383: Marna-----	80	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94
385: Guckeen-----	75	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
386: Cordova-----	85	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15
387B: Kamrar-----	85	Somewhat limited Depth to saturated zone Slow water movement	0.39 0.15	Somewhat limited Depth to saturated zone Slow water movement	0.19 0.15	Somewhat limited Slope Depth to saturated zone Slow water movement	0.50 0.39 0.15
413G: Gosport-----	25	Very limited Slope Slow water movement Depth to saturated zone	1.00 1.00 0.39	Very limited Slope Slow water movement Depth to saturated zone	1.00 1.00 0.19	Very limited Slope Slow water movement Depth to bedrock	1.00 1.00 0.46
Emeline-----	25	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Slope Depth to bedrock Gravel content	1.00 1.00 0.77
Ridgeton-----	25	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
457: Du Page, occasionally flooded-----	85	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
485: Spillville, occasionally flooded-----	80	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
485B: Spillville, rarely flooded-----	85	Very limited Flooding	1.00	Not limited		Somewhat limited Slope	0.12
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
507: Canisteeo-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding Gravel content	1.00 1.00 0.56
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
536: Hanlon, occasionally flooded-----	80	Very limited Flooding	1.00	Not limited		Somewhat limited Flooding	0.60
541C: Estherville-----	45	Not limited		Not limited		Very limited Slope Gravel content	1.00 0.37
Hawick-----	45	Not limited		Not limited		Very limited Slope Gravel content	1.00 0.59
551B: Calamine-----	85	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement Slope	1.00 1.00 0.50
551D: Calamine-----	55	Very limited Depth to saturated zone Slow water movement Slope	1.00 1.00 0.16	Very limited Depth to saturated zone Slow water movement Slope	1.00 1.00 0.16	Very limited Depth to saturated zone Slow water movement Slope	1.00 1.00 1.00
559: Talcot-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
566C: Moingona-----	90	Not limited		Not limited		Very limited Slope	1.00
568D: Cokato-----	80	Somewhat limited Slope	0.04	Somewhat limited Slope	0.04	Very limited Slope	1.00
568E: Cokato-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
583: Minnetonka-----	90	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.94	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.94	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.94
625: Lerdal-----	80	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15
636: Buckney, rarely flooded-----	85	Very limited Flooding	1.00	Not limited		Not limited	
636B: Buckney, rarely flooded-----	90	Very limited Flooding	1.00	Not limited		Somewhat limited Slope	0.50
638C2: Clarion, moderately eroded-----	50	Not limited		Not limited		Very limited Slope	1.00
Storden, moderately eroded-----	35	Not limited		Not limited		Very limited Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
650: Joliet-----	45	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to bedrock Gravel content	1.00 1.00 0.70
Faxon-----	45	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
715: Fluvaquents, frequently flooded	65	Very limited Depth to saturated zone Flooding Too sandy	1.00 1.00 0.87	Very limited Depth to saturated zone Too sandy Flooding	1.00 0.87 0.40	Very limited Depth to saturated zone Flooding Too sandy	1.00 1.00 0.87
735: Havelock, occasionally flooded-----	85	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
740D: Hawick-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope Gravel content	1.00 0.59
775B: Billett-----	90	Not limited		Not limited		Somewhat limited Slope	0.12
775C: Billett-----	85	Somewhat limited Slope	0.01	Somewhat limited Slope	0.01	Very limited Slope	1.00
777B: Wapsie-----	85	Not limited		Not limited		Somewhat limited Slope	0.50
835D2: Storden, moderately eroded-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
Omsrud, moderately eroded-----	35	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
835E2: Storden, moderately eroded-----	50	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835E2: Omsrud, moderately eroded-----	35	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
836B: Kilkenny-----	65	Somewhat limited Slow water movement	0.15	Somewhat limited Slow water movement	0.15	Somewhat limited Slope Slow water movement	0.50 0.15
854D: Fens, Aquolls-----	80	Not rated		Not rated		Not rated	
855: Shorewood-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.60	Slow water movement	0.60	Slow water movement	0.60
956: Harps-----	45	Not rated		Not rated		Not rated	
Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slow water movement	0.15	Slow water movement	0.15	Slow water movement	0.15
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.94	Slow water movement	0.94	Slow water movement	0.94
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.94	Slow water movement	0.94	Slow water movement	0.94
						Slope	0.50
1138B: Clarion-----	65	Not limited		Not limited		Somewhat limited Slope	0.50
1236B: Angus-----	85	Not limited		Not limited		Somewhat limited Slope	0.50
1236C: Angus-----	80	Not limited		Not limited		Very limited Slope	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
1507: Brownton-----	80	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94
1555: Nicollet-----	40	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Gravel content	1.00 0.01
Guckeen-----	25	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15	Very limited Depth to saturated zone Slow water movement	1.00 0.15
1836B: Kilkenny-----	65	Somewhat limited Slow water movement	0.15	Somewhat limited Slow water movement	0.15	Somewhat limited Slope Slow water movement	0.50 0.15
Shorewood-----	25	Very limited Depth to saturated zone Slow water movement	1.00 0.60	Very limited Depth to saturated zone Slow water movement	1.00 0.60	Very limited Depth to saturated zone Slow water movement	1.00 0.60
2700C: Ridgeton-----	75	Not limited		Not limited		Very limited Slope	1.00
2700D: Ridgeton-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Gravel content	1.00 0.01
Urban land-----	50	Not rated		Not rated		Not rated	

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4107: Webster-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4138B: Clarion-----	50	Not limited		Not limited		Somewhat limited Slope	0.50
Urban land-----	30	Not rated		Not rated		Not rated	
4235B: Angus-----	60	Not limited		Not limited		Somewhat limited Slope	0.50
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4325: Le Sueur-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canisteo-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Slow water movement Slope	1.00 1.00 0.50
Urban land-----	50	Not rated		Not rated		Not rated	

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4551D:							
Calamine-----	50	Very limited		Very limited		Very limited	
		Depth to	1.00	Depth to	1.00	Depth to	1.00
		saturated zone		saturated zone		saturated zone	
		Slow water	1.00	Slow water	1.00	Slow water	1.00
		movement		movement		movement	
		Slope	0.16	Slope	0.16	Slope	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4635:							
Buckney-----	50	Not limited		Not limited		Not limited	
Urban land-----	50	Not rated		Not rated		Not rated	
4635B:							
Buckney-----	50	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Urban land-----	50	Not rated		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010:							
Pits, sand and							
gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone							
quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum							
quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled,							
frequently flooded	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00

Camp Areas, Picnic Areas, and Playgrounds--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5507:							
Corvuso-----	55	Very limited Depth to saturated zone Slow water movement	1.00 0.96	Very limited Depth to saturated zone Slow water movement	1.00 0.96	Very limited Depth to saturated zone Slow water movement	1.00 0.96
Brownston-----	35	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94	Very limited Depth to saturated zone Slow water movement	1.00 0.94
AW: Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okobojo, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
27B: Terril-----	85	Not limited		Not limited		Not limited	
34: Estherville-----	90	Not limited		Not limited		Somewhat limited Droughty	0.10
34B: Estherville-----	85	Not limited		Not limited		Somewhat limited Droughty	0.10
55: Nicollet-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
62F: Storden-----	80	Somewhat limited Slope	0.82	Not limited		Very limited Slope	1.00
90: Okobojo, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
95: Harps-----	85	Not rated		Not rated		Very limited Depth to saturated zone	1.00
107: Webster-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
108: Wadena-----	85	Not limited		Not limited		Not limited	
108B: Wadena-----	95	Not limited		Not limited		Not limited	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
108C: Wadena-----	75	Not limited		Not limited		Not limited	
135: Coland, occasionally flooded-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
136: Ankeny, rarely flooded-----	80	Not limited		Not limited		Not limited	
138B: Clarion-----	80	Not limited		Not limited		Not limited	
138C2: Clarion, moderately eroded-----	80	Not limited		Not limited		Not limited	
201B: Coland-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Terril-----	35	Not limited		Not limited		Not limited	
203: Cylinder-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
227: Wadena, loamy substratum-----	70	Not limited		Not limited		Not limited	
227B: Wadena, loamy substratum-----	70	Not limited		Not limited		Not limited	
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
236D: Lester-----	80	Not limited		Not limited		Somewhat limited Slope	0.63
236E: Lester-----	85	Somewhat limited Slope	0.02	Not limited		Very limited Slope	1.00
236F: Lester-----	80	Somewhat limited Slope	0.82	Not limited		Very limited Slope	1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
259: Biscay-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
262G: Lester-----	60	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Belview-----	20	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
274: Rolfe, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
307: Dundas-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
315B: Udifluvents, occasionally flooded-----	80	Not limited		Not limited		Not rated	
323B: Fort Dodge-----	90	Not limited		Not limited		Not limited	
325: Le Sueur-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
338: Garmore-----	100	Not limited		Not limited		Not limited	
342: Estherville, loamy substratum-----	70	Not limited		Not limited		Somewhat limited Droughty	0.36
342B: Estherville, loamy substratum-----	70	Not limited		Not limited		Somewhat limited Droughty	0.36
344B: Copaston-----	80	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 0.81

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
345: Copaston-----	35	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 0.81
Jacwin-----	25	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
355: Luther-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
383: Marna-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
385: Guckeen-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
386: Cordova-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
387B: Kamrar-----	85	Not limited		Not limited		Somewhat limited Depth to saturated zone	0.19
413G: Gosport-----	25	Very limited Slope Water erosion	1.00 1.00	Very limited Water erosion Slope	1.00 0.78	Very limited Slope Depth to bedrock Depth to saturated zone	1.00 0.46 0.19
Emeline-----	25	Very limited Slope	1.00	Not limited		Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Ridgeton-----	25	Very limited Slope	1.00	Somewhat limited Slope	0.44	Very limited Slope	1.00
457: Du Page, occasionally flooded-----	85	Not limited		Not limited		Somewhat limited Flooding	0.60

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
485: Spillville, occasionally flooded-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
485B: Spillville, rarely flooded-----	85	Not limited		Not limited		Not limited	
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
507: Canistee-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
536: Hanlon, occasionally flooded-----	80	Not limited		Not limited		Somewhat limited Flooding	0.60
541C: Estherville-----	45	Not limited		Not limited		Somewhat limited Droughty	0.10
Hawick-----	45	Not limited		Not limited		Somewhat limited Droughty	0.91
551B: Calamine-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
551D: Calamine-----	55	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Slope	1.00 0.16
559: Talcot-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
566C: Moingona-----	90	Not limited		Not limited		Not limited	
568D: Cokato-----	80	Not limited		Not limited		Somewhat limited Slope	0.04
568E: Cokato-----	80	Not limited		Not limited		Very limited Slope	1.00
583: Minnetonka-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
625: Lerdal-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
636: Buckney, rarely flooded-----	85	Not limited		Not limited		Somewhat limited Droughty	0.70
636B: Buckney, rarely flooded-----	90	Not limited		Not limited		Somewhat limited Droughty	0.70

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
638C2: Clarion, moderately eroded-----	50	Not limited		Not limited		Not limited	
Storden, moderately eroded-----	35	Not limited		Not limited		Not limited	
650: Joliet-----	45	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Depth to bedrock Droughty	1.00 1.00 0.48
Faxon-----	45	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Depth to bedrock Content of large stones	1.00 0.42 0.01
715: Fluvaquents, frequently flooded	65	Very limited Depth to saturated zone Too sandy Flooding	1.00 0.87 0.40	Very limited Depth to saturated zone Too sandy Flooding	1.00 0.87 0.40	Not rated	
735: Havelock, occasionally flooded-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60
740D: Hawick-----	80	Not limited		Not limited		Somewhat limited Droughty Slope	0.91 0.63
775B: Billett-----	90	Not limited		Not limited		Not limited	
775C: Billett-----	85	Not limited		Not limited		Somewhat limited Slope	0.01
777B: Wapsie-----	85	Not limited		Not limited		Not limited	
835D2: Storden, moderately eroded-----	50	Not limited		Not limited		Somewhat limited Slope	0.63
Omsrud, moderately eroded-----	35	Not limited		Not limited		Somewhat limited Slope	0.63

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835E2: Storden, moderately eroded-----	50	Somewhat limited Slope	0.02	Not limited		Very limited Slope	1.00
Omsrud, moderately eroded-----	35	Somewhat limited Slope	0.02	Not limited		Very limited Slope	1.00
836B: Kilkenny-----	65	Not limited		Not limited		Not limited	
854D: Fens, Aquolls-----	80	Not rated		Not rated		Not rated	
855: Shorewood-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
956: Harps-----	45	Not rated		Not rated		Very limited Depth to saturated zone	1.00
Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1138B: Clarion-----	65	Not limited		Not limited		Not limited	
1236B: Angus-----	85	Not limited		Not limited		Not limited	
1236C: Angus-----	80	Not limited		Not limited		Not limited	
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1507: Brownton-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1555: Nicollet-----	40	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Guckeen-----	25	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1836B: Kilkenny-----	65	Not limited		Not limited		Not limited	
Shorewood-----	25	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
2700C: Ridgeton-----	75	Not limited		Not limited		Not limited	
2700D: Ridgeton-----	80	Not limited		Not limited		Somewhat limited Slope	0.63
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4107: Webster-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4138B: Clarion-----	50	Not limited		Not limited		Not limited	
Urban land-----	30	Not rated		Not rated		Not rated	
4235B: Angus-----	60	Not limited		Not limited		Not limited	
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Not limited		Not limited		Somewhat limited Slope	0.63
Urban land-----	50	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4325: Le Sueur-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canistee-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551D: Calamine-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Slope	1.00 0.16
Urban land-----	50	Not rated		Not rated		Not rated	
4635: Buckney-----	50	Not limited		Not limited		Somewhat limited Droughty	0.70
Urban land-----	50	Not rated		Not rated		Not rated	
4635B: Buckney-----	50	Not limited		Not limited		Somewhat limited Droughty	0.70
Urban land-----	50	Not rated		Not rated		Not rated	
4946B: Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010: Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5030: Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035: Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040: Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049: Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060: Pits, clay-----	100	Not rated		Not rated		Not rated	
5080: Udorthents-----	100	Not rated		Not rated		Not rated	
5457: Du Page, channeled, frequently flooded	80	Somewhat limited Flooding	0.40	Somewhat limited Flooding	0.40	Very limited Flooding	1.00
5507: Corvuso-----	55	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Brownton-----	35	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
AW: Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary, which is in Part I of this publication.

Building Site Development

The titles of the tables described in this section are:

- “Dwellings and Small Commercial Buildings”
- “Roads and Streets, Shallow Excavations, and Lawns and Landscaping”

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 tables described in this section 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. *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 0.01 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.

Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

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
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00
27B: Terril-----	85	Not limited		Somewhat limited Depth to saturated zone	0.61	Not limited	
34: Estherville-----	90	Not limited		Not limited		Not limited	
34B: Estherville-----	85	Not limited		Not limited		Not limited	
55: Nicollet-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
62F: Storden-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00
95: Harps-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
107: Webster-----	80	Very limited Depth to saturated zone Shrink-swell	1.00 0.32	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.32
108: Wadena-----	85	Not limited		Not limited		Not limited	

Dwellings and Small Commercial Buildings--Continued

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
108B: Wadena-----	95	Not limited		Not limited		Not limited	
108C: Wadena-----	75	Not limited		Not limited		Somewhat limited Slope	0.88
135: Coland, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 0.50
136: Ankeny, rarely flooded-----	80	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
138B: Clarion-----	80	Not limited		Somewhat limited Depth to saturated zone	0.61	Not limited	
138C2: Clarion, moderately eroded-----	80	Not limited		Somewhat limited Depth to saturated zone	0.61	Somewhat limited Slope	0.88
201B: Coland-----	50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
Terril-----	35	Not limited		Somewhat limited Depth to saturated zone	0.61	Not limited	
203: Cylinder-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
227: Wadena, loamy substratum-----	70	Not limited		Not limited		Not limited	
227B: Wadena, loamy substratum-----	70	Not limited		Not limited		Not limited	
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Dwellings and Small Commercial Buildings--Continued

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
236D: Lester-----	80	Somewhat limited Slope Shrink-swell	0.63 0.50	Somewhat limited Slope Shrink-swell	0.63 0.50	Very limited Slope Shrink-swell	1.00 0.50
236E: Lester-----	85	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50
236F: Lester-----	80	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50
259: Biscay-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
262G: Lester-----	60	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50
Belview-----	20	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
274: Rolfe, depressiona, ponded-----	85	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
307: Dundas-----	80	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
315B: Udifuvents, occasionally flooded-----	80	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
323B: Fort Dodge-----	90	Not limited		Not limited		Not limited	

Dwellings and Small Commercial Buildings--Continued

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
325: Le Sueur-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00
338: Garmore-----	100	Somewhat limited Shrink-swell	0.01	Somewhat limited Depth to saturated zone Shrink-swell	0.61 0.01	Somewhat limited Shrink-swell	0.01
342: Estherville, loamy substratum-----	70	Not limited		Not limited		Not limited	
342B: Estherville, loamy substratum-----	70	Not limited		Not limited		Not limited	
344B: Copaston-----	80	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00
345: Copaston-----	35	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00	Very limited Depth to hard bedrock	1.00
Jacwin-----	25	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
355: Luther-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
383: Marna-----	80	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
385: Guckeen-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
386: Cordova-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50

Dwellings and Small Commercial Buildings--Continued

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
387B: Kamrar-----	85	Somewhat limited Shrink-swell Depth to saturated zone	0.50 0.39	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Somewhat limited Shrink-swell Depth to saturated zone	0.50 0.39
413G: Gosport-----	25	Very limited Slope Shrink-swell Depth to saturated zone	1.00 1.00 0.39	Very limited Slope Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited Slope Shrink-swell Depth to saturated zone	1.00 1.00 0.39
Emeline-----	25	Very limited Slope Depth to hard bedrock	1.00 1.00	Very limited Slope Depth to hard bedrock	1.00 1.00	Very limited Slope Depth to hard bedrock	1.00 1.00
Ridgeton-----	25	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
457: Du Page, occasionally flooded-----	85	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.61	Very limited Flooding	1.00
485: Spillville, occasionally flooded-----	80	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00
485B: Spillville, rarely flooded-----	85	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.61	Very limited Flooding	1.00
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
507: Canisteo-----	75	Very limited Depth to saturated zone Shrink-swell	1.00 0.01	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.01

Dwellings and Small Commercial Buildings--Continued

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
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Organic matter content Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Organic matter content Ponding	1.00 1.00 1.00
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone Ponding Shrink-swell	1.00 1.00 0.32	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding Shrink-swell	1.00 1.00 0.32
536: Hanlon, occasionally flooded-----	80	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.61	Very limited Flooding	1.00
541C: Estherville-----	45	Not limited		Not limited		Somewhat limited Slope	0.88
Hawick-----	45	Not limited		Not limited		Somewhat limited Slope	0.88
551B: Calamine-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone	1.00
551D: Calamine-----	55	Very limited Depth to saturated zone Slope	1.00 0.16	Very limited Depth to saturated zone Shrink-swell Slope	1.00 1.00 0.16	Very limited Depth to saturated zone Slope	1.00 1.00
559: Talcot-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50

Dwellings and Small Commercial Buildings--Continued

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
566C: Moingona-----	90	Not limited		Somewhat limited Depth to saturated zone	0.61	Somewhat limited Slope	0.88
568D: Cokato-----	80	Somewhat limited Shrink-swell Slope	0.50 0.04	Somewhat limited Shrink-swell Slope	0.50 0.04	Very limited Slope Shrink-swell	1.00 0.50
568E: Cokato-----	80	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50	Very limited Slope Shrink-swell	1.00 0.50
583: Minnetonka-----	90	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00
625: Lerdal-----	80	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
636: Buckney, rarely flooded-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
636B: Buckney, rarely flooded-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
638C2: Clarion, moderately eroded-----	50	Not limited		Somewhat limited Depth to saturated zone	0.61	Somewhat limited Slope	0.88
Storden, moderately eroded-----	35	Not limited		Not limited		Somewhat limited Slope	0.88

Dwellings and Small Commercial Buildings--Continued

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
650: Joliet-----	45	Very limited Depth to saturated zone Depth to hard bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to hard bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to hard bedrock	1.00 1.00
Faxon-----	45	Very limited Depth to saturated zone Shrink-swell Depth to hard bedrock	1.00 0.50 0.42	Very limited Depth to saturated zone Depth to hard bedrock Shrink-swell	1.00 1.00 0.50	Very limited Depth to saturated zone Shrink-swell Depth to hard bedrock	1.00 0.50 0.42
715: Fluvaquents, frequently flooded	65	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00
735: Havelock, occasionally flooded-----	85	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
740D: Hawick-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
775B: Billett-----	90	Not limited		Not limited		Not limited	
775C: Billett-----	85	Somewhat limited Slope	0.01	Somewhat limited Slope	0.01	Very limited Slope	1.00
777B: Wapsie-----	85	Not limited		Not limited		Not limited	
835D2: Storden, moderately eroded-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
Omsrud, moderately eroded-----	35	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
835E2: Storden, moderately eroded-----	50	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00

Dwellings and Small Commercial Buildings--Continued

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
835E2: Omsrud, moderately eroded-----	35	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
836B: Kilkenny-----	65	Somewhat limited Shrink-swell	0.50	Somewhat limited Depth to saturated zone Shrink-swell	0.61 0.50	Somewhat limited Shrink-swell	0.50
854D: Fens, Aquolls-----	80	Very limited Subsidence Depth to saturated zone Organic matter content	1.00 1.00 1.00	Very limited Subsidence Depth to saturated zone Slope	1.00 1.00 0.16	Very limited Subsidence Depth to saturated zone Organic matter content	1.00 1.00 1.00
855: Shorewood-----	85	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
956: Harps-----	45	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone Shrink-swell	1.00 0.50
Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Shrink-swell Ponding	1.00 1.00 1.00
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
1138B: Clarion-----	65	Not limited		Somewhat limited Depth to saturated zone	0.61	Not limited	
1236B: Angus-----	85	Somewhat limited Shrink-swell	0.50	Not limited		Somewhat limited Shrink-swell	0.50

Dwellings and Small Commercial Buildings--Continued

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
1236C: Angus-----	80	Somewhat limited Shrink-swell	0.50	Not limited		Somewhat limited Slope Shrink-swell	0.88 0.50
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding Shrink-swell	1.00 1.00 0.50	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding Shrink-swell	1.00 1.00 0.50
1507: Brownton-----	80	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
1555: Nicollet-----	40	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Guckeen-----	25	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1836B: Kilkenny-----	65	Somewhat limited Shrink-swell	0.50	Somewhat limited Depth to saturated zone Shrink-swell	0.61 0.50	Somewhat limited Shrink-swell	0.50
Shorewood-----	25	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
2700C: Ridgeton-----	75	Not limited		Not limited		Somewhat limited Slope	0.88
2700D: Ridgeton-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Very limited Slope	1.00
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	

Dwellings and Small Commercial Buildings--Continued

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
4107: Webster-----	60	Very limited Depth to saturated zone Shrink-swell	1.00 0.32	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.32
Urban land-----	40	Not rated		Not rated		Not rated	
4138B: Clarion-----	50	Not limited		Somewhat limited Depth to saturated zone	0.61	Not limited	
Urban land-----	30	Not rated		Not rated		Not rated	
4235B: Angus-----	60	Somewhat limited Shrink-swell	0.50	Not limited		Somewhat limited Shrink-swell	0.50
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Somewhat limited Slope Shrink-swell	0.63 0.50	Somewhat limited Slope Shrink-swell	0.63 0.50	Very limited Slope Shrink-swell	1.00 0.50
Urban land-----	50	Not rated		Not rated		Not rated	
4325: Le Sueur-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.50	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canistee-----	50	Very limited Depth to saturated zone Shrink-swell	1.00 0.01	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 0.01
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	

Dwellings and Small Commercial Buildings--Continued

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
4551D:							
Calamine-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slope	0.16	Shrink-swell Slope	1.00 0.16	Slope	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4635:							
Buckney-----	50	Not limited		Not limited		Not limited	
Urban land-----	50	Not rated		Not rated		Not rated	
4635B:							
Buckney-----	50	Not limited		Not limited		Not limited	
Urban land-----	50	Not rated		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010:							
Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled, frequently flooded	80	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.61	Very limited Flooding	1.00

Dwellings and Small Commercial Buildings--Continued

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
5507:							
Corvuso-----	55	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
Brownton-----	35	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
AW: Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

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
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
27B: Terril-----	85	Somewhat limited Frost action Low strength	0.50 0.22	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
34: Estherville-----	90	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.10
34B: Estherville-----	85	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.10
55: Nicollet-----	75	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
62F: Storden-----	80	Very limited Slope Low strength Frost action	1.00 0.78 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
95: Harp-----	85	Very limited Depth to saturated zone Frost action Shrink-swell	1.00 1.00 0.50	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
107: Webster-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
108: Wadena-----	85	Somewhat limited Low strength	0.22	Very limited Cutbanks cave	1.00	Not limited	
108B: Wadena-----	95	Somewhat limited Low strength	0.22	Very limited Cutbanks cave	1.00	Not limited	
108C: Wadena-----	75	Not limited		Very limited Cutbanks cave	1.00	Not limited	
135: Coland, occasionally flooded-----	85	Very limited Depth to saturated zone Frost action Flooding	1.00 1.00 1.00	Very limited Depth to saturated zone Flooding Cutbanks cave	1.00 0.60 0.10	Very limited Depth to saturated zone Flooding	1.00 0.60
136: Ankeny, rarely flooded-----	80	Somewhat limited Frost action Flooding	0.50 0.40	Very limited Cutbanks cave	1.00	Not limited	
138B: Clarion-----	80	Very limited Low strength Frost action	1.00 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
138C2: Clarion, moderately eroded-----	80	Somewhat limited Frost action	0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
201B: Coland-----	50	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Terril-----	35	Somewhat limited Frost action Low strength	0.50 0.22	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
203: Cylinder-----	80	Very limited Depth to saturated zone Frost action	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
227: Wadena, loamy substratum-----	70	Not limited		Very limited Cutbanks cave	1.00	Not limited	
227B: Wadena, loamy substratum-----	70	Not limited		Very limited Cutbanks cave	1.00	Not limited	
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 0.22	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
236D: Lester-----	80	Very limited Low strength Slope Shrink-swell	1.00 0.63 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
236E: Lester-----	85	Very limited Slope Low strength Shrink-swell	1.00 1.00 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
236F: Lester-----	80	Very limited Slope Low strength Shrink-swell	1.00 1.00 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
259: Biscay-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
262G: Lester-----	60	Very limited Slope Low strength Shrink-swell	1.00 1.00 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
Belview-----	20	Very limited Slope Frost action Low strength	1.00 0.50 0.22	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
274: Rolfe, depressional, ponded-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone Frost action	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
307: Dundas-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone	1.00
315B: Udifluvents, occasionally flooded-----	80	Very limited Flooding	1.00	Somewhat limited Flooding Cutbanks cave	0.60 0.10	Not rated	
323B: Fort Dodge-----	90	Very limited Low strength Frost action	1.00 0.50	Very limited Cutbanks cave	1.00	Not limited	
325: Le Sueur-----	90	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 0.22	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
338: Garmore-----	100	Very limited Frost action Low strength Shrink-swell	1.00 1.00 0.01	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
342: Estherville, loamy substratum-----	70	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.36
342B: Estherville, loamy substratum-----	70	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.36

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
344B: Copaston-----	80	Very limited Depth to hard bedrock Frost action	1.00 0.50	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock Droughty	1.00 0.81
345: Copaston-----	35	Very limited Depth to hard bedrock Frost action	1.00 0.50	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock Droughty	1.00 0.81
Jacwin-----	25	Very limited Shrink-swell Depth to saturated zone Frost action	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.72 0.10	Very limited Depth to saturated zone	1.00
355: Luther-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
383: Marna-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.28 0.10	Very limited Depth to saturated zone	1.00
385: Guckeen-----	75	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 0.22	Very limited Depth to saturated zone Cutbanks cave Too clayey	1.00 0.10 0.02	Very limited Depth to saturated zone	1.00
386: Cordova-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
387B: Kamrar-----	85	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Somewhat limited Depth to saturated zone	0.19
413G: Gosport-----	25	Very limited Slope Low strength Shrink-swell	1.00 1.00 1.00	Very limited Slope Depth to saturated zone Depth to soft bedrock	1.00 1.00 0.46	Very limited Slope Depth to bedrock Depth to saturated zone	1.00 0.46 0.19

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
413G: Emeline-----	25	Very limited Depth to hard bedrock Slope Frost action	1.00 1.00 0.50	Very limited Depth to hard bedrock Slope Cutbanks cave	1.00 1.00 0.10	Very limited Depth to bedrock Slope Droughty	1.00 1.00 1.00
Ridgeton-----	25	Very limited Slope Low strength Frost action	1.00 0.78 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
457: Du Page, occasionally flooded-----	85	Very limited Flooding Low strength Frost action	1.00 1.00 0.50	Somewhat limited Depth to saturated zone Flooding Cutbanks cave	0.61 0.60 0.10	Somewhat limited Flooding	0.60
485: Spillville, occasionally flooded-----	80	Very limited Depth to saturated zone Flooding Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Flooding Cutbanks cave	1.00 0.60 0.10	Very limited Depth to saturated zone Flooding	1.00 0.60
485B: Spillville, rarely flooded-----	85	Very limited Low strength Frost action Flooding	1.00 0.50 0.40	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
507: Canistee-----	75	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Organic matter content Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
536: Hanlon, occasionally flooded-----	80	Very limited Flooding Frost action	1.00 0.50	Somewhat limited Depth to saturated zone Flooding Cutbanks cave	0.61 0.60 0.10	Somewhat limited Flooding	0.60
541C: Estherville-----	45	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.10
Hawick-----	45	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.91
551B: Calamine-----	85	Very limited Depth to saturated zone Low strength Frost action	1.00 1.00 0.50	Very limited Depth to saturated zone Cutbanks cave Too clayey	1.00 0.10 0.03	Very limited Depth to saturated zone	1.00
551D: Calamine-----	55	Very limited Depth to saturated zone Low strength Frost action	1.00 1.00 0.50	Very limited Depth to saturated zone Slope Cutbanks cave	1.00 0.16 0.10	Very limited Depth to saturated zone Slope	1.00 0.16
559: Talcot-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone Frost action Shrink-swell	1.00 1.00 0.50	Very limited Cutbanks cave Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
566C: Moingona-----	90	Very limited Low strength Frost action	1.00 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
568D: Cokato-----	80	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Cutbanks cave Slope	0.10 0.04	Somewhat limited Slope	0.04
568E: Cokato-----	80	Very limited Slope Low strength Shrink-swell	1.00 1.00 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
583: Minnetonka-----	90	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Very limited Depth to saturated zone	1.00
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 0.28	Very limited Depth to saturated zone Ponding	1.00 1.00
625: Lerdal-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
636: Buckney, rarely flooded-----	85	Somewhat limited Flooding	0.40	Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.70
636B: Buckney, rarely flooded-----	90	Somewhat limited Flooding	0.40	Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.70

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
638C2: Clarion, moderately eroded-----	50	Somewhat limited Frost action	0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
Storden, moderately eroded-----	35	Somewhat limited Low strength Frost action	0.78 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
650: Joliet-----	45	Very limited Depth to hard bedrock Depth to saturated zone Frost action	1.00 1.00 1.00	Very limited Depth to hard bedrock Depth to saturated zone Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Depth to bedrock Droughty	1.00 1.00 0.48
Faxon-----	45	Very limited Depth to saturated zone Frost action Shrink-swell	1.00 1.00 0.50	Very limited Depth to hard bedrock Depth to saturated zone Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Depth to bedrock Content of large stones	1.00 0.42 0.01
715: Fluvaquents, frequently flooded	65	Very limited Depth to saturated zone Flooding	1.00 1.00	Very limited Cutbanks cave Depth to saturated zone Flooding	1.00 1.00 0.80	Not rated	
735: Havelock, occasionally flooded-----	85	Very limited Depth to saturated zone Frost action Flooding	1.00 1.00 1.00	Very limited Depth to saturated zone Flooding Cutbanks cave	1.00 0.60 0.10	Very limited Depth to saturated zone Flooding	1.00 0.60
740D: Hawick-----	80	Somewhat limited Slope	0.63	Very limited Cutbanks cave Slope	1.00 0.63	Somewhat limited Droughty Slope	0.91 0.63
775B: Billett-----	90	Somewhat limited Frost action	0.50	Very limited Cutbanks cave	1.00	Not limited	
775C: Billett-----	85	Somewhat limited Frost action Slope	0.50 0.01	Very limited Cutbanks cave Slope	1.00 0.01	Somewhat limited Slope	0.01

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
777B: Wapsie-----	85	Not limited		Very limited Cutbanks cave	1.00	Not limited	
835D2: Storden, moderately eroded-----	50	Somewhat limited Low strength Slope Frost action	0.78 0.63 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
Omsrud, moderately eroded-----	35	Very limited Low strength Slope Frost action	1.00 0.63 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
835E2: Storden, moderately eroded-----	50	Very limited Slope Low strength Frost action	1.00 0.78 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
Omsrud, moderately eroded-----	35	Very limited Slope Low strength Frost action	1.00 1.00 0.50	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
836B: Kilkenny-----	65	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
854D: Fens, Aquolls-----	80	Very limited Depth to saturated zone Subsidence Frost action	1.00 1.00 1.00	Very limited Depth to saturated zone Organic matter content Slope	1.00 1.00 0.16	Not rated	
855: Shorewood-----	85	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.15 0.10	Very limited Depth to saturated zone	1.00
956: Harps-----	45	Very limited Depth to saturated zone Frost action Shrink-swell	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
956: Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Cutbanks cave	1.00 1.00 0.10	Very limited Depth to saturated zone Ponding	1.00 1.00
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Dense layer Too clayey	1.00 0.50 0.28	Very limited Depth to saturated zone	1.00
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.28 0.10	Very limited Depth to saturated zone	1.00
1138B: Clarion-----	65	Very limited Low strength Frost action	1.00 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
1236B: Angus-----	85	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
1236C: Angus-----	80	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Frost action Ponding	1.00 1.00 1.00	Very limited Cutbanks cave Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
1507: Brownton-----	80	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.28 0.10	Very limited Depth to saturated zone	1.00

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
1555: Nicollet-----	40	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Guckeen-----	25	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 0.22	Very limited Depth to saturated zone Cutbanks cave Too clayey	1.00 0.10 0.02	Very limited Depth to saturated zone	1.00
1836B: Kilkenny-----	65	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
Shorewood-----	25	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.15 0.10	Very limited Depth to saturated zone	1.00
2700C: Ridgeton-----	75	Somewhat limited Low strength Frost action	0.78 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
2700D: Ridgeton-----	80	Somewhat limited Low strength Slope Frost action	0.78 0.63 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4107: Webster-----	60	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
4138B: Clarion-----	50	Very limited Low strength Frost action	1.00 0.50	Somewhat limited Depth to saturated zone Cutbanks cave	0.61 0.10	Not limited	
Urban land-----	30	Not rated		Not rated		Not rated	
4235B: Angus-----	60	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Very limited Low strength Slope Shrink-swell	1.00 0.63 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
Urban land-----	50	Not rated		Not rated		Not rated	
4325: Le Sueur-----	60	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00 0.22	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Very limited Shrink-swell Depth to saturated zone Frost action	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.72 0.10	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canistee-----	50	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Cutbanks cave	1.00 0.10	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Very limited Depth to saturated zone Low strength Frost action	1.00 1.00 0.50	Very limited Depth to saturated zone Cutbanks cave Too clayey	1.00 0.10 0.03	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
4551D:							
Calamine-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Low strength	1.00	Slope	0.16	Slope	0.16
		Frost action	0.50	Cutbanks cave	0.10		
Urban land-----	50	Not rated		Not rated		Not rated	
4635:							
Buckney-----	50	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.70
Urban land-----	50	Not rated		Not rated		Not rated	
4635B:							
Buckney-----	50	Not limited		Very limited Cutbanks cave	1.00	Somewhat limited Droughty	0.70
Urban land-----	50	Not rated		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010:							
Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled, frequently flooded	80	Very limited Flooding	1.00	Somewhat limited Flooding	0.80	Very limited Flooding	1.00
		Low strength	1.00	Depth to saturated zone	0.61		
		Frost action	0.50	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

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
5507:							
Corvuso-----	55	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.28 0.10	Very limited Depth to saturated zone	1.00
Brownston-----	35	Very limited Depth to saturated zone Frost action Low strength	1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.28 0.10	Very limited Depth to saturated zone	1.00
AW: Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Sanitary Facilities

The titles of the tables described in this section are:

- “Sewage Disposal”
- “Landfills”

These tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings 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 these uses. *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. *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 0.01 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).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If

the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Organic matter content	1.00 1.00 1.00
27B: Terril-----	85	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32
34: Estherville-----	90	Very limited Filtering capacity Seepage, bottom layer	1.00 1.00	Very limited Seepage	1.00
34B: Estherville-----	85	Very limited Filtering capacity Seepage, bottom layer	1.00 1.00	Very limited Seepage Slope	1.00 0.32
55: Nicollet-----	75	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 0.50
62F: Storden-----	80	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Organic matter content	1.00 1.00 1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
95: Harps-----	85	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Not rated	
107: Webster-----	80	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 0.50
108: Wadena-----	85	Very limited Seepage, bottom layer Slow water movement	1.00 0.46	Very limited Seepage	1.00
108B: Wadena-----	95	Very limited Seepage, bottom layer Slow water movement	1.00 0.46	Very limited Seepage Slope	1.00 0.32
108C: Wadena-----	75	Very limited Seepage, bottom layer Slow water movement	1.00 0.46	Very limited Seepage Slope	1.00 1.00
135: Coland, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Slow water movement	1.00 1.00 0.75	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 0.53
136: Ankeny, rarely flooded-----	80	Very limited Seepage, bottom layer Flooding	1.00 0.40	Very limited Seepage Flooding	1.00 0.40
138B: Clarion-----	80	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
138C2: Clarion, moderately eroded-----	80	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Very limited Slope Depth to saturated zone Seepage	1.00 0.71 0.50
201B: Coland-----	50	Very limited Depth to saturated zone Slow water movement	1.00 0.75	Very limited Depth to saturated zone Seepage Slope	1.00 0.53 0.08
Terril-----	35	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32
203: Cylinder-----	80	Very limited Depth to saturated zone Seepage, bottom layer Slow water movement	1.00 1.00 0.50	Very limited Seepage Depth to saturated zone	1.00 1.00
227: Wadena, loamy substratum-----	70	Somewhat limited Slow water movement	0.50	Very limited Seepage	1.00
227B: Wadena, loamy substratum-----	70	Somewhat limited Slow water movement	0.50	Very limited Seepage Slope	1.00 0.32
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Seepage Depth to saturated zone	1.00 1.00
236D: Lester-----	80	Somewhat limited Slope Slow water movement	0.63 0.50	Very limited Slope Seepage	1.00 0.50

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
236E: Lester-----	85	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
236F: Lester-----	80	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
259: Biscay-----	85	Very limited Depth to saturated zone Seepage, bottom layer Slow water movement	1.00 1.00 0.50	Very limited Seepage Depth to saturated zone	1.00 1.00
262G: Lester-----	60	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
Belview-----	20	Very limited Slope Slow water movement	1.00 0.46	Very limited Slope Seepage	1.00 0.53
274: Rolfe, depressiona l, ponded-----	85	Very limited Slow water movement Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 0.50
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Seepage Depth to saturated zone	1.00 1.00
307: Dundas-----	80	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
315B: Udifluvents, occasionally flooded-----	80	Very limited Flooding Seepage, bottom layer	1.00 1.00	Very limited Flooding Seepage Slope	1.00 1.00 0.08
323B: Fort Dodge-----	90	Very limited Seepage, bottom layer Slow water movement	1.00 0.50	Very limited Seepage Slope	1.00 0.32
325: Le Sueur-----	90	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 0.50
338: Garmore-----	100	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Somewhat limited Depth to saturated zone Seepage	0.71 0.50
342: Estherville, loamy substratum-----	70	Somewhat limited Slow water movement	0.50	Very limited Seepage	1.00
342B: Estherville, loamy substratum-----	70	Somewhat limited Slow water movement	0.50	Very limited Seepage Slope	1.00 0.32
344B: Copaston-----	80	Very limited Depth to bedrock Seepage, bottom layer	1.00 1.00	Very limited Depth to hard bedrock Seepage Slope	1.00 1.00 0.08
345: Copaston-----	35	Very limited Depth to bedrock Seepage, bottom layer	1.00 1.00	Very limited Depth to hard bedrock Seepage Slope	1.00 1.00 0.08

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
345: Jacwin-----	25	Very limited Slow water movement Depth to saturated zone Depth to bedrock	1.00 1.00 0.99	Very limited Depth to saturated zone Depth to soft bedrock Seepage	1.00 0.99 0.50
355: Luther-----	85	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
383: Marna-----	80	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
385: Guckeen-----	75	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
386: Cordova-----	85	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
387B: Kamrar-----	85	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage Slope	1.00 0.50 0.32
413G: Gosport-----	25	Very limited Slow water movement Depth to saturated zone Slope	1.00 1.00 1.00	Very limited Depth to soft bedrock Slope Depth to saturated zone	1.00 1.00 1.00
Emeline-----	25	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to hard bedrock Slope	1.00 1.00
Ridgeton-----	25	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
457: Du Page, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Slow water movement	1.00 0.99 0.46	Very limited Flooding Depth to saturated zone Seepage	1.00 0.71 0.53
485: Spillville, occasionally flooded-----	80	Very limited Flooding Depth to saturated zone Slow water movement	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 0.50
485B: Spillville, rarely flooded-----	85	Somewhat limited Depth to saturated zone Slow water movement Flooding	0.99 0.50 0.40	Somewhat limited Depth to saturated zone Seepage Flooding	0.71 0.50 0.40
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding Slow water movement	1.00 1.00 0.50	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 0.50
507: Canisteo-----	75	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 0.50
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Organic matter content	1.00 1.00 1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
526: Wacousta, mucky, depressional, ponded-----	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Slow water movement	0.50	Seepage	0.50
536: Hanlon, occasionally flooded-----	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.71
541C: Estherville-----	45	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
Hawick-----	45	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
551B: Calamine-----	85	Very limited		Very limited	
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	0.50
		Depth to bedrock	0.78	Depth to soft bedrock	0.42
551D: Calamine-----	55	Very limited		Very limited	
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Depth to bedrock	0.78	Seepage	0.50
559: Talcot-----	85	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Slow water movement	0.46		

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Seepage Depth to saturated zone	1.00 1.00
566C: Moingona-----	90	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Very limited Slope Depth to saturated zone Seepage	1.00 0.71 0.50
568D: Cokato-----	80	Somewhat limited Slow water movement Slope	0.50 0.04	Very limited Slope Seepage	1.00 0.50
568E: Cokato-----	80	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
583: Minnetonka-----	90	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.32
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 0.50
625: Lerdal-----	80	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
636: Buckney, rarely flooded-----	85	Very limited Filtering capacity Seepage, bottom layer Flooding	1.00 1.00 0.40	Very limited Seepage Flooding	1.00 0.40

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
636B: Buckney, rarely flooded-----	90	Very limited Filtering capacity Seepage, bottom layer Flooding	1.00 1.00 0.40	Very limited Seepage Flooding Slope	1.00 0.40 0.32
638C2: Clarion, moderately eroded-----	50	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Very limited Slope Depth to saturated zone Seepage	1.00 0.71 0.50
Storden, moderately eroded-----	35	Somewhat limited Slow water movement	0.50	Very limited Slope Seepage	1.00 0.50
650: Joliet-----	45	Very limited Depth to bedrock Depth to saturated zone	1.00 1.00	Very limited Depth to hard bedrock Depth to saturated zone Seepage	1.00 1.00 0.53
Faxon-----	45	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to hard bedrock Seepage Depth to saturated zone	1.00 1.00 1.00
715: Fluvaquents, frequently flooded	65	Very limited Flooding Depth to saturated zone Filtering capacity	1.00 1.00 1.00	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 1.00
735: Havelock, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Seepage, bottom layer	1.00 1.00 1.00	Very limited Flooding Seepage Depth to saturated zone	1.00 1.00 1.00

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
740D: Hawick-----	80	Very limited Filtering capacity Seepage, bottom layer Slope	1.00 1.00 0.63	Very limited Slope Seepage	1.00 1.00
775B: Billett-----	90	Very limited Seepage, bottom layer	1.00	Very limited Seepage Slope	1.00 0.08
775C: Billett-----	85	Very limited Seepage, bottom layer Slope	1.00 0.01	Very limited Seepage Slope	1.00 1.00
777B: Wapsie-----	85	Very limited Seepage, bottom layer Slow water movement	1.00 0.50	Very limited Seepage Slope	1.00 0.32
835D2: Storden, moderately eroded-----	50	Somewhat limited Slope Slow water movement	0.63 0.50	Very limited Slope Seepage	1.00 0.50
Omsrud, moderately eroded-----	35	Somewhat limited Slope Slow water movement	0.63 0.50	Very limited Slope Seepage	1.00 0.50
835E2: Storden, moderately eroded-----	50	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
Omsrud, moderately eroded-----	35	Very limited Slope Slow water movement	1.00 0.50	Very limited Slope Seepage	1.00 0.50
836B: Kilkenny-----	65	Very limited Slow water movement Depth to saturated zone	1.00 0.99	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
854D: Fens, Aquolls-----	80	Very limited Depth to saturated zone Subsidence Slow water movement	1.00 1.00 0.72	Very limited Depth to saturated zone Slope Seepage	1.00 1.00 1.00
855: Shorewood-----	85	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
956: Harps-----	45	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Not rated	
956: Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone Slow water movement Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding Organic matter content	1.00 1.00 1.00
1007: Cosmos, bouldery----	65	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
1055B: Kandiyohi, bouldery	65	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Slope	1.00 0.32
1138B: Clarion-----	65	Somewhat limited Depth to saturated zone Slow water movement	0.99 0.50	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32
1236B: Angus-----	85	Somewhat limited Slow water movement	0.50	Somewhat limited Seepage Slope	0.50 0.32

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1236C: Angus-----	80	Somewhat limited Slow water movement	0.50	Very limited Slope Seepage	1.00 0.50
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Seepage, bottom layer Ponding	1.00 1.00 1.00	Very limited Seepage Depth to saturated zone Ponding	1.00 1.00 1.00
1507: Brownton-----	80	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
1555: Nicollet-----	40	Very limited Depth to saturated zone Slow water movement	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 0.50
Guckeen-----	25	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
1836B: Kilkenny-----	65	Very limited Slow water movement Depth to saturated zone	1.00 0.99	Somewhat limited Depth to saturated zone Seepage Slope	0.71 0.50 0.32
Shorewood-----	25	Very limited Depth to saturated zone Slow water movement	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
2700C: Ridgeton-----	75	Somewhat limited Slow water movement	0.50	Very limited Slope Seepage	1.00 0.50
2700D: Ridgeton-----	80	Somewhat limited Slope Slow water movement	0.63 0.50	Very limited Slope Seepage	1.00 0.50
4000: Urban land-----	100	Not rated		Not rated	

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4055: Nicollet-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
Urban land-----	50	Not rated		Not rated	
4107: Webster-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
Urban land-----	40	Not rated		Not rated	
4138B: Clarion-----	50	Somewhat limited Depth to saturated zone	0.99	Somewhat limited Depth to saturated zone	0.71
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
Urban land-----	30	Not rated		Not rated	
4235B: Angus-----	60	Somewhat limited Slow water movement	0.50	Somewhat limited Seepage	0.50
				Slope	0.32
Urban land-----	40	Not rated		Not rated	
4236D: Lester-----	50	Somewhat limited Slope	0.63	Very limited Slope	1.00
		Slow water movement	0.50	Seepage	0.50
Urban land-----	50	Not rated		Not rated	
4325: Le Sueur-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
Urban land-----	40	Not rated		Not rated	
4444: Jacwin-----	50	Very limited Slow water movement	1.00	Very limited Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to soft bedrock	0.99
		Depth to bedrock	0.99	Seepage	0.50
Urban land-----	50	Not rated		Not rated	

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4507: Canisteo-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
Urban land-----	50	Not rated		Not rated	
4551B: Calamine-----	50	Very limited Slow water movement	1.00	Very limited Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	0.50
		Depth to bedrock	0.78	Depth to soft bedrock	0.42
Urban land-----	50	Not rated		Not rated	
4551D: Calamine-----	50	Very limited Slow water movement	1.00	Very limited Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Depth to bedrock	0.78	Seepage	0.50
Urban land-----	50	Not rated		Not rated	
4635: Buckney-----	50	Very limited Filtering capacity	1.00	Very limited Seepage	1.00
		Seepage, bottom layer	1.00		
Urban land-----	50	Not rated		Not rated	
4635B: Buckney-----	50	Very limited Filtering capacity	1.00	Very limited Seepage	1.00
		Seepage, bottom layer	1.00	Slope	0.08
Urban land-----	50	Not rated		Not rated	
4946B: Udorthents-----	70	Not rated		Not rated	
Highway-----	30	Not rated		Not rated	
5010: Pits, sand and gravel-----	100	Not rated		Not rated	
5030: Pits, limestone quarries-----	100	Not rated		Not rated	

Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5035: Pits, gypsum quarries-----	100	Not rated		Not rated	
5040: Udorthents, loamy---	100	Not rated		Not rated	
5049: Aquolls, ponded-----	60	Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated	
5060: Pits, clay-----	100	Not rated		Not rated	
5080: Udorthents-----	100	Not rated		Not rated	
5457: Du Page, channeled, frequently flooded	80	Very limited Flooding Depth to saturated zone Slow water movement	1.00 0.99 0.46	Very limited Flooding Depth to saturated zone Seepage	1.00 0.71 0.53
5507: Corvuso-----	55	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
Brownnton-----	35	Very limited Slow water movement Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 0.50
AW: Animal waste lagoon	100	Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Hard to compact Ponding	1.00 1.00 1.00 1.00
27B: Terril-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
34: Estherville-----	90	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.19
34B: Estherville-----	85	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.19
55: Nicollet-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
62F: Storden-----	80	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
90: Okoboji, mucky, depressional, ponded-----	85	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Hard to compact Ponding	1.00 1.00 1.00 1.00
95: Harps-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not rated	
107: Webster-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
108: Wadena-----	85	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.15
108B: Wadena-----	95	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.28
108C: Wadena-----	75	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.28
135: Coland, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Too clayey	1.00 1.00 0.50	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
136: Ankeny, rarely flooded-----	80	Very limited Seepage, bottom layer Flooding	1.00 0.40	Very limited Seepage Flooding	1.00 0.40	Somewhat limited Seepage	0.50
138B: Clarion-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
138C2: Clarion, moderately eroded-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
201B: Coland-----	50	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Terril-----	35	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
203: Cylinder-----	80	Very limited Depth to saturated zone Seepage, bottom layer Too sandy	1.00 1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Seepage Too sandy	1.00 1.00 0.50
227: Wadena, loamy substratum-----	70	Very limited Too sandy	1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.01
227B: Wadena, loamy substratum-----	70	Very limited Too sandy	1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.01
228: Cylinder, loamy substratum-----	70	Very limited Depth to saturated zone Too sandy	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Seepage Too sandy	1.00 1.00 0.50
236D: Lester-----	80	Somewhat limited Slope Too clayey	0.63 0.50	Somewhat limited Slope	0.63	Somewhat limited Slope Too clayey	0.63 0.50
236E: Lester-----	85	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Too clayey	1.00 0.50
236F: Lester-----	80	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Too clayey	1.00 0.50
259: Biscay-----	85	Very limited Depth to saturated zone Seepage, bottom layer Too sandy	1.00 1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
262G: Lester-----	60	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Too clayey	1.00 0.50
Belview-----	20	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
274: Rolfe, depressional, ponded-----	85	Very limited Depth to saturated zone Too clayey Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
278: Biscay, loamy substratum-----	70	Very limited Depth to saturated zone Too sandy	1.00 0.50	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Seepage Too sandy	1.00 1.00 0.50
307: Dundas-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
315B: Udifluvents, occasionally flooded-----	80	Very limited Flooding Seepage, bottom layer	1.00 1.00	Very limited Flooding Seepage	1.00 1.00	Somewhat limited Seepage	0.50
323B: Fort Dodge-----	90	Very limited Seepage, bottom layer	1.00	Not limited		Not limited	
325: Le Sueur-----	90	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
338: Garmore-----	100	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Too clayey	0.50
342: Estherville, loamy substratum-----	70	Very limited Too sandy	1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.25
342B: Estherville, loamy substratum-----	70	Very limited Too sandy	1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.25

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
344B: Copaston-----	80	Very limited Depth to bedrock Seepage, bottom layer	1.00 1.00	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Seepage	1.00 0.52
345: Copaston-----	35	Very limited Depth to bedrock Seepage, bottom layer	1.00 1.00	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Seepage	1.00 0.52
Jacwin-----	25	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 0.99	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
355: Luther-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
383: Marna-----	80	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
385: Guckeen-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
386: Cordova-----	85	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
387B: Kamrar-----	85	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Depth to saturated zone Too clayey	0.86 0.50
413G: Gosport-----	25	Very limited Depth to saturated zone Slope Depth to bedrock	1.00 1.00 1.00	Very limited Slope Depth to saturated zone Depth to bedrock	1.00 1.00 1.00	Very limited Slope Too clayey Hard to compact	1.00 1.00 1.00
Emeline-----	25	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Slope Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Slope	1.00 1.00
Ridgeton-----	25	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
457: Du Page, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Not limited	
485: Spillville, occasionally flooded-----	80	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone	1.00
485B: Spillville, rarely flooded-----	85	Very limited Depth to saturated zone Flooding	1.00 0.40	Very limited Depth to saturated zone Flooding	1.00 0.40	Not limited	
506: Wacousta, depressional, ponded-----	80	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 0.50	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 0.50
507: Canistee-----	75	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
511: Blue Earth, depressional, ponded-----	85	Very limited Depth to saturated zone Organic matter content Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Hard to compact Ponding	1.00 1.00 1.00
526: Wacousta, mucky, depressional, ponded-----	90	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
536: Hanlon, occasionally flooded-----	80	Very limited Flooding Depth to saturated zone Seepage, bottom layer	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Somewhat limited Seepage	0.50
541C: Estherville-----	45	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.19
Hawick-----	45	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage Gravel content	1.00 1.00 0.01
551B: Calamine-----	85	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 0.42	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
551D: Calamine-----	55	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock Slope	1.00 0.42 0.16	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
559: Talcot-----	85	Very limited Depth to saturated zone Seepage, bottom layer Too sandy	1.00 1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
561: Talcot, loamy substratum-----	70	Very limited Depth to saturated zone Too sandy	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
566C: Moingona-----	90	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Too clayey	0.50
568D: Cokato-----	80	Somewhat limited Too clayey Slope	0.50 0.04	Somewhat limited Slope	0.04	Somewhat limited Too clayey Slope	0.50 0.04

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
568E: Cokato-----	80	Very limited Slope Too clayey	1.00 0.50	Very limited Slope	1.00	Very limited Slope Too clayey	1.00 0.50
583: Minnetonka-----	90	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
606: Lanyon, depressional, ponded-----	80	Very limited Depth to saturated zone Too clayey Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
625: Lerdal-----	80	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Hard to compact Too clayey	1.00 1.00 0.50
636: Buckney, rarely flooded-----	85	Very limited Seepage, bottom layer Too sandy Flooding	1.00 0.50 0.40	Very limited Seepage Flooding	1.00 0.40	Very limited Seepage Too sandy	1.00 0.50
636B: Buckney, rarely flooded-----	90	Very limited Seepage, bottom layer Too sandy Flooding	1.00 0.50 0.40	Very limited Seepage Flooding	1.00 0.40	Very limited Seepage Too sandy	1.00 0.50
638C2: Clarion, moderately eroded-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
Storden, moderately eroded-----	35	Not limited		Not limited		Not limited	
650: Joliet-----	45	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to bedrock Depth to saturated zone	1.00 1.00

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
650: Faxon-----	45	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00	Very limited Depth to saturated zone Seepage Depth to bedrock	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 1.00
715: Fluvaquents, frequently flooded	65	Very limited Flooding Depth to saturated zone Seepage, bottom layer	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Seepage	1.00 1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
735: Havelock, occasionally flooded-----	85	Very limited Flooding Depth to saturated zone Seepage, bottom layer	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
740D: Hawick-----	80	Very limited Seepage, bottom layer Too sandy Slope	1.00 1.00 0.63	Very limited Seepage Slope	1.00 0.63	Very limited Too sandy Seepage Slope	1.00 1.00 0.63
775B: Billett-----	90	Very limited Seepage, bottom layer	1.00	Very limited Seepage	1.00	Somewhat limited Seepage	0.50
775C: Billett-----	85	Very limited Seepage, bottom layer Slope	1.00 0.01	Very limited Seepage Slope	1.00 0.01	Somewhat limited Seepage Slope	0.50 0.01
777B: Wapsie-----	85	Very limited Seepage, bottom layer Too sandy	1.00 1.00	Very limited Seepage	1.00	Very limited Too sandy Seepage	1.00 1.00
835D2: Storden, moderately eroded-----	50	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63
Omsrud, moderately eroded-----	35	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835E2: Storden, moderately eroded-----	50	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Omsrud, moderately eroded-----	35	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
836B: Kilkenny-----	65	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Too clayey	0.50
854D: Fens, Aquolls-----	80	Very limited Depth to saturated zone Too clayey Slope	1.00 0.50 0.16	Very limited Depth to saturated zone Seepage Slope	1.00 1.00 0.16	Very limited Depth to saturated zone Slope	1.00 0.16
855: Shorewood-----	85	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
956: Harps-----	45	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not rated	
Okoboji, depressional, ponded-----	35	Very limited Depth to saturated zone Ponding Too clayey	1.00 1.00 0.50	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Hard to compact Ponding	1.00 1.00 1.00
1007: Cosmos, bouldery----	65	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Hard to compact Too clayey	1.00 1.00 0.50
1055B: Kandiyohi, bouldery	65	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Hard to compact Too clayey	1.00 1.00 0.50

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1138B: Clarion-----	65	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
1236B: Angus-----	85	Not limited		Not limited		Somewhat limited Too clayey	0.50
1236C: Angus-----	80	Not limited		Not limited		Somewhat limited Too clayey	0.50
1259: Biscay, depressional, ponded-----	80	Very limited Depth to saturated zone Seepage, bottom layer Too sandy	1.00 1.00 1.00	Very limited Depth to saturated zone Seepage Ponding	1.00 1.00 1.00	Very limited Depth to saturated zone Too sandy Seepage	1.00 1.00 1.00
1507: Brownton-----	80	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
1555: Nicollet-----	40	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Guckeen-----	25	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
1836B: Kilkenny-----	65	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Somewhat limited Too clayey	0.50
Shorewood-----	25	Very limited Depth to saturated zone Too clayey	1.00 1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
2700C: Ridgeton-----	75	Not limited		Not limited		Not limited	
2700D: Ridgeton-----	80	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63	Somewhat limited Slope	0.63
4000: Urban land-----	100	Not rated		Not rated		Not rated	

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4055: Nicollet-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not limited		Not rated	
4107: Webster-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	40	Not rated		Not limited		Not rated	
4138B: Clarion-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Not limited	
Urban land-----	30	Not rated		Not limited		Not rated	
4235B: Angus-----	60	Not limited		Not limited		Somewhat limited Too clayey	0.50
Urban land-----	40	Not rated		Not limited		Not rated	
4236D: Lester-----	50	Somewhat limited Slope Too clayey	0.63 0.50	Somewhat limited Slope	0.63	Somewhat limited Slope Too clayey	0.63 0.50
Urban land-----	50	Not rated		Somewhat limited Slope	0.63	Not rated	
4325: Le Sueur-----	60	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
Urban land-----	40	Not rated		Not limited		Not rated	
4444: Jacwin-----	50	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 0.99	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
Urban land-----	50	Not rated		Not limited		Not rated	
4507: Canisteo-----	50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
Urban land-----	50	Not rated		Not limited		Not rated	

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4551B: Calamine-----	50	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock	1.00 0.42	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
Urban land-----	50	Not rated		Not limited		Not rated	
4551D: Calamine-----	50	Very limited Depth to saturated zone Depth to bedrock Too clayey	1.00 1.00 1.00	Very limited Depth to saturated zone Depth to bedrock Slope	1.00 0.42 0.16	Very limited Depth to saturated zone Too clayey Hard to compact	1.00 1.00 1.00
Urban land-----	50	Not rated		Somewhat limited Slope	0.16	Not rated	
4635: Buckney-----	50	Very limited Seepage, bottom layer Too sandy	1.00 0.50	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
Urban land-----	50	Not rated		Not limited		Not rated	
4635B: Buckney-----	50	Very limited Seepage, bottom layer Too sandy	1.00 0.50	Very limited Seepage	1.00	Very limited Seepage Too sandy	1.00 0.50
Urban land-----	50	Not rated		Not limited		Not rated	
4946B: Udorthents-----	70	Not rated		Not limited		Not rated	
Highway-----	30	Not rated		Not limited		Not rated	
5010: Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030: Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035: Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040: Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049: Aquolls, ponded-----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	

Landfills--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5060: Pits, clay-----	100	Not rated		Not rated		Not rated	
5080: Udorthents-----	100	Not rated		Not rated		Not rated	
5457: Du Page, channeled, frequently flooded	80	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Not limited	
5507: Corvuso-----	55	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Hard to compact Too clayey	1.00 1.00 0.50
Brownton-----	35	Very limited Depth to saturated zone Too clayey	1.00 0.50	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Too clayey	1.00 0.50
AW: Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Construction Materials

The titles of the tables described in this section are:

- “Source of Sand and Gravel”
- “Source of Reclamation Material, Roadfill, and Topsoil”

These tables give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* 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 the table “Source of Sand and Gravel,” only the likelihood 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 bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated as *improbable*, *possible*, *probable*, or *very likely* sources of gravel. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel. The number 0.00 indicates an improbable source; 0.01 to 0.39, a possible source; 0.40 to 0.99, a probable source; and 1.00, a very likely source.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand. A rating of good or fair means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. The larger the number, the greater the likelihood that the layer is a source of sand.

In the table “Source of Reclamation Material, Roadfill, and Topsoil,” the rating class terms are *good*, *fair*, and *poor*. 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 reclamation material, roadfill, and topsoil. The lower the number, the greater the limitation.

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).

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.

Source of Sand and Gravel

(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 as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
6: Okoboji, depressional, ponded-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
27B: Terril-----	85	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
34: Estherville-----	90	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.69
34B: Estherville-----	85	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.69
55: Nicollet-----	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
62F: Storden-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
90: Okoboji, mucky, depressional, ponded-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
95: Harps-----	85	Improbable		Not rated	
		Thickest layer	0.00		
		Bottom layer	0.00		
107: Webster-----	80	Improbable		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
108: Wadena-----	85	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.63
108B: Wadena-----	95	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.63
108C: Wadena-----	75	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.52
135: Coland, occasionally flooded-----	85	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.01
136: Ankeny, rarely flooded-----	80	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
138B: Clarion-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
138C2: Clarion, moderately eroded-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
201B: Coland-----	50	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
Terril-----	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
203: Cylinder-----	80	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.04	Bottom layer	0.10
227: Wadena, loamy substratum-----	70	Improbable		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.63

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
227B: Wadena, loamy substratum-----	70	Improbable		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.63
228: Cylinder, loamy substratum-----	70	Possible		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.04	Thickest layer	0.10
236D: Lester-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
236E: Lester-----	85	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
236F: Lester-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
259: Biscay-----	85	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.47
262G: Lester-----	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Belview-----	20	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
274: Rolfe, depressional, ponded-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
278: Biscay, loamy substratum-----	70	Improbable		Fair	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.08
307: Dundas-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
315B: Udifluvents, occasionally flooded-----	80	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
323B: Fort Dodge-----	90	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.10
325: Le Sueur-----	90	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
338: Garmore-----	100	Improbable		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
342: Estherville, loamy substratum-----	70	Improbable		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.52
342B: Estherville, loamy substratum-----	70	Improbable		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.52
344B: Copaston-----	80	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
345: Copaston-----	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Jacwin-----	25	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
355: Luther-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
383: Marna-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
385: Guckeen-----	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
386: Cordova-----	85	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
387B: Kamrar-----	85	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
413G: Gosport-----	25	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
Emeline-----	25	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Ridgeton-----	25	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
457: Du Page, occasionally flooded-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
485: Spillville, occasionally flooded-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
485B: Spillville, rarely flooded-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
506: Wacousta, depressional, ponded-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
507: Canistee-----	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
511: Blue Earth, depressional, ponded-----	85	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
526: Wacousta, mucky, depressional, ponded-----	90	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
536: Hanlon, occasionally flooded-----	80	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.03
541C: Estherville-----	45	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.03
		Bottom layer	0.00	Bottom layer	0.69
Hawick-----	45	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.07
		Bottom layer	0.04	Bottom layer	0.50
551B: Calamine-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
551D: Calamine-----	55	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
559: Talcot-----	85	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.75
561: Talcot, loamy substratum-----	70	Improbable		Fair	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.47
566C: Moingona-----	90	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
568D: Cokato-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
568E: Cokato-----	80	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
583: Minnetonka-----	90	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
606: Lanyon, depressional, ponded-----	80	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
625: Lerdal-----	80	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
636: Buckney, rarely flooded-----	85	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.06
636B: Buckney, rarely flooded-----	90	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.06
638C2: Clarion, moderately eroded-----	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Storden, moderately eroded-----	35	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
650: Joliet-----	45	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
Faxon-----	45	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
715: Fluvaquents, frequently flooded	65	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.10
		Thickest layer	0.00	Bottom layer	0.42

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
735: Havelock, occasionally flooded-----	85	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.03
740D: Hawick-----	80	Possible		Fair	
		Thickest layer	0.00	Thickest layer	0.07
		Bottom layer	0.04	Bottom layer	0.50
775B: Billett-----	90	Improbable		Fair	
		Thickest layer	0.00	Thickest layer	0.04
		Bottom layer	0.00	Bottom layer	0.08
775C: Billett-----	85	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.08
777B: Wapsie-----	85	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.41
835D2: Storden, moderately eroded-----	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Omsrud, moderately eroded-----	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
835E2: Storden, moderately eroded-----	50	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Omsrud, moderately eroded-----	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
836B: Kilkenny-----	65	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
854D: Fens, Aquolls-----	80	Not rated		Not rated	

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
855: Shorewood-----	85	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
956: Harps-----	45	Improbable		Not rated	
		Bottom layer	0.00		
		Thickest layer	0.00		
Okoboji, depressional, ponded-----	35	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1007: Cosmos, bouldery----	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1055B: Kandiyohi, bouldery	65	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
1138B: Clarion-----	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1236B: Angus-----	85	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
1236C: Angus-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1259: Biscay, depressional, ponded-----	80	Improbable		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.47
1507: Brownton-----	80	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
1555: Nicollet-----	40	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
1555: Guckeen-----	25	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
1836B: Kilkenny-----	65	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Shorewood-----	25	Improbable		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
2700C: Ridgeton-----	75	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
2700D: Ridgeton-----	80	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
4000: Urban land-----	100	Not rated		Not rated	
4055: Nicollet-----	50	Improbable		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
Urban land-----	50	Not rated		Not rated	
4107: Webster-----	60	Improbable		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Urban land-----	40	Not rated		Not rated	
4138B: Clarion-----	50	Improbable		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Urban land-----	30	Not rated		Not rated	
4235B: Angus-----	60	Improbable		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Urban land-----	40	Not rated		Not rated	
4236D: Lester-----	50	Improbable		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
4236D: Urban land-----	50	Not rated		Not rated	
4325: Le Sueur-----	60	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	40	Not rated		Not rated	
4444: Jacwin-----	50	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	50	Not rated		Not rated	
4507: Canisteo-----	50	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	50	Not rated		Not rated	
4551B: Calamine-----	50	Improbable Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	50	Not rated		Not rated	
4551D: Calamine-----	50	Improbable Bottom layer Thickest layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Urban land-----	50	Not rated		Not rated	
4635: Buckney-----	50	Improbable Thickest layer Bottom layer	0.00 0.00	Fair Thickest layer Bottom layer	0.00 0.06
Urban land-----	50	Not rated		Not rated	
4635B: Buckney-----	50	Improbable Thickest layer Bottom layer	0.00 0.00	Fair Thickest layer Bottom layer	0.00 0.06
Urban land-----	50	Not rated		Not rated	
4946B: Udorthents-----	70	Not rated		Not rated	
Highway-----	30	Not rated		Not rated	
5010: Pits, sand and gravel-----	100	Not rated		Not rated	

Source of Sand and Gravel--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of gravel		Potential as source of sand	
		Rating class	Value	Rating class	Value
5030: Pits, limestone quarries-----	100	Not rated		Not rated	
5035: Pits, gypsum quarries-----	100	Not rated		Not rated	
5040: Udorthents, loamy---	100	Not rated		Not rated	
5049: Aquolls, ponded----	60	Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated	
5060: Pits, clay-----	100	Not rated		Not rated	
5080: Udorthents-----	100	Not rated		Not rated	
5457: Du Page, channeled, frequently flooded	80	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
5507: Corvuso-----	55	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
Brownton-----	35	Improbable Thickest layer Bottom layer	0.00 0.00	Poor Bottom layer Thickest layer	0.00 0.00
AW: Animal waste lagoon	100	Not rated		Not rated	
SL: Sewage lagoon-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Fair		Poor		Poor	
		Too clayey	0.05	Wetness	0.00	Wetness	0.00
		Carbonate content	0.97	Low strength	0.00	Too clayey	0.05
				Shrink-swell	0.16		
27B: Terril-----	85	Fair		Fair		Good	
		Carbonate content	0.97	Low strength	0.78		
34: Estherville-----	90	Poor		Good		Poor	
		Too sandy	0.00			Rock fragments	0.00
		Content of organic matter	0.12			Too sandy	0.00
		Droughty	0.70			Hard to reclaim (rock fragments)	0.32
34B: Estherville-----	85	Poor		Good		Poor	
		Too sandy	0.00			Rock fragments	0.00
		Content of organic matter	0.12			Too sandy	0.00
		Droughty	0.70			Hard to reclaim (rock fragments)	0.32
55: Niccollet-----	75	Fair		Poor		Poor	
		Content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Carbonate content	0.97				
		Water erosion	0.99				
62F: Storden-----	80	Fair		Fair		Poor	
		Content of organic matter	0.88	Slope	0.18	Slope	0.00
		Carbonate content	0.97	Low strength	0.22	Carbonate content	0.97
		Water erosion	0.99				
90: Okoboji, mucky, depressional, ponded-----	85	Fair		Poor		Poor	
		Too clayey	0.05	Low strength	0.00	Wetness	0.00
		Carbonate content	0.97	Wetness	0.00	Too clayey	0.05
				Shrink-swell	0.42		
95: Harps-----	85	Fair		Poor		Poor	
		Carbonate content	0.68	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Carbonate content	0.68

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107: Webster-----	80	Fair		Poor		Poor	
		Content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Carbonate content	0.97				
		Water erosion	0.99				
108: Wadena-----	85	Fair		Good		Fair	
		Content of organic matter	0.12			Hard to reclaim (rock fragments)	0.01
						Rock fragments	0.92
108B: Wadena-----	95	Fair		Good		Fair	
		Content of organic matter	0.12			Hard to reclaim (rock fragments)	0.01
						Rock fragments	0.92
108C: Wadena-----	75	Fair		Good		Fair	
		Content of organic matter	0.12			Hard to reclaim (rock fragments)	0.01
						Rock fragments	0.92
135: Coland, occasionally flooded-----	85	Fair		Poor		Poor	
		Too clayey	0.98	Low strength Wetness Shrink-swell	0.00 0.00 0.99	Wetness Too clayey	0.00 0.98
136: Ankeny, rarely flooded-----	80	Good		Good		Good	
138B: Clarion-----	80	Fair		Good		Fair	
		Content of organic matter	0.12			Rock fragments	0.99
		Carbonate content	0.97				
		Water erosion	0.99				
138C2: Clarion, moderately eroded-----	80	Fair		Good		Good	
		Content of organic matter	0.12				
		Carbonate content	0.97				
		Water erosion	0.99				
201B: Coland-----	50	Fair		Poor		Poor	
		Too clayey	0.98	Wetness Low strength Shrink-swell	0.00 0.00 0.99	Wetness Too clayey	0.00 0.98
Terril-----	35	Fair		Fair		Good	
		Carbonate content	0.97	Low strength	0.78		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
203: Cylinder-----	80	Fair Too sandy Content of organic matter	0.01 0.12	Poor Wetness	0.00	Poor Rock fragments Wetness Too sandy	0.00 0.00 0.01
227: Wadena, loamy substratum-----	70	Poor Too sandy Content of organic matter	0.00 0.12	Good		Poor Rock fragments Too sandy Hard to reclaim (rock fragments)	0.00 0.00 0.01
227B: Wadena, loamy substratum-----	70	Poor Too sandy Content of organic matter	0.00 0.12	Good		Poor Rock fragments Too sandy Hard to reclaim (rock fragments)	0.00 0.00 0.01
228: Cylinder, loamy substratum-----	70	Fair Content of organic matter	0.12	Poor Wetness	0.00	Poor Wetness Hard to reclaim (rock fragments) Rock fragments	0.00 0.01 0.95
236D: Lester-----	80	Fair Content of organic matter Carbonate content	0.88 0.97	Poor Low strength Shrink-swell	0.00 0.97	Fair Slope	0.37
236E: Lester-----	85	Fair Content of organic matter Carbonate content	0.88 0.97	Poor Low strength Shrink-swell Slope	0.00 0.97 0.98	Poor Slope	0.00
236F: Lester-----	80	Fair Content of organic matter Carbonate content	0.88 0.97	Poor Low strength Slope Shrink-swell	0.00 0.18 0.97	Poor Slope	0.00
259: Biscay-----	85	Fair Content of organic matter Carbonate content	0.12 0.97	Poor Wetness	0.00	Poor Wetness Hard to reclaim (rock fragments)	0.00 0.03
262G: Lester-----	60	Fair Content of organic matter Carbonate content	0.88 0.97	Poor Low strength Slope Shrink-swell	0.00 0.00 0.97	Poor Slope	0.00

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
262G: Belview-----	20	Fair		Poor		Poor	
		Content of organic matter	0.12	Slope	0.00	Slope	0.00
		Carbonate content	0.97	Low strength	0.78	Carbonate content	0.97
274: Rolfe, depressional, ponded-----	85	Poor		Poor		Poor	
		Too clayey	0.00	Wetness	0.00	Wetness	0.00
		Content of organic matter	0.88	Low strength	0.00	Too clayey	0.00
		Too acid	0.97	Shrink-swell	0.53		
278: Biscay, loamy substratum-----	70	Fair		Poor		Poor	
		Content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Carbonate content	0.97			Hard to reclaim (rock fragments)	0.68
307: Dundas-----	80	Fair		Poor		Poor	
		Content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Too acid	0.92				
		Carbonate content	0.97				
315B: Udifluvents, occasionally flooded-----	80	Not rated		Good		Not rated	
323B: Fort Dodge-----	90	Good		Poor		Good	
				Low strength	0.00		
325: Le Sueur-----	90	Fair		Poor		Poor	
		Content of organic matter	0.12	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Shrink-swell	0.99		
		Carbonate content	0.97				
338: Garmore-----	100	Fair		Poor		Good	
		Content of organic matter	0.50	Low strength	0.00		
		Too acid	0.97				
		Water erosion	0.99				
342: Estherville, loamy substratum-----	70	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Content of organic matter	0.12			Rock fragments	0.00
		Droughty	0.85			Hard to reclaim (rock fragments)	0.32

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
342B: Estherville, loamy substratum-----	70	Poor Too sandy Content of organic matter Droughty	0.00 0.12 0.85	Good		Poor Rock fragments Too sandy Hard to reclaim (rock fragments)	0.00 0.00 0.32
344B: Copaston-----	80	Poor Depth to bedrock Droughty	0.00 0.00	Poor Depth to bedrock	0.00	Poor Depth to bedrock Rock fragments	0.00 0.82
345: Copaston-----	35	Poor Droughty Depth to bedrock	0.00 0.00	Poor Depth to bedrock	0.00	Poor Depth to bedrock Rock fragments	0.00 0.82
Jacwin-----	25	Poor Too clayey Content of organic matter Carbonate content	0.00 0.50 0.97	Poor Wetness Low strength Depth to bedrock	0.00 0.00 0.00	Poor Wetness Too clayey	0.00 0.00
355: Luther-----	85	Fair Content of organic matter Too acid Carbonate content	0.12 0.92 0.97	Poor Wetness	0.00	Poor Wetness	0.00
383: Marna-----	80	Fair Too clayey Content of organic matter Carbonate content	0.05 0.12 0.97	Poor Wetness Shrink-swell Low strength	0.00 0.74 0.78	Poor Wetness Too clayey	0.00 0.05
385: Guckeen-----	75	Fair Content of organic matter Too clayey Water erosion	0.12 0.12 0.99	Poor Wetness Low strength Shrink-swell	0.00 0.78 0.91	Poor Wetness Too clayey	0.00 0.12
386: Cordova-----	85	Fair Content of organic matter Too acid Too clayey	0.12 0.84 0.95	Poor Wetness Low strength Shrink-swell	0.00 0.78 0.97	Poor Wetness Too clayey Rock fragments	0.00 0.94 0.99
387B: Kamrar-----	85	Fair Too clayey Carbonate content	0.02 0.97	Fair Low strength Wetness Shrink-swell	0.22 0.53 0.87	Fair Too clayey Wetness Rock fragments	0.02 0.53 0.98

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
413G: Gosport-----	25	Poor Too clayey Droughty Content of organic matter	0.00 0.12 0.12	Poor Depth to bedrock Low strength Slope	0.00 0.00 0.00	Poor Slope Too clayey Wetness	0.00 0.00 0.53
Emeline-----	25	Poor Depth to bedrock Droughty	0.00 0.00	Poor Slope Depth to bedrock	0.00 0.00	Not rated	
Ridgeton-----	25	Good		Poor Slope Low strength	0.00 0.78	Poor Slope	0.00
457: Du Page, occasionally flooded-----	85	Fair Content of organic matter Carbonate content	0.68 0.80	Good		Good	
485: Spillville, occasionally flooded-----	80	Good		Poor Wetness Low strength	0.00 0.00	Poor Wetness	0.00
485B: Spillville, rarely flooded-----	85	Good		Poor Low strength	0.00	Good	
506: Wacousta, depressional, ponded-----	80	Fair Content of organic matter Water erosion Carbonate content	0.50 0.90 0.97	Poor Low strength Wetness	0.00 0.00	Poor Wetness	0.00
507: Canistee-----	75	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Poor Wetness	0.00	Poor Wetness	0.00
511: Blue Earth, depressional, ponded-----	85	Fair Carbonate content	0.80	Poor Wetness Low strength	0.00 0.00	Poor Rock fragments Wetness Hard to reclaim (rock fragments)	0.00 0.00 0.84

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
526: Wacousta, mucky, depressional, ponded-----	90	Fair		Poor		Poor	
		Content of organic matter	0.50	Wetness	0.00	Wetness	0.00
		Water erosion	0.90	Low strength	0.00		
		Carbonate content	0.97				
536: Hanlon, occasionally flooded-----	80	Good		Good		Good	
541C: Estherville-----	45	Poor		Good		Poor	
		Too sandy	0.00			Rock fragments	0.00
		Content of organic matter	0.12			Too sandy	0.00
		Droughty	0.70			Hard to reclaim (rock fragments)	0.32
Hawick-----	45	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Content of organic matter	0.12			Rock fragments	0.03
		Droughty	0.26			Hard to reclaim (rock fragments)	0.98
551B: Calamine-----	85	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
				Depth to bedrock	0.58		
551D: Calamine-----	55	Fair		Poor		Poor	
		Water erosion	0.90	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Slope	0.84
				Depth to bedrock	0.58		
559: Talcot-----	85	Fair		Poor		Poor	
		Content of organic matter	0.88	Wetness	0.00	Wetness	0.00
		Too clayey	0.88			Hard to reclaim (rock fragments)	0.61
		Carbonate content	0.97			Too clayey	0.88
561: Talcot, loamy substratum-----	70	Fair		Poor		Poor	
		Content of organic matter	0.88	Wetness	0.00	Wetness	0.00
		Too clayey	0.88	Shrink-swell	0.99	Hard to reclaim (rock fragments)	0.82
		Carbonate content	0.97			Too clayey	0.88
566C: Moingona-----	90	Fair		Poor		Good	
		Content of organic matter	0.88	Low strength	0.00		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
568D: Cokato-----	80	Fair		Poor		Fair	
		Carbonate content	0.97	Low strength	0.00	Slope	0.96
		Water erosion	0.99	Shrink-swell	0.93		
568E: Cokato-----	80	Fair		Poor		Poor	
		Carbonate content	0.97	Low strength	0.00	Slope	0.00
		Water erosion	0.99	Shrink-swell	0.93		
583: Minnetonka-----	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Content of organic matter	0.00	Wetness	0.00	Wetness	0.00
		Too acid	0.97	Shrink-swell	0.55		
606: Lanyon, depressional, ponded-----	80	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Wetness	0.00
		Carbonate content	0.68	Wetness	0.00	Too clayey	0.00
				Shrink-swell	0.21	Carbonate content	0.94
625: Lerdal-----	80	Fair		Poor		Poor	
		Too clayey	0.02	Low strength	0.00	Wetness	0.00
		Content of organic matter	0.50	Wetness	0.00	Too clayey	0.01
		Too acid	0.92	Shrink-swell	0.41		
636: Buckney, rarely flooded-----	85	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Droughty	0.08				
		Content of organic matter	0.12				
636B: Buckney, rarely flooded-----	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Droughty	0.08				
		Content of organic matter	0.12				
638C2: Clarion, moderately eroded-----	50	Fair		Good		Good	
		Content of organic matter	0.12				
		Carbonate content	0.97				
		Water erosion	0.99				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
638C2: Storden, moderately eroded-----	35	Fair		Fair		Fair	
		Content of organic matter	0.88	Low strength	0.22	Carbonate content	0.97
		Carbonate content	0.97				
		Water erosion	0.99				
650: Joliet-----	45	Poor		Poor		Poor	
		Depth to bedrock	0.00	Low strength	0.00	Depth to bedrock	0.00
		Droughty	0.00	Wetness	0.00	Wetness	0.00
				Depth to bedrock	0.00	Rock fragments	0.50
Faxon-----	45	Fair		Poor		Poor	
		Depth to bedrock	0.58	Depth to bedrock	0.00	Wetness	0.00
		Droughty	0.99	Wetness	0.00	Depth to bedrock	0.58
				Low strength	0.78	Rock fragments	0.68
715: Fluvaquents, frequently flooded	65	Not rated		Poor		Not rated	
				Wetness	0.00		
735: Havelock, occasionally flooded-----	85	Fair		Poor		Poor	
		Carbonate content	0.97	Low strength	0.00	Wetness	0.00
		Too clayey	0.98	Wetness	0.00	Too clayey	0.93
				Shrink-swell	0.73	Carbonate content	0.97
740D: Hawick-----	80	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Content of organic matter	0.12			Rock fragments	0.03
		Droughty	0.26			Slope	0.37
775B: Billett-----	90	Fair		Good		Good	
		Content of organic matter	0.12				
		Too acid	0.84				
775C: Billett-----	85	Fair		Good		Good	
		Content of organic matter	0.12				
		Too acid	0.84				
777B: Wapsie-----	85	Fair		Good		Fair	
		Content of organic matter	0.12			Rock fragments	0.24
		Too acid	0.84				

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
835D2: Storden, moderately eroded-----	50	Fair		Fair		Fair	
		Content of organic matter	0.88	Low strength	0.22	Slope	0.37
		Carbonate content	0.97			Carbonate content	0.97
		Water erosion	0.99				
Omsrud, moderately eroded-----	35	Fair		Good		Fair	
		Content of organic matter	0.12			Slope	0.37
		Carbonate content	0.97			Rock fragments	0.92
		Water erosion	0.99				
835E2: Storden, moderately eroded-----	50	Fair		Fair		Poor	
		Content of organic matter	0.88	Low strength	0.22	Slope	0.00
		Carbonate content	0.97	Slope	0.98	Carbonate content	0.97
		Water erosion	0.99				
Omsrud, moderately eroded-----	35	Fair		Fair		Poor	
		Content of organic matter	0.12	Slope	0.98	Slope	0.00
		Carbonate content	0.97			Rock fragments	0.92
		Water erosion	0.99				
836B: Kilkenny-----	65	Fair		Poor		Fair	
		Too clayey	0.02	Low strength	0.00	Too clayey	0.01
		Content of organic matter	0.50	Shrink-swell	0.91		
		Too acid	0.92				
854D: Fens, Aquolls-----	80	Not rated		Poor		Not rated	
				Wetness	0.00		
855: Shorewood-----	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too acid	0.68	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.76		
956: Harps-----	45	Fair		Poor		Poor	
		Carbonate content	0.68	Wetness	0.00	Wetness	0.00
				Shrink-swell	0.87	Carbonate content	0.68
Okoboji, depressional, ponded-----	35	Fair		Poor		Poor	
		Too clayey	0.05	Wetness	0.00	Wetness	0.00
		Carbonate content	0.97	Low strength	0.00	Too clayey	0.05
				Shrink-swell	0.16		

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1007: Cosmos, bouldery----	65	Poor Too clayey Content of organic matter Carbonate content	0.00 0.12 0.92	Poor Wetness Low strength Shrink-swell	0.00 0.00 0.01	Poor Too clayey Wetness	0.00 0.00
1055B: Kandiyohi, bouldery	65	Fair Too clayey Content of organic matter Carbonate content	0.01 0.50 0.80	Poor Wetness Low strength Shrink-swell	0.00 0.00 0.02	Poor Wetness Too clayey	0.00 0.00
1138B: Clarion-----	65	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Good		Fair Rock fragments	0.99
1236B: Angus-----	85	Fair Content of organic matter Too acid Carbonate content	0.12 0.97 0.97	Good		Good	
1236C: Angus-----	80	Fair Content of organic matter Too acid Carbonate content	0.12 0.97 0.97	Good		Good	
1259: Biscay, depressional, ponded-----	80	Fair Content of organic matter Carbonate content	0.12 0.97	Poor Wetness	0.00	Poor Wetness Hard to reclaim (rock fragments)	0.00 0.03
1507: Brownton-----	80	Fair Too clayey Carbonate content	0.12 0.99	Poor Low strength Wetness Shrink-swell	0.00 0.00 0.68	Poor Wetness Too clayey Carbonate content	0.00 0.12 0.99
1555: Nicollet-----	40	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Poor Wetness	0.00	Poor Wetness	0.00

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1555: Guckeen-----	25	Fair Too clayey Content of organic matter Water erosion	0.12 0.12 0.99	Poor Wetness Low strength Shrink-swell	0.00 0.78 0.91	Poor Wetness Too clayey	0.00 0.12
1836B: Kilkenny-----	65	Fair Too clayey Content of organic matter Too acid	0.02 0.50 0.92	Poor Low strength Shrink-swell	0.00 0.91	Fair Too clayey	0.01
Shorewood-----	25	Poor Too clayey Too acid	0.00 0.68	Poor Low strength Wetness Shrink-swell	0.00 0.00 0.76	Poor Too clayey Wetness	0.00 0.00
2700C: Ridgeton-----	75	Good		Fair Low strength	0.78	Good	
2700D: Ridgeton-----	80	Good		Fair Low strength	0.78	Fair Slope	0.37
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Poor Wetness	0.00	Poor Wetness	0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4107: Webster-----	60	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Poor Wetness	0.00	Poor Wetness	0.00
Urban land-----	40	Not rated		Not rated		Not rated	
4138B: Clarion-----	50	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Good		Fair Rock fragments	0.99
Urban land-----	30	Not rated		Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4235B: Angus-----	60	Fair Content of organic matter Too acid Carbonate content	0.12 0.97 0.97	Good		Good	
Urban land-----	40	Not rated		Not rated		Not rated	
4236D: Lester-----	50	Fair Content of organic matter Carbonate content	0.88 0.97	Poor Low strength Shrink-swell	0.00 0.97	Fair Slope	0.37
Urban land-----	50	Not rated		Not rated		Not rated	
4325: Le Sueur-----	60	Fair Content of organic matter Too acid Carbonate content	0.12 0.97 0.97	Poor Wetness Shrink-swell	0.00 0.99	Poor Wetness	0.00
Urban land-----	40	Not rated		Not rated		Not rated	
4444: Jacwin-----	50	Poor Too clayey Content of organic matter Carbonate content	0.00 0.50 0.97	Poor Wetness Low strength Depth to bedrock	0.00 0.00 0.00	Poor Too clayey Wetness	0.00 0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4507: Canisteo-----	50	Fair Content of organic matter Carbonate content Water erosion	0.12 0.97 0.99	Poor Wetness	0.00	Poor Wetness	0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551B: Calamine-----	50	Fair Water erosion	0.90	Poor Low strength Wetness Depth to bedrock	0.00 0.00 0.58	Poor Wetness	0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4551D: Calamine-----	50	Fair Water erosion	0.90	Poor Wetness Low strength Depth to bedrock	0.00 0.00 0.58	Poor Wetness Slope	0.00 0.84
Urban land-----	50	Not rated		Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4635:							
Buckney-----	50	Poor Too sandy Droughty Content of organic matter	0.00 0.08 0.12	Good		Poor Too sandy	0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4635B:							
Buckney-----	50	Poor Too sandy Droughty Content of organic matter	0.00 0.08 0.12	Good		Poor Too sandy	0.00
Urban land-----	50	Not rated		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not rated		Not rated		Not rated	
Highway-----	30	Not rated		Not rated		Not rated	
5010:							
Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled, frequently flooded	80	Fair Content of organic matter Carbonate content	0.68 0.80	Good		Good	

Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential as source of reclamation material		Potential as source of roadfill		Potential as source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5507:							
Corvuso-----	55	Fair		Poor		Poor	
		Too clayey	0.02	Low strength	0.00	Wetness	0.00
		Content of	0.12	Wetness	0.00	Too clayey	0.02
		organic matter		Shrink-swell	0.12		
		Carbonate content	0.92				
Brownton-----	35	Fair		Poor		Poor	
		Too clayey	0.12	Wetness	0.00	Wetness	0.00
		Carbonate content	0.99	Low strength	0.00	Too clayey	0.12
				Shrink-swell	0.68	Carbonate content	0.99
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	
SL:							
Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W:							
Water-----	100	Not rated		Not rated		Not rated	

Water Management

The table “Ponds and Embankments” gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings 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 these uses. *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. *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 table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 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).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6: Okoboji, depressional, ponded-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Hard to pack	1.00 1.00 0.25	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
27B: Terril-----	85	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.49	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
34: Estherville-----	90	Very limited Seepage	1.00	Somewhat limited Seepage	0.69	Very limited Depth to water	1.00
34B: Estherville-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.69	Very limited Depth to water	1.00
55: Nicollet-----	75	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.44	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
62F: Storden-----	80	Somewhat limited Seepage Slope	0.70 0.18	Very limited Piping	0.99	Very limited Depth to water	1.00
90: Okoboji, mucky, depressional, ponded-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Hard to pack	1.00 1.00 0.09	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
95: Harps-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
107: Webster-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.21	Somewhat limited Slow refill Cutbanks cave	0.30 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
108: Wadena-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.63	Very limited Depth to water	1.00
108B: Wadena-----	95	Very limited Seepage	1.00	Somewhat limited Seepage	0.63	Very limited Depth to water	1.00
108C: Wadena-----	75	Very limited Seepage	1.00	Somewhat limited Seepage	0.52	Very limited Depth to water	1.00
135: Coland, occasionally flooded-----	85	Somewhat limited Seepage	0.72	Very limited Depth to saturated zone Piping Seepage	1.00 0.15 0.01	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
136: Ankeny, rarely flooded-----	80	Very limited Seepage	1.00	Somewhat limited Seepage	0.05	Very limited Depth to water	1.00
138B: Clarion-----	80	Somewhat limited Seepage	0.70	Very limited Piping	0.99	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
138C2: Clarion, moderately eroded-----	80	Somewhat limited Seepage	0.70	Very limited Piping	0.99	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
201B: Coland-----	50	Somewhat limited Seepage	0.72	Very limited Depth to saturated zone Piping Seepage	1.00 0.15 0.01	Somewhat limited Slow refill Cutbanks cave	0.28 0.10
Terril-----	35	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.49	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
203: Cylinder-----	80	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.10	Very limited Cutbanks cave	1.00

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
227: Wadena, loamy substratum-----	70	Very limited Seepage	1.00	Somewhat limited Seepage	0.63	Very limited Depth to water	1.00
227B: Wadena, loamy substratum-----	70	Very limited Seepage	1.00	Somewhat limited Seepage	0.63	Very limited Depth to water	1.00
228: Cylinder, loamy substratum-----	70	Very limited Seepage	1.00	Very limited Depth to saturated zone Piping Seepage	1.00 0.99 0.10	Very limited Cutbanks cave	1.00
236D: Lester-----	80	Somewhat limited Seepage Slope	0.70 0.01	Somewhat limited Piping	0.46	Very limited Depth to water	1.00
236E: Lester-----	85	Somewhat limited Seepage Slope	0.70 0.04	Somewhat limited Piping	0.46	Very limited Depth to water	1.00
236F: Lester-----	80	Somewhat limited Seepage Slope	0.70 0.18	Somewhat limited Piping	0.46	Very limited Depth to water	1.00
259: Biscay-----	85	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.47	Very limited Cutbanks cave	1.00
262G: Lester-----	60	Somewhat limited Slope Seepage	0.99 0.70	Somewhat limited Piping	0.46	Very limited Depth to water	1.00
Belview-----	20	Somewhat limited Slope Seepage	0.97 0.72	Somewhat limited Piping	0.73	Very limited Depth to water	1.00
274: Rolfe, depression, ponded-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding	1.00 1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
278: Biscay, loamy substratum-----	70	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.08	Very limited Cutbanks cave	1.00
307: Dundas-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.72	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
315B: Udifluvents, occasionally flooded-----	80	Very limited Seepage	1.00	Not limited		Very limited Depth to water	1.00
323B: Fort Dodge-----	90	Very limited Seepage	1.00	Somewhat limited Piping Seepage	0.92 0.10	Very limited Depth to water	1.00
325: Le Sueur-----	90	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.90	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
338: Garmore-----	100	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.54	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
342: Estherville, loamy substratum-----	70	Very limited Seepage	1.00	Somewhat limited Seepage	0.52	Very limited Depth to water	1.00
342B: Estherville, loamy substratum-----	70	Very limited Seepage	1.00	Somewhat limited Seepage	0.52	Very limited Depth to water	1.00
344B: Copaston-----	80	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer	1.00	Very limited Depth to water	1.00
345: Copaston-----	35	Very limited Seepage Depth to bedrock	1.00 1.00	Very limited Thin layer	1.00	Very limited Depth to water	1.00

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
345: Jacwin-----	25	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.46	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
355: Luther-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.72	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
383: Marna-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
385: Guckeen-----	75	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.01	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
386: Cordova-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.09	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
387B: Kamrar-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	0.99	Somewhat limited Slow refill Cutbanks cave Depth to saturated zone	0.30 0.10 0.01
413G: Gosport-----	25	Somewhat limited Slope Depth to bedrock	0.72 0.11	Very limited Depth to saturated zone Thin layer Hard to pack	0.99 0.86 0.28	Very limited Slow refill Cutbanks cave Depth to saturated zone	1.00 0.10 0.01
Emeline-----	25	Very limited Depth to bedrock Slope Seepage	1.00 0.28 0.05	Very limited Thin layer Piping	1.00 0.92	Very limited Depth to water	1.00
Ridgeton-----	25	Somewhat limited Seepage Slope	0.70 0.59	Somewhat limited Piping	0.51	Very limited Depth to water	1.00
457: Du Page, occasionally flooded-----	85	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.90	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.28 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
485: Spillville, occasionally flooded-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.72	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
485B: Spillville, rarely flooded-----	85	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.72	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
506: Wacousta, depressional, ponded-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Piping	1.00 1.00 0.18	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
507: Canistee-----	75	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.55	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
511: Blue Earth, depressional, ponded-----	85	Somewhat limited Seepage	0.70	Very limited Organic matter content Depth to saturated zone Ponding	1.00 1.00 1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
526: Wacousta, mucky, depressional, ponded-----	90	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Piping	1.00 1.00 0.12	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
536: Hanlon, occasionally flooded-----	80	Very limited Seepage	1.00	Somewhat limited Seepage	0.03	Somewhat limited Depth to saturated zone Cutbanks cave	0.81 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
541C: Estherville-----	45	Very limited Seepage	1.00	Somewhat limited Seepage	0.69	Very limited Depth to water	1.00
Hawick-----	45	Very limited Seepage	1.00	Somewhat limited Seepage	0.50	Very limited Depth to water	1.00
551B: Calamine-----	85	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.11	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
551D: Calamine-----	55	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.11	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
559: Talcot-----	85	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.75	Very limited Cutbanks cave	1.00
561: Talcot, loamy substratum-----	70	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.47	Very limited Cutbanks cave	1.00
566C: Moingona-----	90	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.38	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
568D: Cokato-----	80	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.24	Very limited Depth to water	1.00
568E: Cokato-----	80	Somewhat limited Seepage Slope	0.70 0.03	Somewhat limited Piping	0.24	Very limited Depth to water	1.00
583: Minnetonka-----	90	Somewhat limited Seepage	0.57	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.43 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
606: Lanyon, depressional, ponded-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Hard to pack	1.00 1.00 0.64	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
625: Lerdal-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
636: Buckney, rarely flooded-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
636B: Buckney, rarely flooded-----	90	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
638C2: Clarion, moderately eroded-----	50	Somewhat limited Seepage	0.70	Very limited Piping	0.99	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
Storden, moderately eroded-----	35	Somewhat limited Seepage	0.70	Very limited Piping	0.99	Very limited Depth to water	1.00
650: Joliet-----	45	Very limited Depth to bedrock Seepage	1.00 0.02	Very limited Depth to saturated zone Thin layer Piping	1.00 1.00 0.68	Very limited Depth to hard bedrock Slow refill Cutbanks cave	1.00 0.28 0.10
Faxon-----	45	Very limited Seepage Depth to bedrock	1.00 0.85	Very limited Depth to saturated zone Thin layer Piping	1.00 0.85 0.05	Very limited Depth to hard bedrock Cutbanks cave	1.00 0.10
715: Fluvaquents, frequently flooded	65	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage	1.00 0.42	Very limited Cutbanks cave	1.00

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
735: Havelock, occasionally flooded-----	85	Very limited Seepage	1.00	Very limited Depth to saturated zone Seepage Piping	1.00 0.03 0.03	Somewhat limited Cutbanks cave	0.10
740D: Hawick-----	80	Very limited Seepage Slope	1.00 0.01	Somewhat limited Seepage	0.50	Very limited Depth to water	1.00
775B: Billett-----	90	Very limited Seepage	1.00	Somewhat limited Seepage	0.08	Very limited Depth to water	1.00
775C: Billett-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.08	Very limited Depth to water	1.00
777B: Wapsie-----	85	Very limited Seepage	1.00	Somewhat limited Seepage	0.41	Very limited Depth to water	1.00
835D2: Storden, moderately eroded-----	50	Somewhat limited Seepage Slope	0.70 0.01	Very limited Piping	0.99	Very limited Depth to water	1.00
Omsrud, moderately eroded-----	35	Somewhat limited Seepage Slope	0.70 0.01	Somewhat limited Piping	0.81	Very limited Depth to water	1.00
835E2: Storden, moderately eroded-----	50	Somewhat limited Seepage Slope	0.70 0.04	Very limited Piping	0.99	Very limited Depth to water	1.00
Omsrud, moderately eroded-----	35	Somewhat limited Seepage Slope	0.70 0.04	Somewhat limited Piping	0.81	Very limited Depth to water	1.00
836B: Kilkenny-----	65	Somewhat limited Seepage	0.70	Not limited		Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
854D: Fens, Aquolls-----	80	Very limited Seepage	1.00	Not rated		Somewhat limited Cutbanks cave	0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
855: Shorewood-----	85	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
956: Harps-----	45	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Okoboji, depressional, ponded-----	35	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Ponding Hard to pack	1.00 1.00 0.25	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
1007: Cosmos, bouldery---	65	Not limited		Very limited Depth to saturated zone Hard to pack	1.00 0.59	Very limited Slow refill Cutbanks cave	1.00 0.10
1055B: Kandiyohi, bouldery	65	Somewhat limited Seepage	0.05	Very limited Depth to saturated zone Hard to pack	1.00 0.53	Somewhat limited Slow refill Cutbanks cave	0.95 0.10
1138B: Clarion-----	65	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.94	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
1236B: Angus-----	85	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.42	Very limited Depth to water	1.00
1236C: Angus-----	80	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.42	Very limited Depth to water	1.00
1259: Biscay, depressional, ponded-----	80	Very limited Seepage	1.00	Very limited Depth to saturated zone Ponding Seepage	1.00 1.00 0.47	Very limited Cutbanks cave	1.00
1507: Brownton-----	80	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Hard to pack	1.00 0.15	Somewhat limited Slow refill Cutbanks cave	0.30 0.10

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1555: Nicollet-----	40	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.44	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Guckeen-----	25	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.01	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
1836B: Kilkenny-----	65	Somewhat limited Seepage	0.70	Not limited		Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
Shorewood-----	25	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone	1.00	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
2700C: Ridgeton-----	75	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.51	Very limited Depth to water	1.00
2700D: Ridgeton-----	80	Somewhat limited Seepage Slope	0.70 0.01	Somewhat limited Piping	0.51	Very limited Depth to water	1.00
4000: Urban land-----	100	Not rated		Not rated		Not rated	
4055: Nicollet-----	50	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.44	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	50	Not limited		Not rated		Not rated	
4107: Webster-----	60	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.21	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	40	Not limited		Not rated		Not rated	
4138B: Clarion-----	50	Somewhat limited Seepage	0.70	Very limited Piping	0.99	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.30 0.10
Urban land-----	30	Not limited		Not rated		Not rated	

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4235B: Angus-----	60	Somewhat limited Seepage	0.70	Somewhat limited Piping	0.42	Very limited Depth to water	1.00
Urban land-----	40	Not limited		Not rated		Not rated	
4236D: Lester-----	50	Somewhat limited Seepage Slope	0.70 0.01	Somewhat limited Piping	0.46	Very limited Depth to water	1.00
Urban land-----	50	Somewhat limited Slope	0.01	Not rated		Not rated	
4325: Le Sueur-----	60	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.90	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	40	Not limited		Not rated		Not rated	
4444: Jacwin-----	50	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.46	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	50	Not limited		Not rated		Not rated	
4507: Canistee-----	50	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Piping	1.00 0.55	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	50	Not limited		Not rated		Not rated	
4551B: Calamine-----	50	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.11	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	50	Not limited		Not rated		Not rated	
4551D: Calamine-----	50	Somewhat limited Seepage Depth to bedrock	0.70 0.01	Very limited Depth to saturated zone Thin layer	1.00 0.11	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
Urban land-----	50	Not limited		Not rated		Not rated	
4635: Buckney-----	50	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
Urban land-----	50	Not limited		Not rated		Not rated	

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4635B:							
Buckney-----	50	Very limited Seepage	1.00	Somewhat limited Seepage	0.06	Very limited Depth to water	1.00
Urban land-----	50	Not limited		Not rated		Not rated	
4946B:							
Udorthents-----	70	Not limited		Not rated		Not rated	
Highway-----	30	Not limited		Not rated		Not rated	
5010:							
Pits, sand and gravel-----	100	Not rated		Not rated		Not rated	
5030:							
Pits, limestone quarries-----	100	Not rated		Not rated		Not rated	
5035:							
Pits, gypsum quarries-----	100	Not rated		Not rated		Not rated	
5040:							
Udorthents, loamy---	100	Not rated		Not rated		Not rated	
5049:							
Aquolls, ponded----	60	Not rated		Not rated		Not rated	
Udorthents, loamy---	30	Not rated		Not rated		Not rated	
5060:							
Pits, clay-----	100	Not rated		Not rated		Not rated	
5080:							
Udorthents-----	100	Not rated		Not rated		Not rated	
5457:							
Du Page, channeled, frequently flooded	80	Somewhat limited Seepage	0.72	Somewhat limited Piping	0.90	Somewhat limited Depth to saturated zone Slow refill Cutbanks cave	0.81 0.28 0.10
5507:							
Corvuso-----	55	Somewhat limited Seepage	0.02	Very limited Depth to saturated zone Hard to pack	1.00 0.38	Somewhat limited Slow refill Cutbanks cave	0.98 0.10
Brownton-----	35	Somewhat limited Seepage	0.70	Very limited Depth to saturated zone Hard to pack	1.00 0.15	Somewhat limited Slow refill Cutbanks cave	0.30 0.10
AW:							
Animal waste lagoon	100	Not rated		Not rated		Not rated	

Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SL: Sewage lagoon-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Properties

The table described in this section gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary in Part I.

Classification of the soils is determined according to the Unified soil classification system (ASTM) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487–00.

Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
6: Okoboji, depressional, ponded-----	0-6	Silty clay loam	OH	A-7-6	0	0	100	100	95-100	91-96	64-76	24-28
	6-32	Silty clay loam	MH	A-7-5	0	0	100	100	95-100	91-96	51-69	25-28
	32-56	Silty clay loam, silty clay	CH	A-7-6	0	0	100	100	95-100	90-97	46-59	25-30
	56-60	Loam, silty clay loam	CL	A-6	0	0-4	95-100	84-100	79-100	70-93	35-46	17-25
27B: Terril-----	0-9	Loam	CL	A-6	0	0-5	94-100	89-100	75-97	55-74	33-47	11-21
	9-36	Clay loam, loam	CL	A-6	0	0-5	94-100	89-100	75-99	55-76	29-47	12-22
	36-50	Loam, clay loam	CL	A-7, A-6	0	0-5	95-100	84-100	74-94	56-73	35-42	16-21
	50-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
34: Estherville----	0-7	Sandy loam	SM, SC, SC-SM	A-2, A-4, A- 2-4	0	0-5	89-100	70-100	51-82	24-45	19-32	2-10
	7-18	Sandy loam, loam, coarse sandy loam	SC-SM, SC	A-4, A-2, A- 2-4	0	0-4	87-100	70-100	51-81	25-43	21-31	6-12
	18-80	Gravelly coarse sand, very gravelly sand, loamy coarse sand	SP, SM, SP-SM	A-1-b	0	0-7	66-92	35-92	16-48	2-13	0-21	NP-4
34B: Estherville----	0-7	Sandy loam	SC, SC-SM, SM	A-2, A-2-4, A-4	0	0-5	89-100	70-100	51-82	24-45	19-32	2-10
	7-18	Sandy loam, loam, coarse sandy loam	SC, SC-SM	A-2, A-2-4, A-4	0	0-4	87-100	70-100	51-81	25-43	21-31	6-12
	18-80	Gravelly coarse sand, very gravelly sand, loamy coarse sand	SM, SP, SP-SM	A-1-b	0	0-7	66-92	35-92	16-48	2-13	0-21	NP-4
55: Nicollet-----	0-10	Loam, clay loam	ML	A-7-6	0	0-5	94-100	82-100	68-93	50-70	39-49	11-18
	10-17	Clay loam, loam	CL	A-7-6	0	0-5	94-100	82-100	68-93	52-73	36-50	13-21
	17-36	Clay loam, loam	CL	A-6	0	0-5	94-100	83-100	66-93	50-73	27-44	11-21
	36-60	Loam, sandy loam	CL-ML, SC-SM, SC, CL	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
62F:												
Storden-----	0-7	Loam	CL, ML	A-4, A-6	0	0-5	94-100	89-100	76-94	56-71	30-40	5-15
	7-55	Loam, clay loam	CL, CL-ML	A-4, A-6	0-1	0-4	95-100	81-100	68-96	50-73	20-40	5-15
	55-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
90:												
Okoboji, mucky, depressional, ponded-----	0-8	Mucky silty clay loam	OH	A-7-5	0	0	100	100	91-100	80-90	55-77	12-20
	8-20	Silty clay loam, silty clay	MH	A-7-5	0	0	100	100	95-100	91-98	53-73	25-29
	20-40	Silty clay loam, silty clay	CH	A-7-6	0	0	100	100	95-100	90-97	49-61	25-30
	40-60	Loam, silty clay loam	CL	A-7-6	0	0-4	95-100	84-100	79-100	70-93	37-49	17-25
95:												
Harps-----	0-8	Loam, clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-45	10-25
	8-16	Loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-45	10-25
	16-42	Loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-60	15-35
	42-60	Loam	CL	A-6	0	0-5	95-100	90-100	70-80	50-75	25-40	10-25
107:												
Webster-----	0-8	Silty clay loam	CH, CL, MH	A-7, A-6	0	0-5	94-100	89-100	85-100	76-94	35-60	15-30
	8-16	Silty clay loam	CH, CL, ML	A-7, A-6, A- 7-6	0	0-5	94-100	89-100	85-100	76-94	35-60	15-30
	16-32	Clay loam, loam	CL	A-7, A-6, A- 7-6	0	0-5	95-100	89-100	77-96	60-77	39-51	17-25
	32-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
108:												
Wadena-----	0-8	Loam	CL	A-6	0	0	95-100	84-100	72-94	53-71	33-45	11-18
	8-13	Loam	CL	A-6	0	0	95-100	84-100	72-94	53-71	31-43	11-18
	13-30	Loam	CL, SC	A-6	0	0	95-100	77-100	64-93	47-70	29-41	12-19
	30-80	Stratified very gravelly coarse sand to sand	SP, SP-SM	A-1-b	0-2	0-3	63-100	19-100	15-80	2-14	0-19	NP-2
108B:												
Wadena-----	0-7	Loam	ML, CL	A-6	0	0	95-100	84-100	72-94	53-71	33-45	11-18
	7-10	Loam	ML, CL	A-6	0	0	95-100	84-100	72-94	53-71	31-43	11-18
	10-25	Loam	CL, SC	A-6	0	0	95-100	77-100	64-93	47-70	29-41	12-19
	25-80	Stratified very gravelly coarse sand to sand	SP-SM, SP, SW-SM	A-1-b	0-2	0-3	63-100	19-100	8-48	2-13	0-19	NP-2

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
108C:												
Wadena-----	0-7	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	7-10	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	10-25	Loam	SM, ML, CL, SC	A-4	0	0	95-100	77-100	64-93	47-70	25-40	5-12
	25-80	Stratified very gravelly coarse sand to sand	SP-SM, SP	A-1	0-2	0-3	63-100	19-100	15-80	2-14	---	NP
135:												
Coland, occasionally flooded-----	0-8	Clay loam, silty clay loam	ML, MH	A-7-5, A-7-6	0	0	100	100	95-100	84-92	47-59	18-24
	8-32	Silty clay loam, clay loam	CL	A-7, A-6, A- 7-6	0	0	100	100	95-100	84-92	35-50	15-25
	32-40	Clay loam	ML, MH	A-7, A-7-5	0	0	100	100	91-94	76-79	45-53	18-21
	40-44	Sandy loam, loam	SC-SM, SC	A-2-4, A-2-6, A-4	0	0	95-100	87-100	65-85	35-50	23-36	7-15
	44-52	Sandy clay loam, loam, sandy loam	CL	A-6	0	0	100	95-100	79-97	59-75	25-41	9-19
	52-60	Sandy loam, loam	SC-SM, SC	A-2-4, A-2-6, A-4	0	0	95-100	87-100	65-85	35-50	23-36	7-15
136:												
Ankeny, rarely flooded-----	0-7	Fine sandy loam	SC-SM, SC	A-6, A-4, A- 2-4	0	0-4	95-100	90-100	80-97	35-47	25-34	6-11
	7-30	Fine sandy loam	SC-SM, SC	A-6, A-2-4, A-4	0	0-4	95-100	90-100	80-97	35-47	25-34	6-11
	30-44	Fine sandy loam, sandy loam	SC, SC-SM	A-4, A-2-4	0	0-4	95-100	90-100	81-96	35-45	21-27	6-10
	44-60	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-2-4	0	0-4	95-100	91-100	82-98	22-32	0-21	NP-6
138B:												
Clarion-----	0-7	Loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	7-18	Loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	18-36	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	69-94	52-73	25-40	5-15
	36-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
138C2: Clarion, moderately eroded-----	0-6	Loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	6-16	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	16-35	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	35-60	Loam, sandy loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
201B: Coland-----	0-8	Clay loam, silty clay loam	ML, MH	A-7-5, A-7-6	0	0	100	100	95-100	84-92	47-59	18-24
	8-32	Silty clay loam, clay loam	CL	A-7, A-6, A- 7-6	0	0	100	100	95-100	84-92	35-50	15-25
	32-40	Clay loam	ML, MH	A-7, A-7-5	0	0	100	100	91-94	76-79	45-53	18-21
	40-44	Sandy loam, loam	SC-SM, SC	A-2-4, A-2-6, A-4	0	0	95-100	87-100	65-85	35-50	23-36	7-15
	44-52	Sandy clay loam, loam, sandy loam	CL	A-6	0	0	100	95-100	79-97	59-75	25-41	9-19
	52-60	Sandy loam, loam	SC-SM, SC	A-2-4, A-2-6, A-4	0	0	95-100	87-100	65-85	35-50	23-36	7-15
Terril-----	0-9	Loam	CL	A-6	0	0-5	94-100	89-100	75-97	55-74	33-47	11-21
	9-36	Clay loam, loam	CL	A-6	0	0-5	94-100	89-100	75-99	55-76	29-47	12-22
	36-50	Loam, clay loam	CL	A-7, A-6	0	0-5	95-100	84-100	74-94	56-73	35-42	16-21
	50-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
203: Cylinder-----	0-8	Loam	ML	A-7-6	0	0	100	89-100	75-92	55-70	37-47	12-18
	8-18	Loam, clay loam	CL	A-6	0	0	100	89-100	75-92	55-70	32-43	12-18
	18-28	Clay loam, loam	SC, CL	A-6	0	0	95-100	78-100	63-92	46-70	29-43	12-21
	28-80	Very gravelly loamy sand, loamy sand, coarse sand	SM, SP-SM, SP-SC	A-1-b, A-3, A-2	0	0-7	72-97	49-97	35-80	7-24	0-23	NP-7
227: Wadena, loamy substratum-----	0-7	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	7-16	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	16-23	Loam	SM, ML, CL, SC	A-4	0	0	95-100	77-100	64-93	47-70	25-40	5-12
	23-30	Loam, sandy loam	SM, ML, CL, SC	A-4	0	0	95-100	77-100	64-93	47-70	25-40	5-12
	30-62	Gravelly coarse sand	GP, GP-GM, SP, SP-SM	A-1	0-2	0-3	63-100	19-100	---	---	---	NP
	62-80	Loam, clay loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
227B: Wadena, loamy substratum-----	0-7	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	7-16	Loam	ML	A-4	0	0	95-100	84-100	72-94	53-71	25-40	2-10
	16-23	Loam	SM, ML, CL, SC	A-4	0	0	95-100	77-100	64-93	47-70	25-40	5-12
	23-30	Loam, sandy loam	SM, ML, CL, SC	A-4	0	0	95-100	77-100	64-93	47-70	25-40	5-12
	30-62	Gravelly coarse sand	GP, GP-GM, SP, SP-SM	A-1	0-2	0-3	63-100	19-100	---	---	---	NP
	62-80	Loam, clay loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25
228: Cylinder, loamy substratum-----	0-12	Loam	CL	A-6	0	0	100	89-100	78-92	58-70	30-40	10-20
	12-20	Loam, clay loam	CL	A-6	0	0	100	89-100	78-92	58-70	30-40	10-20
	20-34	Loam, clay loam	SC, CL	A-6	0	0	95-100	78-100	66-93	49-71	30-40	10-20
	34-63	Very gravelly loamy sand, loamy sand, coarse sand	SM, SP-SM	A-1, A-3, A-2	0	0-7	72-97	49-97	35-80	7-24	0-14	NP
	63-80	Loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25
236D: Lester-----	0-7	Loam	CL	A-4, A-6	0	0-5	94-100	83-100	72-93	53-71	30-40	5-15
	7-38	Clay loam, loam	CL	A-6, A-7-6	0-1	0-4	95-100	85-100	73-94	56-75	35-45	16-23
	38-60	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
236E: Lester-----	0-7	Loam	CL	A-4, A-6	0	0-5	94-100	83-100	72-93	53-71	30-40	5-15
	7-38	Clay loam, loam	CL	A-6, A-7-6	0-1	0-4	95-100	85-100	73-94	56-75	35-45	16-23
	38-60	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
236F: Lester-----	0-7	Loam	CL	A-4, A-6	0	0-5	94-100	83-100	72-93	53-71	30-40	5-15
	7-38	Clay loam, loam	CL	A-6, A-7-6	0-1	0-4	95-100	85-100	73-94	56-75	35-45	16-23
	38-60	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
259:												
Biscay-----	0-7	Clay loam, loam	CL, ML, MH	A-6, A-7	0	0	94-100	88-100	77-93	60-73	35-50	10-25
	7-20	Loam, clay loam	CL, ML	A-6, A-7, A-7-6	0	0	94-100	88-100	79-94	60-73	37-53	17-21
	20-28	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0	0	94-100	83-100	70-96	51-73	30-43	12-21
	28-38	Gravelly loam, sandy loam, gravelly sandy loam	SC-SM, SC	A-4, A-6	0	0-4	95-100	64-100	51-98	35-73	20-38	6-19
	38-80	Very gravelly coarse sand	SP, SP-SM, SW-SM	A-1-b	0	0-3	63-95	23-95	10-47	2-15	0-20	NP-3
262G:												
Lester-----	0-7	Loam	CL	A-4, A-6	0	0-5	94-100	83-100	72-93	53-71	30-40	5-15
	7-38	Clay loam, loam	CL	A-6, A-7-6	0-1	0-4	95-100	85-100	73-94	56-75	35-45	16-23
	38-60	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Belview-----												
	0-9	Loam	ML, CL	A-6	0	0-5	94-100	89-100	76-94	56-71	33-47	11-18
	9-50	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	50-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
274:												
Rolfe, depressional, ponded-----	0-10	Silt loam	OL, CL, ML	A-6, A-4	0	0	100	94-100	88-98	75-84	30-40	5-15
	10-21	Silt loam	OL, CL, ML	A-6, A-4	0	0	100	94-100	84-100	71-92	30-40	5-15
	21-55	Clay, silty clay, clay loam	CH	A-7-6	0	0	100	95-100	90-100	86-98	49-57	27-33
	55-80	Clay loam, loam	CL	A-6, A-7	0	0	95-100	86-100	73-97	57-78	34-46	16-25
278:												
Biscay, loamy substratum-----	0-7	Loam, clay loam	ML, CL	A-6, A-7	0	0	94-100	88-100	74-97	56-76	35-50	10-25
	7-22	Loam, clay loam, sandy clay loam	CL, ML	A-7	0	0	95-100	90-100	70-90	50-75	42-54	17-22
	22-36	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0	0	95-100	90-100	70-90	50-75	35-44	17-22
	36-56	Gravelly loamy sand	SP-SM, GP-GM	A-1	0	0-4	63-95	23-95	17-77	6-30	---	NP
	56-74	Gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1	0	0-5	45-95	35-95	20-45	2-10	0-20	NP-3
	74-80	Loam, clay loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
307:												
Dundas-----	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	94-100	80-100	65-86	26-47	6-19
	9-15	Loam	CL	A-6	0	0-5	95-100	84-100	72-92	51-68	26-34	9-15
	15-40	Clay loam, silty clay loam, sandy clay loam	CL	A-6, A-7	0	0-1	97-100	86-100	72-98	55-79	31-47	13-25
	40-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
315B:												
Udifluvents, occasionally flooded-----	0-8	Variable	SC-SM, CL-ML	A-4	0	0	100	95-100	81-98	38-54	19-34	2-12
	8-60	Stratified sandy loam to silt loam	SC-SM, CL-ML	A-4	0	0	100	95-100	67-84	40-55	16-30	2-12
323B:												
Fort Dodge-----	0-39	Loam	CL	A-4, A-6	0	0-5	100	94-100	82-93	60-70	25-40	8-15
	39-58	Loam, clay loam	CL	A-4, A-6	0	0-4	100	90-100	77-94	58-72	25-40	8-15
	58-80	Loamy coarse sand, sand, coarse sand, gravelly sand	SM	A-2-4	0	0-8	91-100	81-100	47-64	20-31	25-40	8-15
325:												
Le Sueur-----	0-17	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	90-100	80-95	50-65	25-40	5-15
	17-37	Clay loam	CL, CL-ML	A-6, A-4	0	0	95-100	95-100	90-100	70-85	20-40	5-15
	37-46	Loam	CL	A-7, A-6	0	0	95-100	95-100	85-100	60-80	35-50	15-25
	46-80	Loam	CL-ML, CL	A-6, A-4	0-1	0-5	95-100	90-100	80-95	55-75	20-40	5-20
338:												
Garmore-----	0-6	Loam	CL, CL-ML, ML	A-6, A-4	0	0-5	95-100	84-100	73-92	55-70	25-40	5-20
	6-17	Loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	84-100	73-92	55-70	25-40	5-20
	17-21	Loam, clay loam, silt loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	84-100	71-93	55-73	25-40	5-20
	21-49	Loam, clay loam	CL	A-6	0	0-4	95-100	85-100	74-93	57-73	34-42	16-21
	49-80	Loam	CL, CL-ML	A-4, A-6	0	0-4	95-100	85-100	74-92	55-70	25-40	5-15
342:												
Estherville, loamy substratum-----	0-7	Sandy loam	SM, SC, SC-SM	A-2, A-4	0	0-5	89-100	70-100	51-82	24-45	20-30	2-10
	7-15	Sandy loam, loam, coarse sandy loam	SM, SC-SM, SC	A-4, A-2	0	0-4	87-100	70-100	51-81	25-43	20-30	2-8
	15-75	Gravelly sand, loamy sand, gravelly coarse sand, loamy coarse sand	SP, SM, SP-SM	A-1	0	0-7	66-92	35-92	16-48	2-13	---	NP
	75-80	Loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In			Pct	Pct					Pct
342B: Estherville, loamy substratum-----	0-7	Sandy loam	SM, SC, SC-SM	A-2, A-4	0	0-5	89-100	70-100	51-82	24-45	20-30	2-10
	7-15	Sandy loam, loam, coarse sandy loam	SM, SC-SM, SC	A-4, A-2	0	0-4	87-100	70-100	51-81	25-43	20-30	2-8
	15-75	Gravelly sand, loamy sand, gravelly coarse sand, loamy coarse sand	SP, SM, SP-SM	A-1	0	0-7	66-92	35-92	16-48	2-13	---	NP
	75-80	Loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25
344B: Copaston-----	0-7	Loam	SC	A-6, A-7-6	0	0-4	95-100	71-100	53-90	30-58	28-49	9-20
	7-11	Fine sandy loam	SC	A-2, A-4, A-6	0	0-4	95-100	73-100	66-97	31-48	25-33	9-13
	11-18	Sandy loam	SC	A-4, A-2-6	0-1	0-4	91-100	69-100	51-90	26-53	24-40	9-21
	18-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
345: Copaston-----	0-7	Loam	SC	A-7-6, A-6	0	0-4	95-100	71-100	53-90	30-58	28-49	9-20
	7-11	Fine sandy loam	SC	A-6, A-2, A-4	0	0-4	95-100	73-100	66-97	31-48	25-33	9-13
	11-18	Sandy loam	SC	A-2-6, A-4	0-1	0-4	91-100	69-100	51-90	26-53	24-40	9-21
	18-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Jacwin-----	0-7	Silty clay loam, loam, silt loam	MH, ML	A-7-6, A-7-5	0	0	100	100	88-98	72-82	41-53	14-22
	7-13	Loam, silty clay loam, silt loam	MH, ML	A-7-5, A-7-6	0	0	100	100	89-99	72-82	41-53	15-22
	13-24	Sandy clay loam, loam, clay loam	CL	A-6, A-7-6	0	1-4	95-100	85-100	71-95	54-75	31-46	13-22
	24-37	Clay, silty clay	CH	A-7-6	0	0	100	100	88-100	86-100	51-73	29-45
	37-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
355: Luther-----	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	94-100	80-100	65-86	26-47	6-19
	9-15	Loam	CL	A-6	0	0-5	95-100	84-100	72-92	51-68	26-34	9-15
	15-40	Clay loam, silty clay loam, sandy clay loam	CL	A-6, A-7	0	0-1	97-100	86-100	72-98	55-79	31-47	13-25
	40-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
383: Marna-----	0-20	Silty clay loam	MH	A-7, A-7-5	0	0	94-100	83-100	78-100	75-100	53-76	25-35
	20-32	Clay, silty clay, silty clay loam	CH	A-7, A-7-6	0	0	95-100	84-100	66-100	56-92	46-70	25-44
	32-41	Silty clay loam, clay loam	CL	A-7, A-7-6	0	0	90-100	80-100	70-94	54-74	38-47	19-25
	41-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
385:												
Guckeen-----	0-15	Silty clay loam	MH	A-7, A-7-5	0	0	100	94-100	90-100	86-96	53-63	25-28
	15-24	Silty clay, silty clay loam, clay	CH	A-7, A-7-6	0	0	100	94-100	87-100	83-100	46-63	25-36
	24-30	Clay loam, loam	CL	A-6, A-7, A- 7-6	0	0-4	90-100	81-100	68-100	52-89	35-59	17-36
	30-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
386:												
Cordova-----	0-18	Clay loam	MH, ML, CL, OH	A-7, A-7-5	0	0	94-100	89-100	80-93	62-73	45-55	18-21
	18-38	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	90-100	80-100	70-94	54-74	39-53	19-25
	38-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
387B:												
Kamrar-----	0-15	Clay loam, silty clay loam	CH	A-7-6	0	0	94-100	88-100	84-100	81-96	50-58	24-28
	15-32	Silty clay loam, clay, clay loam	CH, CL	A-7-6	0	0	89-100	78-100	72-100	64-97	45-64	25-36
	32-54	Clay loam, clay, silty clay	CH, CL	A-7, A-7-6	0	0	89-100	78-100	65-99	49-79	36-55	16-28
	54-80	Clay loam, loam	CL	A-6, A-7	0	0-4	90-100	76-100	65-95	48-73	31-42	13-21
413G:												
Gospport-----	0-7	Silt loam, loam, silty clay loam	CL	A-7-6	0	0	100	89-100	82-98	70-84	37-45	15-19
	7-27	Clay, silty clay, silty clay loam	CH	A-7-6	0	0	100	90-100	79-100	76-100	46-69	26-44
	27-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Emeline-----	0-9	Silt loam, clay loam, loam	CL	A-6	0	0-11	81-100	62-100	50-96	35-72	27-44	7-18
	9-80	Bedrock	---	---	---	---	---	---	---	---	---	---
Ridgeton-----	0-29	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	29-38	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	38-50	Clay loam, loam	CL	A-7, A-6	0	0-4	95-100	85-100	74-94	55-72	30-41	15-21
	50-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
457: Du Page, occasionally flooded-----	0-30	Silt loam	CL, ML	A-6, A-7-6	0	0	95-100	83-100	76-100	68-91	33-47	11-18
	30-35	Sandy loam, loam, gravelly sandy clay loam, silt loam	CL, ML	A-6, A-7-6	0	0	90-100	61-100	53-95	39-73	28-43	12-18
	35-80	Stratified silt loam to gravelly sandy clay loam	CL, CL-ML, ML, SC, SC- SM	A-4, A-6	0	0	86-100	55-100	47-100	36-83	17-36	3-16
485: Spillville, occasionally flooded-----	0-20	Loam	ML	A-7-6	0	0	100	95-100	80-93	58-70	36-48	11-17
	20-54	Loam	CL	A-6	0	0	100	95-100	80-93	58-70	29-44	12-18
	54-80	Sandy clay loam, loam, sandy loam	SC-SM, CL	A-4, A-6	0	0	100	95-100	80-94	56-69	25-38	9-16
485B: Spillville, rarely flooded	0-20	Loam	ML	A-7-6	0	0	100	95-100	80-93	58-70	36-48	11-17
	20-54	Loam	CL	A-6	0	0	100	95-100	80-93	58-70	29-44	12-18
	54-80	Sandy clay loam, loam, sandy loam	SC-SM, CL	A-4, A-6	0	0	100	95-100	80-94	56-69	25-38	9-16
506: Wacousta, depressional, ponded-----	0-9	Silty clay loam	MH	A-7-5	0	0	100	100	95-100	91-99	54-66	18-24
	9-14	Silty clay loam	MH	A-7-5	0	0	100	100	95-100	91-99	51-64	18-24
	14-16	Silty clay loam, silt loam	CH, CL	A-7-6	0	0	100	100	93-100	89-100	38-53	16-25
	16-80	Silt loam, silty clay loam	CL	A-6	0	0-5	94-100	89-100	83-100	78-100	27-42	12-21
507: Canistee-----	0-10	Clay loam	ML, OL, MH	A-7-5	0	0	94-100	88-100	77-95	59-75	47-59	18-24
	10-18	Clay loam	ML, OL, CL	A-7	0	0	94-100	88-100	77-95	59-75	40-50	15-20
	18-39	Clay loam, loam, silty clay loam	CL	A-7-6, A-6	0	0	98-100	88-100	75-100	57-80	35-53	13-25
	39-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth In	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
511: Blue Earth, depressional, ponded-----					Pct	Pct						
	0-10	Mucky silt loam	OH	A-7-5	0	0	87-100	75-100	69-100	66-100	50-95	11-21
	10-68	Mucky silty clay loam, mucky silt loam	OH	A-7-5	0	0	90-100	54-100	48-100	45-99	49-93	11-20
	68-80	Mucky silty clay loam, mucky silt loam	CL	A-7, A-6	0	0	95-100	85-100	75-100	71-98	29-44	12-23
526: Wacousta, mucky, depressional, ponded-----												
	0-7	Mucky silt loam	MH	A-7-5	0	0	100	100	95-100	91-99	54-66	18-24
	7-14	Silty clay loam	MH	A-7-5	0	0	100	100	95-100	91-99	51-64	18-24
	14-27	Silty clay loam, silt loam	CH, CL	A-7-6	0	0	100	100	93-100	89-100	38-53	16-25
	27-80	Silt loam, silty clay loam	CL	A-6	0	0-5	94-100	89-100	83-100	78-100	28-41	12-21
536: Hanlon, occasionally flooded-----												
	0-7	Fine sandy loam	SC, SM, SC-SM	A-4	0	0	100	100	90-96	41-47	26-35	7-12
	7-50	Sandy loam, fine sandy loam	SC-SM, SC	A-4	0	0	100	100	90-96	41-47	24-33	7-12
	50-69	Loamy fine sand, fine sandy loam, sandy loam	SC-SM, SC	A-4, A-2	0	0	100	100	75-80	25-40	15-25	5-10
	69-80	Loamy sand, loam, sandy loam	SC-SM, SC	A-4, A-2, A-6	0	0	100	100	70-86	32-48	0-31	NP-12
541C: Estherville-----												
	0-7	Sandy loam	SM, SC, SC-SM	A-2, A-4, A- 2-4	0	0-5	89-100	70-100	51-82	24-45	19-32	2-10
	7-18	Sandy loam, loam, coarse sandy loam	SC-SM, SC	A-4, A-2, A- 2-4	0	0-4	87-100	70-100	51-81	25-43	21-31	6-12
	18-80	Gravelly coarse sand, very gravelly sand, loamy coarse sand	SP, SM, SP-SM	A-1-b	0	0-7	66-92	35-92	16-48	2-13	0-21	NP-4
Hawick-----												
	0-7	Coarse sandy loam, gravelly loamy sand	SM, SC-SM	A-2-4	0-1	0-4	85-100	68-100	49-82	20-40	18-35	2-10
	7-11	Gravelly loamy coarse sand, gravelly coarse sand, loamy sand	SP-SC, SP-SM	A-1-b, A-2, A-3	0-1	0-4	80-95	52-95	24-52	5-18	0-23	NP-6
	11-80	Gravelly coarse sand, gravelly sand, coarse sand, sand	SW-SM, SP, SP-SM	A-1-b, A-3, A-2	0-1	0-3	60-95	50-95	30-65	2-10	0-19	NP-2

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches					Pct	Pct
	In											
551B: Calamine-----	0-8	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	8-20	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	20-27	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	86-94	38-48	19-25
	27-34	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	93-100	88-100	46-62	25-37
	34-46	Silty clay	CH	A-7-6	0	0	100	100	97-100	92-100	50-62	29-37
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
551D: Calamine-----	0-8	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	8-20	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	20-27	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	86-94	38-48	19-25
	27-34	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	93-100	88-100	46-62	25-37
	34-46	Silty clay	CH	A-7-6	0	0	100	100	97-100	92-100	50-62	29-37
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
559: Talcot-----	0-10	Silty clay loam, clay loam	MH	A-7, A-7-5	0	0	100	100	97-100	87-94	48-60	19-24
	10-26	Silty clay loam, clay loam	CL	A-7, A-7-6	0	0	100	100	96-100	85-90	43-53	21-25
	26-30	Silty clay loam, clay loam	CL	A-7, A-7-6	0	0	95-100	78-100	65-94	50-74	37-49	17-25
	30-60	Loamy coarse sand, gravelly sand	SP-SM	A-1-b	0	0	74-90	44-90	33-72	3-10	0-21	NP-3
561: Talcot, loamy substratum-----	0-21	Clay loam	CL	A-7	0	0	100	100	80-90	60-85	40-50	15-25
	21-37	Sandy clay loam, clay loam	CL	A-6	0	0	95-100	85-100	70-90	60-85	40-50	15-25
	37-75	Sand, loamy sand, gravelly coarse sand	SP, SP-SM, SW	A-1	0	0	65-90	50-85	20-50	2-10	0-14	NP
	75-80	Loam, clay loam	CL	A-7, A-6	0	0	100	100	100	90-100	27-45	12-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
566C:												
Moingona-----	0-16	Loam	CL	A-4, A-6	0	0-1	95-100	89-100	78-90	57-65	25-40	8-15
	16-40	Sandy clay loam, loam, clay loam	CL	A-6	0	0-1	95-100	90-100	75-92	56-71	31-41	14-21
	40-60	Stratified sandy loam to clay loam, loam, clay loam, sandy loam	CL	A-6, A-4	0	0-1	95-100	91-100	75-98	56-77	24-40	9-21
568D:												
Cokato-----	0-16	Loam	ML	A-6, A-7-6	0	0-1	95-100	84-100	73-92	55-70	37-47	14-18
	16-41	Clay loam, loam, sandy clay loam	CL	A-6, A-7, A- 7-6	0	0-4	95-100	84-100	70-96	54-77	34-49	15-25
	41-60	Loam	CL	A-6	0	0-4	95-100	85-100	72-95	53-73	31-43	13-21
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
568E:												
Cokato-----	0-16	Loam	ML	A-6, A-7-6	0	0-1	95-100	84-100	73-92	55-70	37-47	14-18
	16-41	Clay loam, loam, sandy clay loam	CL	A-6, A-7, A- 7-6	0	0-4	95-100	84-100	70-96	54-77	34-49	15-25
	41-60	Loam	CL	A-6	0	0-4	95-100	85-100	72-95	53-73	31-43	13-21
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
583:												
Minnetonka-----	0-13	Silty clay loam	MH, CL	A-7	0	0	94-100	88-100	85-100	76-94	45-62	18-24
	13-35	Silty clay, silty clay loam	CH, CL	A-7	0	0	94-100	88-100	79-100	75-100	46-70	25-44
	35-60	Silty clay loam, silt loam, clay loam	CL	A-6, A-7	0	0	95-100	81-100	74-100	64-94	35-50	17-29
606:												
Lanyon, depressional, ponded-----	0-13	Silty clay loam	MH	A-7, A-7-5	0	0	100	100	98-100	93-95	62-67	28-30
	13-20	Silty clay, silty clay loam	MH, CH	A-7, A-7-6	0	0	100	95-100	82-100	79-100	49-76	25-43
	20-52	Silty clay, silty clay loam	CH, MH	A-7, A-7-6	0	0	100	95-100	82-100	79-100	49-76	25-43
	52-60	Clay loam	CL	A-7, A-6, A- 7-6	0	0	96-100	87-100	72-96	55-76	36-50	17-27

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
625: Lerdal-----	0-7	Silt loam, silty clay loam	CL	A-6, A-7, A-7-6	0	0	94-100	82-100	73-98	62-85	33-47	12-19
	7-9	Silty clay loam	CL	A-6, A-7, A-7-6	0	0	94-100	82-100	78-100	69-91	35-46	17-23
	9-47	Silty clay loam, clay loam	CL, CH	A-7, A-7-6	0	0	94-100	83-100	77-100	68-100	46-65	25-40
	47-60	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	70-93	53-73	29-39	12-18
636: Buckney, rarely flooded-----	0-14	Fine sandy loam	SC-SM, SC	A-4	0	0	100	100	90-96	39-45	23-32	6-10
	14-22	Fine sandy loam, loamy very fine sand	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	86-98	40-52	15-29	1-10
	22-60	Sand, loamy fine sand, loamy sand	SM, SC-SM	A-2-4	0	0	100	100	89-99	23-33	16-27	2-10
636B: Buckney, rarely flooded-----	0-14	Fine sandy loam	SC, SC-SM	A-4	0	0	100	100	90-96	39-45	23-32	6-10
	14-22	Fine sandy loam, loamy very fine sand	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	86-98	40-52	15-29	1-10
	22-60	Sand, loamy fine sand, loamy sand	SC-SM, SM	A-2-4	0	0	100	100	89-99	23-33	16-27	2-10
638C2: Clarion, moderately eroded-----	0-6	Loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	6-16	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	16-35	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	35-60	Loam, sandy loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Storden, moderately eroded-----	0-5	Loam	CL, ML	A-4, A-6	0	0-5	94-100	89-100	76-94	56-71	30-40	5-15
	5-55	Loam, clay loam	CL, CL-ML	A-4, A-6	0-1	0-4	95-100	81-100	68-96	50-73	20-40	5-15
	55-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
650: Joliet-----	0-15	Silt loam	ML	A-7-6	0-1	0-5	87-100	66-100	60-100	52-89	36-47	11-18
	15-19	Loam, clay loam, silty clay loam	CL	A-7-6, A-6	0-1	0-4	89-100	69-100	63-100	56-91	34-48	16-23
	19-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
650:												
Faxon-----	0-15	Clay loam, loam	ML	A-6, A-7-6	0	0-10	94-100	83-100	72-92	56-73	39-53	17-21
	15-34	Loam, fine sandy loam	CL, SC	A-6, A-7	0	0-8	95-100	68-100	57-96	42-73	29-45	12-21
	34-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
715:												
Fluvaquents, frequently flooded-----	0-9	Variable	SM	A-2-4	0	0	90-100	81-100	60-82	17-28	0-26	NP-6
	9-80	Sand, loamy sand	SP-SM	A-2-4	0	0	91-100	82-100	62-84	7-17	0-23	NP-6
735:												
Havelock, occasionally flooded-----	0-9	Clay loam	MH	A-7-5	0	0	100	100	87-95	67-75	49-61	19-25
	9-40	Clay loam	CL	A-7-6	0	0	100	100	87-95	67-75	40-55	19-25
	40-60	Sandy loam, loam	SC	A-6	0	0	100	90-100	63-86	29-48	22-38	7-19
740D:												
Hawick-----	0-7	Coarse sandy loam, gravelly loamy sand	SM, SC-SM	A-2-4	0-1	0-4	85-100	68-100	49-82	20-40	18-35	2-10
	7-11	Gravelly loamy coarse sand, gravelly coarse sand, loamy sand	SP-SC, SP-SM	A-1-b, A-2, A-3	0-1	0-4	80-95	52-95	24-52	5-18	0-23	NP-6
	11-80	Gravelly coarse sand, gravelly sand, coarse sand, sand	SW-SM, SP, SP-SM	A-1-b, A-3, A-2	0-1	0-3	60-95	50-95	30-65	2-10	0-19	NP-2
775B:												
Billett-----	0-8	Fine sandy loam, sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	0	100	95-100	69-82	33-45	18-29	2-9
	8-13	Fine sandy loam, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	100	95-100	69-81	33-43	21-29	6-12
	13-28	Fine sandy loam, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	100	95-100	69-81	33-43	20-28	6-12
	28-41	Loamy sand, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	96-100	81-100	57-81	27-43	18-28	4-12
	41-47	Sandy loam, loamy sand	SC-SM, SC	A-2-4, A-4, A-6	0	0	96-100	81-100	64-89	20-45	18-28	4-12
	47-52	Loamy sand, fine sand, loamy fine sand, sand	SM, SC-SM, SW-SM	A-2-4, A-1-b, A-3	0	0-4	86-100	68-100	20-75	5-30	0-19	NP-3
	52-60	Gravelly sand, sand, loamy sand, gravelly loamy sand	SM, SP-SM	A-2-4, A-1-b, A-3	0	0-3	86-100	64-100	49-82	5-30	0-19	NP-3

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
775C: Billett-----	0-8	Fine sandy loam, sandy loam	SM, SC-SM, SC	A-2-4, A-4	0	0	100	95-100	69-82	33-45	18-29	2-9
	8-13	Fine sandy loam, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	100	95-100	69-81	33-43	21-29	6-12
	13-28	Fine sandy loam, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	100	95-100	69-81	33-43	20-28	6-12
	28-41	Loamy sand, sandy loam	SC-SM, SC	A-2-4, A-4, A-6	0	0	96-100	81-100	57-81	27-43	18-28	4-12
	41-47	Sandy loam, loamy sand	SC-SM, SC	A-2-4, A-4, A-6	0	0	96-100	81-100	64-89	20-45	18-28	4-12
	47-52	Loamy sand, fine sand, loamy fine sand, sand	SM, SC-SM, SW-SM	A-2-4, A-1-b, A-3	0	0-4	86-100	68-100	20-75	5-30	0-19	NP-3
	52-60	Gravelly sand, sand, loamy sand, gravelly loamy sand	SM, SP-SM	A-2-4, A-1-b, A-3	0	0-3	86-100	64-100	49-82	5-30	0-19	NP-3
777B: Wapsie-----	0-8	Sandy clay loam, sandy loam, loam	CL, ML, CL-ML	A-4	0	0	100	88-100	74-93	53-68	28-38	7-13
	8-13	Sandy clay loam, sandy loam, loam	CL, CL-ML	A-4	0	0	100	88-100	74-93	53-68	23-31	7-13
	13-17	Loam	CL, SC-SM	A-4, A-6	0	0	85-95	65-90	56-83	40-61	24-32	9-15
	17-27	Sandy clay loam	SC, SC-SM	A-4, A-6	0	0	85-95	65-90	52-81	27-46	24-35	9-17
	27-29	Loam, sandy loam	SC, SC-SM	A-2-6, A-6	0	0	85-95	65-90	48-72	23-38	24-32	9-15
	29-38	Gravelly loamy sand, sand, gravelly sand	SM	A-1-b, A-2-4	0	0	86-95	67-91	50-74	14-26	0-21	NP-6
	38-60	Sand, gravelly loamy sand, gravelly sand	SW, SM, SP, SP-SM	A-1-b, A-2-4	0	0	67-97	34-89	26-75	3-15	0-21	NP-6
835D2: Storden, moderately eroded-----	0-5	Loam	CL, ML	A-4, A-6	0	0-5	94-100	89-100	76-94	56-71	30-40	5-15
	5-55	Loam, clay loam	CL, CL-ML	A-4, A-6	0-1	0-4	95-100	81-100	68-96	50-73	20-40	5-15
	55-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Omsrud, moderately eroded-----	0-6	Loam	CL	A-6	0	0-5	95-100	84-100	73-93	54-70	33-44	13-18
	6-20	Loam, clay loam	CL	A-6	0	0-4	90-100	75-100	63-93	48-72	32-43	15-21
	20-30	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	30-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
835E2: Storden, moderately eroded-----	0-5	Loam	CL, ML	A-4, A-6	0	0-5	94-100	89-100	76-94	56-71	30-40	5-15
	5-55	Loam, clay loam	CL, CL-ML	A-4, A-6	0-1	0-4	95-100	81-100	68-96	50-73	20-40	5-15
	55-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Omsrud, moderately eroded-----	0-6	Loam	CL	A-6	0	0-5	95-100	84-100	73-93	54-70	33-44	13-18
	6-20	Loam, clay loam	CL	A-6	0	0-4	90-100	75-100	63-93	48-72	32-43	15-21
	20-30	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	30-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
836B: Kilkenny-----	0-9	Silt loam, loam	ML, CL	A-6, A-7, A- 7-6	0	0	94-100	88-100	75-96	56-74	39-53	17-25
	9-53	Clay loam, clay, silty clay loam	CH, CL	A-7, A-7-6	0	0	94-100	83-100	74-99	59-81	44-56	25-32
	53-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
854D: Fens, Aquolls---	0-35	Muck	PT	A-8	0	0	---	---	---	---	---	---
	35-80	Clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	84-92	19-57	3-29
855: Shorewood-----	0-17	Silty clay loam	CL, ML, MH	A-7, A-7-5	0	0	100	100	94-100	84-94	47-66	21-28
	17-39	Silty clay, silty clay loam	CH, MH	A-7, A-7-6	0	0	100	100	90-100	86-100	48-72	26-40
	39-60	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
956: Harps-----	0-8	Loam, clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-45	10-25
	8-16	Loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-45	10-25
	16-42	Loam	CL	A-7, A-6	0	0-5	95-100	95-100	80-90	65-80	30-60	15-35
	42-60	Loam	CL	A-6	0	0-5	95-100	90-100	70-80	50-75	25-40	10-25
Okoboji, depressional, ponded-----	0-6	Silty clay loam	OH	A-7-6	0	0	100	100	95-100	91-96	64-76	24-28
	6-32	Silty clay loam	MH	A-7-5	0	0	100	100	95-100	91-96	51-69	25-28
	32-56	Silty clay loam, silty clay	CH	A-7-6	0	0	100	100	95-100	90-97	46-59	25-30
	56-60	Loam, silty clay loam	CL	A-6	0	0-4	95-100	84-100	79-100	70-93	35-46	17-25

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1007:												
Cosmos, bouldery	0-7	Clay loam	CH, MH	A-7-5	0-1	0-1	98-100	96-100	88-100	84-100	53-76	25-36
	7-20	Silty clay	CH, MH	A-7-5	0-1	0-1	98-100	96-100	88-100	84-100	53-76	25-36
	20-30	Silty clay, silty clay loam, clay	CH	A-7-6	0-1	0-1	98-100	96-100	84-100	81-100	46-75	25-44
	30-36	Silty clay, silty clay loam, clay	CH	A-7-6	0-1	0-1	98-100	96-100	84-100	81-100	46-75	25-44
	36-60	Clay, clay loam, silty clay	CH, CL	A-7-6	0-1	0-2	95-100	91-100	76-100	61-92	40-67	21-41
1055B:												
Kandiyohi, bouldery-----	0-10	Clay loam	MH, CH	A-7-5	0-1	1	95-100	89-100	76-100	61-83	54-75	25-36
	10-23	Silty clay, silty clay loam, clay	CH	A-7-6	0	0-1	95-100	90-100	71-100	60-92	46-75	25-44
	23-64	Clay loam, silty clay, clay	CH	A-7-6	0-1	1-3	95-100	90-100	76-100	61-92	40-68	21-41
	64-80	Clay loam, clay	CH, CL	A-7-6	0-1	1-4	95-100	91-100	76-100	61-92	40-68	21-41
1138B:												
Clarion-----	0-7	Clay loam, loam	CL	A-7-6, A-6	0	0-5	95-100	89-100	74-93	53-69	39-51	17-24
	7-18	Loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	18-36	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	69-94	52-73	25-40	5-15
	36-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
1236B:												
Angus-----	0-8	Loam	CL	A-6	0	0-5	94-100	83-100	72-93	53-71	33-45	13-18
	8-35	Clay loam, loam	CL	A-7-6	0-1	0-4	95-100	85-100	73-97	56-78	35-47	16-25
	35-40	Loam, clay loam	CL	A-6	0-1	0-4	95-100	86-100	74-97	57-78	32-43	16-23
	40-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
1236C:												
Angus-----	0-8	Loam	CL	A-6	0	0-5	94-100	83-100	72-93	53-71	33-45	13-18
	8-35	Clay loam, loam	CL	A-7-6	0-1	0-4	95-100	85-100	73-97	56-78	35-47	16-25
	35-40	Loam, clay loam	CL	A-6	0-1	0-4	95-100	86-100	74-97	57-78	32-43	16-23
	40-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1259: Biscay, depressional, ponded-----	0-7	Clay loam, loam	CL, MH	A-7, A-7-5	0	0	94-100	88-100	77-93	60-73	48-62	17-20
	7-20	Loam, clay loam	CL, ML	A-6, A-7, A-7-6	0	0	94-100	88-100	79-94	60-73	37-53	17-21
	20-28	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0	0	94-100	83-100	70-96	51-73	30-43	12-21
	28-38	Gravelly loam, sandy loam, gravelly sandy loam	SC-SM, SC	A-6	0	0-4	95-100	64-100	51-98	35-73	20-38	6-19
	38-80	Very gravelly coarse sand	SP, SP-SM, SW-SM	A-1-b	0	0-3	63-95	23-95	10-47	2-15	0-20	NP-3
1507: Brownton-----	0-22	Silty clay loam	CH, MH	A-7-5	0	0	100	94-100	90-100	86-96	53-67	25-28
	22-38	Silty clay, clay, silty clay loam	CH	A-7-6	0	0	100	94-100	82-100	78-100	46-70	25-44
	38-60	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	73-96	57-77	33-47	16-22
1555: Nicollet-----	0-10	Loam, clay loam	ML	A-7-6	0	0-5	94-100	82-100	68-93	50-70	39-49	11-18
	10-17	Clay loam, loam	CL	A-7-6	0	0-5	94-100	82-100	68-93	52-73	36-50	13-21
	17-36	Clay loam, loam	CL	A-6	0	0-5	94-100	83-100	66-93	50-73	27-44	11-21
	36-60	Loam, sandy loam	CL-ML, SC-SM, SC, CL	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Guckeen-----	0-15	Silty clay loam	MH	A-7, A-7-5	0	0	100	94-100	90-100	86-96	53-63	25-28
	15-24	Silty clay, silty clay loam, clay	CH	A-7, A-7-6	0	0	100	94-100	87-100	83-100	46-63	25-36
	24-30	Clay loam, loam	CL	A-6, A-7, A-7-6	0	0-4	90-100	81-100	68-100	52-89	35-59	17-36
	30-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
1836B: Kilkenny-----	0-9	Silt loam, loam	ML, CL	A-6, A-7, A-7-6	0	0	94-100	88-100	75-96	56-74	39-53	17-25
	9-53	Clay loam, clay, silty clay loam	CH, CL	A-7, A-7-6	0	0	94-100	83-100	74-99	59-81	44-56	25-32
	53-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
Shorewood-----	0-17	Silty clay loam	CL, ML, MH	A-7, A-7-5	0	0	100	100	94-100	84-94	47-66	21-28
	17-39	Silty clay, silty clay loam	CH, MH	A-7, A-7-6	0	0	100	100	90-100	86-100	48-72	26-40
	39-60	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
2700C:												
Ridgeton-----	0-29	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	29-38	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	38-50	Clay loam, loam	CL	A-7, A-6	0	0-4	95-100	85-100	74-94	55-72	30-41	15-21
	50-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
2700D:												
Ridgeton-----	0-29	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	29-38	Loam	ML	A-7-6	0	0-5	94-100	89-100	75-93	55-70	33-53	11-17
	38-50	Clay loam, loam	CL	A-7, A-6	0	0-4	95-100	85-100	74-94	55-72	30-41	15-21
	50-80	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
4000.												
Urban land												
4055:												
Nicollet-----	0-10	Loam, clay loam	ML	A-7-6	0	0-5	94-100	82-100	68-93	50-70	39-49	11-18
	10-17	Clay loam, loam	CL	A-7-6	0	0-5	94-100	82-100	68-93	52-73	36-50	13-21
	17-36	Clay loam, loam	CL	A-6	0	0-5	94-100	83-100	66-93	50-73	27-44	11-21
	36-60	Loam, sandy loam	CL-ML, SC-SM, SC, CL	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Urban land.												
4107:												
Webster-----	0-8	Silty clay loam	CH, CL, MH	A-7, A-6	0	0-5	94-100	89-100	85-100	76-94	35-60	15-30
	8-16	Silty clay loam	CH, CL, ML	A-7, A-6, A- 7-6	0	0-5	94-100	89-100	85-100	76-94	35-60	15-30
	16-32	Clay loam, loam	CL	A-7, A-6, A- 7-6	0	0-5	95-100	89-100	77-96	60-77	39-51	17-25
	32-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Urban land.												
4138B:												
Clarion-----	0-7	Loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	7-18	Loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	89-100	77-92	55-68	25-40	5-15
	18-36	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	69-94	52-73	25-40	5-15
	36-60	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Urban land.												

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
4235B:												
Angus-----	0-8	Loam	CL	A-6	0	0-5	94-100	83-100	72-93	53-71	33-45	13-18
	8-35	Clay loam, loam	CL	A-7-6	0-1	0-4	95-100	85-100	73-97	56-78	35-47	16-25
	35-40	Loam, clay loam	CL	A-6	0-1	0-4	95-100	86-100	74-97	57-78	32-43	16-23
	40-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Urban land.												
4236D:												
Lester-----	0-7	Loam	CL	A-4, A-6	0	0-5	94-100	83-100	72-93	53-71	30-40	5-15
	7-38	Clay loam, loam	CL	A-6, A-7-6	0-1	0-4	95-100	85-100	73-94	56-75	35-45	16-23
	38-60	Loam, clay loam	CL	A-6	0	0-4	95-100	84-100	72-95	53-73	29-39	12-18
	60-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15
Urban land.												
4325:												
Le Sueur-----	0-17	Loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	90-100	80-95	50-65	25-40	5-15
	17-37	Clay loam	CL, CL-ML	A-6, A-4	0	0	95-100	95-100	90-100	70-85	20-40	5-15
	37-46	Loam	CL	A-7, A-6	0	0	95-100	95-100	85-100	60-80	35-50	15-25
	46-80	Loam	CL-ML, CL	A-6, A-4	0-1	0-5	95-100	90-100	80-95	55-75	20-40	5-20
Urban land.												
4444:												
Jacwin-----	0-7	Silty clay loam, loam, silt loam	MH, ML	A-7-5, A-7-6	0	0	100	100	88-98	72-82	41-53	14-22
	7-13	Loam, silty clay loam, silt loam	MH, ML	A-7-5, A-7-6	0	0	100	100	89-99	72-82	41-53	15-22
	13-24	Sandy clay loam, loam, clay loam	CL	A-6, A-7-6	0	1-4	95-100	85-100	71-95	54-75	31-46	13-22
	24-37	Clay, silty clay	CH	A-7-6	0	0	100	100	88-100	86-100	51-73	29-45
	37-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land.												
4507:												
Canistee-----	0-10	Clay loam	ML, OL, MH	A-7-5	0	0	94-100	88-100	77-95	59-75	47-59	18-24
	10-18	Clay loam	ML, OL, CL	A-7	0	0	94-100	88-100	77-95	59-75	40-50	15-20
	18-39	Clay loam, loam, silty clay loam	CL	A-7-6, A-6	0	0	98-100	88-100	75-100	57-80	35-53	13-25
	39-80	Loam, sandy loam	SC-SM, SC, CL, CL-ML	A-4, A-6	0	0-4	91-100	78-100	65-93	46-69	22-32	7-15

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
4507: Urban land.												
4551B: Calamine-----	0-8	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	8-20	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	20-27	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	86-94	38-48	19-25
	27-34	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	93-100	88-100	46-62	25-37
	34-46	Silty clay	CH	A-7-6	0	0	100	100	97-100	92-100	50-62	29-37
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land.												
4551D: Calamine-----	0-8	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	8-20	Silty clay loam, silt loam, loam	ML	A-7-5, A-7-6	0	0	100	100	96-100	85-94	45-56	17-24
	20-27	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	97-100	86-94	38-48	19-25
	27-34	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	93-100	88-100	46-62	25-37
	34-46	Silty clay	CH	A-7-6	0	0	100	100	97-100	92-100	50-62	29-37
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Urban land.												
4635: Buckney-----	0-14	Fine sandy loam	SC-SM, SC	A-4	0	0	100	100	90-96	39-45	23-32	6-10
	14-22	Fine sandy loam, loamy very fine sand	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	86-98	40-52	15-29	1-10
	22-60	Sand, loamy fine sand, loamy sand	SM, SC-SM	A-2-4	0	0	100	100	89-99	23-33	16-27	2-10
Urban land.												

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
4635B:												
Buckney-----	0-14	Fine sandy loam	SC-SM, SC	A-4	0	0	100	100	90-96	39-45	23-32	6-10
	14-22	Fine sandy loam, loamy very fine sand	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	86-98	40-52	15-29	1-10
	22-60	Sand, loamy fine sand, loamy sand	SM, SC-SM	A-2-4	0	0	100	100	89-99	23-33	16-27	2-10
Urban land.												
4946B.												
Udorthents-												
Highway												
5010.												
Pits, sand and gravel												
5030.												
Pits, limestone quarries												
5035.												
Pits, gypsum quarries												
5040.												
Udorthents, loamy												
5049.												
Aquolls, ponded- Udorthents, loamy												
5060.												
Pits, clay												
5080.												
Udorthents												

Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
5457: Du Page, channeled, frequently flooded-----	0-30	Silt loam	CL, ML	A-6, A-7-6	0	0	95-100	83-100	76-100	68-91	33-47	11-18
	30-35	Sandy loam, loam, gravelly sandy clay loam, silt loam	CL, ML	A-6, A-7-6	0	0	90-100	61-100	53-95	39-73	28-43	12-18
	35-80	Stratified silt loam to gravelly sandy clay loam	CL, CL-ML, ML, SC, SC- SM	A-4, A-6	0	0	86-100	55-100	47-100	36-83	17-36	3-16
5507: Corvuso-----	0-20	Silty clay loam, clay loam	MH	A-7-5	0-1	0-1	100	94-100	86-100	76-100	53-78	25-39
	20-30	Clay, silty clay, silty clay loam	CH	A-7-6	0-1	1	100	95-100	75-100	64-92	45-70	25-44
	30-80	Clay loam, clay, silty clay	CH, CL	A-7-6	0-1	1-3	95-100	91-100	77-100	61-93	41-65	21-40
Brownton-----	0-22	Silty clay loam	CH, MH	A-7-5	0	0	100	94-100	90-100	86-96	53-67	25-28
	22-38	Silty clay, clay, silty clay loam	CH	A-7-6	0	0	100	94-100	82-100	78-100	46-70	25-44
	38-60	Clay loam, loam	CL	A-6	0	0-4	95-100	84-100	73-96	57-77	33-47	16-22
AW. Animal waste lagoon												
SL. Sewage lagoon												
W. Water												

Physical Properties

The table described in this section shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$ - or $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth		Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
	In	Pct							Kw	Kf	T		
6: Okoboji, depressional, ponded-----	0-6	35-40	1.30-1.40	0.2-0.6	0.21-0.23	6.0-8.9	9.0-12	.32	.32	5	4	86	
	6-32	35-40	1.30-1.40	0.2-0.6	0.21-0.23	6.0-8.9	3.0-9.0	.32	.32				
	32-56	35-42	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	0.5-3.0	.32	.32				
	56-60	25-35	1.40-1.50	0.6-2	0.18-0.20	2.6-5.8	0.0-0.5	.28	.28				
27B: Terril-----	0-9	18-30	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	5	6	48	
	9-36	18-32	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.24	.24				
	36-50	24-30	1.40-1.45	0.6-2	0.17-0.19	2.3-4.2	0.5-1.0	.28	.28				
	50-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37				
34: Estherville-----	0-7	5-15	1.25-1.35	2-6	0.13-0.18	0.0-2.9	1.5-2.5	.20	.20	4	3	86	
	7-18	10-18	1.35-1.60	2-6	0.12-0.19	0.0-2.9	0.5-1.0	.20	.20				
	18-80	0-8	1.50-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10				
34B: Estherville-----	0-7	5-15	1.25-1.35	2-6	0.13-0.18	0.0-2.9	1.5-2.5	.20	.20	3	3	86	
	7-18	10-18	1.35-1.60	2-6	0.12-0.19	0.0-2.9	0.5-1.0	.20	.20				
	18-80	0-8	1.50-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10				
55: Nicollet-----	0-10	18-27	1.15-1.25	0.6-2	0.17-0.22	1.3-3.2	5.0-6.0	.24	.24	5	6	48	
	10-17	20-30	1.15-1.25	0.6-2	0.17-0.22	1.3-3.2	3.0-5.0	.24	.24				
	17-36	17-30	1.25-1.35	0.6-2	0.15-0.19	0.1-4.2	0.5-2.0	.37	.37				
	36-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37				
62F: Storden-----	0-7	18-27	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.5-3.5	.28	.28	5	4L	86	
	7-55	18-30	1.35-1.65	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37				
	55-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37				
90: Okoboji, mucky, depressional, ponded	0-8	20-30	1.20-1.25	0.6-2	0.22-0.25	0.1-4.2	12-18	.32	.32	5	6	48	
	8-20	35-42	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	4.0-10	.32	.32				
	20-40	35-42	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	2.0-4.0	.32	.32				
	40-60	25-35	1.40-1.50	0.6-2	0.18-0.20	2.6-5.8	1.0-2.0	.28	.28				
95: Harps-----	0-8	25-27	1.35-1.40	0.6-2	0.19-0.21	3.0-5.9	4.5-5.5	.24	.24	5	4L	86	
	8-16	25-27	1.35-1.40	0.6-2	0.19-0.21	3.0-5.9	4.5-5.5	.24	.24				
	16-42	18-32	1.40-1.50	0.6-2	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32				
	42-60	20-30	1.50-1.70	0.6-2	0.17-0.19	3.0-5.9	0.0-1.0	.32	.32				
107: Webster-----	0-8	27-35	1.35-1.40	0.6-2	0.19-0.21	3.2-5.8	6.0-7.0	.28	.28	5	7	38	
	8-16	27-35	1.35-1.40	0.6-2	0.19-0.21	3.2-5.8	4.0-5.0	.28	.28				
	16-32	25-35	1.40-1.50	0.6-2	0.16-0.18	2.6-5.8	2.0-3.0	.32	.32				
	32-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37				
108: Wadena-----	0-8	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48	
	8-13	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.24	.24				
	13-30	18-27	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32				
	30-80	1-5	1.55-1.65	20-101	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10				

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
108B: Wadena-----	0-7	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48
	7-10	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.24	.24			
	10-25	18-27	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	25-80	1-5	1.55-1.65	20-101	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
108C: Wadena-----	0-7	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48
	7-10	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.24	.24			
	10-25	18-27	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	25-80	1-5	1.55-1.65	20-101	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
135: Coland, occasionally flooded-----	0-8	27-35	1.40-1.50	0.6-2	0.20-0.22	3.2-5.8	5.0-7.0	.24	.24	5	6	48
	8-32	27-35	1.40-1.50	0.6-2	0.20-0.22	3.2-5.8	4.0-5.0	.24	.24			
	32-40	27-30	1.40-1.50	0.6-2	0.15-0.19	3.2-4.2	4.0-6.5	.32	.32			
	40-44	12-22	1.45-1.60	0.6-2	0.11-0.17	0.0-1.6	0.5-2.0	.24	.24			
	44-52	14-27	1.50-1.60	0.6-2	0.13-0.19	0.0-3.2	0.5-2.0	.28	.28			
	52-60	12-22	1.45-1.60	0.6-2	0.11-0.17	0.0-1.6	0.5-2.0	.24	.24			
136: Ankeny, rarely flooded	0-7	10-18	1.50-1.55	2-6	0.16-0.18	0.0-0.4	2.0-3.0	.20	.20	4	3	86
	7-30	10-18	1.50-1.55	2-6	0.16-0.18	0.0-0.4	2.0-3.0	.20	.20			
	30-44	10-16	1.55-1.65	2-6	0.15-0.17	0.0-0.0	0.5-1.0	.20	.20			
	44-60	2-10	1.65-1.75	6-20	0.12-0.14	0.0-0.0	0.0-0.5	.20	.20			
138B: Clarion-----	0-7	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	3.0-4.0	.24	.24	5	6	48
	7-18	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	2.0-3.0	.24	.24			
	18-36	24-30	1.50-1.70	0.6-2	0.17-0.19	0.0-2.3	0.5-2.0	.37	.37			
	36-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
138C2: Clarion, moderately eroded-----	0-6	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	2.2-3.2	.28	.28	5	6	48
	6-16	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	1.0-2.0	.32	.32			
	16-35	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	0.5-1.0	.32	.32			
	35-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.1-0.5	.37	.37			
201B: Coland-----	0-8	27-35	1.40-1.50	0.6-2	0.20-0.22	3.2-5.8	5.0-7.0	.24	.24	5	6	48
	8-32	27-35	1.40-1.50	0.6-2	0.20-0.22	3.2-5.8	4.0-5.0	.24	.24			
	32-40	27-30	1.40-1.50	0.6-2	0.15-0.19	3.2-4.2	4.0-6.5	.32	.32			
	40-44	12-22	1.45-1.60	0.6-2	0.11-0.17	0.0-1.6	0.5-2.0	.24	.24			
	44-52	14-27	1.50-1.60	0.6-2	0.13-0.19	0.0-3.2	0.5-2.0	.28	.28			
	52-60	12-22	1.45-1.60	0.6-2	0.11-0.17	0.0-1.6	0.5-2.0	.24	.24			
Terril-----	0-9	18-30	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	5	6	48
	9-36	18-32	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.24	.24			
	36-50	24-30	1.40-1.45	0.6-2	0.17-0.19	2.3-4.2	0.5-1.0	.28	.28			
	50-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
203: Cylinder-----	0-8	18-27	1.40-1.45	0.6-2	0.20-0.22	1.6-3.2	4.0-5.0	.24	.24	4	6	48
	8-18	18-27	1.40-1.45	0.6-2	0.20-0.22	1.6-3.2	2.0-3.0	.24	.24			
	18-28	18-30	1.45-1.60	0.6-2	0.17-0.19	1.6-3.2	0.5-2.0	.32	.32			
	28-80	2-12	1.60-1.70	20-101	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
227:												
Wadena, loamy substratum-----	0-7	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48
	7-16	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.24	.24			
	16-23	18-27	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	23-30	16-20	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	30-62	1-5	1.55-1.65	20-101	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
	62-80	18-35	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
227B:												
Wadena, loamy substratum-----	0-7	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48
	7-16	18-27	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.24	.24			
	16-23	18-27	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	23-30	16-20	1.35-1.50	0.6-2	0.14-0.19	0.0-2.9	1.0-2.0	.32	.32			
	30-62	1-5	1.55-1.65	20-101	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
	62-80	18-35	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
228:												
Cylinder, loamy substratum-----	0-12	22-27	1.40-1.45	0.6-2	0.20-0.22	1.6-3.2	4.0-5.0	.24	.24	4	6	48
	12-20	22-27	1.40-1.45	0.6-2	0.20-0.22	1.6-3.2	2.0-3.0	.24	.24			
	20-34	22-30	1.45-1.60	0.6-2	0.17-0.19	1.6-3.2	0.5-2.0	.32	.32			
	34-63	2-12	1.60-1.70	20-101	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			
	63-80	22-27	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
236D:												
Lester-----	0-7	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	7-38	24-32	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	38-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
236E:												
Lester-----	0-7	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	7-38	24-32	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	38-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
236F:												
Lester-----	0-7	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	7-38	24-32	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	38-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
259:												
Biscay-----	0-7	25-30	1.20-1.30	0.6-2	0.20-0.22	3.0-5.9	5.5-6.5	.28	.28	4	6	48
	7-20	25-30	1.20-1.30	0.6-2	0.20-0.22	3.0-5.9	1.0-6.0	.28	.28			
	20-28	18-30	1.25-1.35	0.6-2	0.17-0.19	3.0-5.9	0.5-1.0	.28	.28			
	28-38	10-28	1.35-1.55	2-6	0.11-0.17	0.0-2.9	0.0-0.5	.28	.32			
	38-80	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
262G:												
Lester-----	0-7	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	7-38	24-32	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	38-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
Belview-----	0-9	18-27	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	4L	86
	9-50	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	50-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
274: Rolfe, depressional, ponded-----	0-10	22-27	1.35-1.40	0.6-2	0.22-0.24	0.0-2.9	4.0-6.0	.37	.37	5	6	48
	10-21	18-35	1.35-1.40	0.6-2	0.22-0.24	0.0-2.9	1.0-2.0	.37	.37			
	21-55	38-45	1.40-1.50	0.06-0.2	0.11-0.13	6.0-8.9	0.5-1.0	.28	.28			
	55-80	24-35	1.50-1.60	0.6-2	0.14-0.16	2.3-5.9	0.0-0.5	.28	.28			
278: Biscay, loamy substratum-----	0-7	18-30	1.20-1.30	0.6-2	0.20-0.22	1.3-3.2	5.5-6.5	.28	.28	4	6	48
	7-22	25-32	1.25-1.35	0.6-2	0.17-0.19	1.0-4.2	4.0-6.0	.28	.28			
	22-36	25-32	1.25-1.35	0.6-2	0.17-0.19	1.0-4.2	0.5-1.0	.28	.28			
	36-56	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
	56-74	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
	74-80	18-35	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
307: Dundas-----	0-9	10-27	1.30-1.45	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	9-15	15-22	1.35-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
	15-40	20-35	1.40-1.55	0.2-0.6	0.15-0.19	3.0-5.9	0.2-1.0	.28	.28			
	40-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
315B: Udifluvents, occasionally flooded	0-8	5-18	1.50-1.60	2-6	---	0.0-2.9	---	.20	.20	5	3	86
	8-60	5-18	1.50-1.60	2-6	---	0.0-2.9	---	.20	.20			
323B: Fort Dodge-----	0-39	20-26	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	4	6	48
	39-58	22-30	1.40-1.65	0.6-2	0.16-0.18	0.0-2.9	2.0-3.0	.28	.28			
	58-80	2-8	1.65-1.75	6-20	0.05-0.07	0.0-2.9	0.0-1.0	.10	.17			
325: Le Sueur-----	0-17	16-22	1.40-1.45	0.6-2	0.21-0.23	3.0-5.9	2.5-3.5	.37	.37	5	6	48
	17-37	25-35	1.30-1.40	0.6-2	0.20-0.24	0.0-2.9	3.0-4.0	.24	.24			
	37-46	24-35	1.30-1.45	0.6-2	0.15-0.19	3.0-5.9	0.5-2.0	.32	.32			
	46-80	20-30	1.45-1.60	0.6-2	0.15-0.19	3.0-5.9	0.0-0.5	.32	.32			
338: Garmore-----	0-6	22-27	1.40-1.45	0.6-2	0.19-0.21	1.6-3.2	3.5-4.5	.24	.24	5	6	48
	6-17	22-27	1.40-1.45	0.6-2	0.19-0.21	1.6-3.2	3.0-4.0	.24	.24			
	17-21	22-30	1.40-1.45	0.6-2	0.19-0.21	1.6-4.2	1.0-2.0	.24	.24			
	21-49	24-30	1.45-1.70	0.6-2	0.16-0.18	2.3-4.2	0.0-1.0	.37	.37			
	49-80	22-27	1.45-1.60	0.6-2	0.16-0.18	1.6-3.2	0.0-0.5	.37	.37			
342: Estherville, loamy substratum-----	0-7	5-15	1.25-1.35	2-6	0.13-0.18	0.0-2.9	1.5-2.5	.20	.20	3	3	86
	7-15	10-18	1.35-1.60	2-6	0.12-0.19	0.0-2.9	0.5-1.0	.20	.20			
	15-75	0-8	1.50-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
	75-80	22-27	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
342B: Estherville, loamy substratum-----	0-7	5-15	1.25-1.35	2-6	0.13-0.18	0.0-2.9	1.5-2.5	.20	.20	3	3	86
	7-15	10-18	1.35-1.60	2-6	0.12-0.19	0.0-2.9	0.5-1.0	.20	.20			
	15-75	0-8	1.50-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
	75-80	22-27	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
344B: Copaston-----	0-7	14-30	1.30-1.45	0.6-2	0.18-0.20	0.0-2.9	2.0-5.0	.28	.24	1	4L	86
	7-11	14-20	1.40-1.60	2-6	0.15-0.17	0.0-2.9	0.5-1.0	.28	.28			
	11-18	14-30	1.45-1.65	2-6	0.12-0.14	0.0-2.9	0.0-0.5	.28	.28			
	18-80	---	---	2-20	---	---	---	---	---			
345: Copaston-----	0-7	14-30	1.30-1.45	0.6-2	0.18-0.20	0.0-2.9	2.0-5.0	.28	.24	1	4L	86
	7-11	14-20	1.40-1.60	2-6	0.15-0.17	0.0-2.9	0.5-1.0	.28	.28			
	11-18	14-30	1.45-1.65	2-6	0.12-0.14	0.0-2.9	0.0-0.5	.28	.28			
	18-80	---	---	2-20	---	---	---	---	---			
Jacwin-----	0-7	22-32	1.35-1.45	0.6-2	0.20-0.22	1.0-4.8	4.5-5.5	.28	.28	4	6	48
	7-13	22-32	1.35-1.45	0.6-2	0.20-0.22	2.3-4.8	4.5-5.5	.28	.28			
	13-24	20-32	1.50-1.60	0.6-2	0.17-0.19	1.0-4.8	1.0-2.0	.28	.28			
	24-37	40-60	1.50-1.60	0.0015-0.06	0.12-0.14	8.9-13.7	0.0-1.0	.28	.28			
	37-80	---	---	0.0015-0.06	---	---	---	---	---			
355: Luther-----	0-9	10-27	1.30-1.45	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	9-15	15-22	1.35-1.45	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
	15-40	20-35	1.40-1.55	0.2-0.6	0.15-0.19	3.0-5.9	0.2-1.0	.28	.28			
	40-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
383: Marna-----	0-20	35-50	1.20-1.30	0.06-0.2	0.18-0.22	6.0-8.9	4.0-8.0	.28	.28	5	4	86
	20-32	35-60	1.25-1.40	0.06-0.2	0.13-0.16	6.0-8.9	0.5-1.0	.32	.32			
	32-41	28-35	1.35-1.50	0.2-0.6	0.15-0.19	3.0-5.9	0.2-0.8	.28	.28			
	41-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
385: Guckeen-----	0-15	35-40	1.20-1.30	0.2-0.6	0.16-0.19	6.0-8.9	4.0-6.0	.28	.28	5	4	86
	15-24	35-50	1.25-1.35	0.2-0.6	0.13-0.16	6.0-8.9	0.5-1.5	.28	.28			
	24-30	25-50	1.35-1.80	0.2-0.6	0.15-0.17	3.0-5.9	0.2-0.8	.37	.37			
	30-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
386: Cordova-----	0-18	27-30	1.25-1.45	0.2-0.6	0.18-0.22	3.0-5.9	4.0-7.0	.28	.28	5	6	38
	18-38	28-35	1.35-1.50	0.2-0.6	0.15-0.19	3.0-5.9	1.0-4.0	.28	.28			
	38-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
387B: Kamrar-----	0-15	35-40	1.20-1.30	0.6-2	0.17-0.19	3.0-5.9	3.0-4.0	.28	.28	5	4	86
	15-32	35-50	1.25-1.35	0.2-0.6	0.15-0.19	3.0-5.9	1.0-3.0	.28	.28			
	32-54	24-40	1.25-1.35	0.2-0.6	0.15-0.19	3.0-5.9	1.0-3.0	.28	.28			
	54-80	20-30	1.35-1.55	0.6-2	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
413G: Gosport-----	0-7	22-27	1.30-1.40	0.2-0.6	0.14-0.16	3.0-5.9	2.5-4.5	.43	.43	3	6	48
	7-27	36-60	1.50-1.60	0.0015-0.06	0.12-0.14	6.0-8.9	0.0-0.5	.32	.32			
	27-80	---	---	0.0015-0.06	---	---	---	---	---			
Emeline-----	0-9	12-27	1.15-1.20	0.6-2	0.17-0.22	0.0-3.2	2.5-3.5	.28	.28	1	6	48
	9-80	---	---	0.2-0.6	---	---	---	---	---			
Ridgeton-----	0-29	18-26	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.24	.24	5	6	48
	29-38	18-26	1.35-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.24	.24			
	38-50	22-30	1.45-1.70	0.6-2	0.16-0.18	0.0-2.9	0.0-1.0	.32	.32			
	50-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
457: Du Page, occasionally flooded-----	0-30	18-27	1.35-1.55	0.6-2	0.22-0.24	0.0-2.9	3.0-5.0	.32	.32	5	6	48
	30-35	18-27	1.45-1.65	0.6-2	0.10-0.20	0.0-2.9	0.5-3.0	.32	.32			
	35-80	6-24	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	0.2-1.0	.32	.32			
485: Spillville, occasionally flooded	0-20	18-26	1.45-1.55	0.6-2	0.19-0.21	0.0-2.9	4.0-6.0	.24	.24	5	6	48
	20-54	18-26	1.45-1.55	0.6-2	0.19-0.21	0.0-2.9	1.0-4.0	.24	.24			
	54-80	14-24	1.55-1.70	0.6-2	0.15-0.18	0.0-2.3	0.5-2.0	.28	.28			
485B: Spillville, rarely flooded-----	0-20	18-26	1.45-1.55	0.6-2	0.19-0.21	0.0-2.9	4.0-6.0	.24	.24	5	6	48
	20-54	18-26	1.45-1.55	0.6-2	0.19-0.21	0.0-2.9	1.0-4.0	.24	.24			
	54-80	14-24	1.55-1.70	0.6-2	0.15-0.18	0.0-2.3	0.5-2.0	.28	.28			
506: Wacousta, depressional, ponded	0-9	27-35	1.20-1.25	0.6-2	0.21-0.23	3.2-5.8	8.0-10	.28	.28	5	7	38
	9-14	27-35	1.20-1.25	0.6-2	0.21-0.23	3.2-5.8	7.0-9.0	.28	.28			
	14-16	24-35	1.25-1.30	0.6-2	0.18-0.20	2.3-5.8	2.0-4.0	.28	.28			
	16-80	7-35	1.30-1.40	0.6-2	0.20-0.22	0.4-4.2	0.0-1.0	.43	.43			
507: Canistee-----	0-10	27-35	1.25-1.35	0.6-2	0.18-0.22	3.2-5.8	5.0-7.0	.24	.24	5	4L	86
	10-18	27-35	1.25-1.35	0.6-2	0.18-0.22	3.2-5.8	3.0-5.0	.24	.24			
	18-39	20-35	1.35-1.50	0.6-2	0.15-0.19	3.0-5.8	2.0-4.0	.32	.32			
	39-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.1-0.5	.37	.37			
511: Blue Earth, depressional, ponded	0-10	18-32	0.20-0.80	0.6-2	0.18-0.24	3.0-5.9	10-25	.28	.28	5	6	48
	10-68	18-32	0.20-0.80	0.6-2	0.18-0.24	0.0-2.9	10-25	.28	.28			
	68-80	18-32	1.30-1.60	0.2-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
526: Wacousta, mucky, depressional, ponded	0-7	20-35	1.20-1.25	0.6-2	0.21-0.23	3.2-5.8	12-18	.28	.28	5	7	38
	7-14	27-35	1.20-1.25	0.6-2	0.21-0.23	3.2-5.8	7.0-9.0	.28	.28			
	14-27	24-35	1.25-1.30	0.6-2	0.18-0.20	2.3-5.8	2.0-4.0	.28	.28			
	27-80	18-30	1.30-1.40	0.6-2	0.20-0.22	1.3-3.2	0.0-1.0	.43	.43			
536: Hanlon, occasionally flooded-----	0-7	12-18	1.45-1.55	2-6	0.16-0.18	0.0-2.9	2.0-3.0	.20	.20	5	3	86
	7-50	12-18	1.45-1.55	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20			
	50-69	5-10	1.55-1.70	2-6	0.11-0.13	0.0-2.9	1.0-2.0	.20	.20			
	69-80	2-18	1.55-1.70	2-6	0.12-0.19	0.0-2.9	0.0-1.0	.24	.24			
541C: Estherville-----	0-7	5-15	1.25-1.35	2-6	0.13-0.18	0.0-2.9	1.5-2.5	.20	.20	4	3	86
	7-18	10-18	1.35-1.60	2-6	0.12-0.19	0.0-2.9	0.5-1.0	.20	.20			
	18-80	0-8	1.50-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
Hawick-----	0-7	5-15	1.35-1.55	2-6	0.13-0.15	0.0-2.9	1.0-2.0	.17	.17	3	3	86
	7-11	1-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
	11-80	1-5	1.55-1.65	20-40	0.02-0.06	0.0-2.9	0.0-0.5	.10	.15			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
551B:												
Calamine-----	0-8	26-35	1.20-1.35	0.6-2	0.17-0.24	0.4-3.2	5.0-6.0	.28	.28	4	7	38
	8-20	26-35	1.20-1.35	0.6-2	0.17-0.24	0.4-3.2	5.0-6.0	.28	.28			
	20-27	27-35	1.50-1.60	0.2-0.6	0.18-0.22	3.2-5.8	0.5-1.5	.43	.43			
	27-34	35-50	1.55-1.65	0.0015-0.06	0.08-0.12	7.3-10.5	0.0-0.5	.32	.32			
	34-46	40-50	1.60-1.70	0.0015-0.06	0.08-0.12	7.3-10.5	0.0-0.5	.32	.32			
	46-60	---	---	0.0015-0.06	---	---	0.0-0.5	---	---			
551D:												
Calamine-----	0-8	26-35	1.20-1.35	0.6-2	0.17-0.24	0.4-3.2	5.0-6.0	.28	.28	4	7	38
	8-20	26-35	1.20-1.35	0.6-2	0.17-0.24	0.4-3.2	5.0-6.0	.28	.28			
	20-27	27-35	1.50-1.60	0.2-0.6	0.18-0.22	3.2-5.8	0.5-1.5	.43	.43			
	27-34	35-50	1.55-1.65	0.0015-0.06	0.08-0.12	7.3-10.5	0.0-0.5	.32	.32			
	34-46	40-50	1.60-1.70	0.0015-0.06	0.08-0.12	7.3-10.5	0.0-0.5	.32	.32			
	46-60	---	---	0.0015-0.06	---	---	0.0-0.5	---	---			
559:												
Talcot-----	0-10	28-35	1.20-1.30	0.6-2	0.18-0.22	3.0-5.9	5.0-7.0	.28	.28	4	4L	86
	10-26	30-35	1.20-1.30	0.6-2	0.18-0.22	3.0-5.9	2.0-4.0	.28	.28			
	26-30	25-35	1.25-1.35	0.6-2	0.17-0.20	3.0-5.9	1.0-2.0	.28	.28			
	30-60	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.5-1.0	.15	.15			
561:												
Talcot, loamy substratum-----	0-21	28-35	1.20-1.30	0.6-2	0.18-0.22	3.0-5.9	5.0-7.0	.28	.28	4	4L	86
	21-37	30-35	1.25-1.35	0.6-2	0.17-0.20	3.0-5.9	2.0-6.0	.28	.28			
	37-75	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.5-1.0	.15	.15			
	75-80	18-35	1.30-1.40	0.6-2	0.16-0.22	0.0-2.9	0.1-0.8	.37	.37			
566C:												
Moingona-----	0-16	18-20	1.40-1.45	0.6-2	0.20-0.22	0.0-2.9	3.0-4.0	.24	.24	5	5	56
	16-40	21-30	1.45-1.65	0.6-2	0.16-0.18	0.0-2.9	0.5-1.0	.28	.28			
	40-60	15-30	1.65-1.75	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.28			
568D:												
Cokato-----	0-16	22-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	16-41	22-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	1.0-2.0	.37	.37			
	41-60	12-22	1.50-1.70	0.6-2	0.14-0.18	3.0-5.9	0.0-1.0	.37	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
568E:												
Cokato-----	0-16	22-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	3.0-5.0	.28	.28	5	6	48
	16-41	22-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	1.0-2.0	.37	.37			
	41-60	12-22	1.50-1.70	0.6-2	0.14-0.18	3.0-5.9	0.0-1.0	.37	.37			
	60-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
583:												
Minnetonka-----	0-13	27-35	1.20-1.40	0.2-0.6	0.18-0.22	3.0-5.9	4.0-8.0	.28	.28	5	7	38
	13-35	35-60	1.20-1.35	0.06-0.2	0.13-0.19	6.0-8.9	0.2-1.0	.28	.28			
	35-60	25-40	1.25-1.55	0.2-2	0.16-0.21	3.0-5.9	0.0-0.2	.28	.28			
606:												
Lanyon, depressiona l, ponded-----	0-13	34-42	1.35-1.40	0.06-0.2	0.14-0.16	6.0-8.9	6.0-7.0	.28	.28	5	4	86
	13-20	35-60	1.40-1.60	0.06-0.2	0.12-0.14	6.0-8.9	2.0-4.0	.28	.28			
	20-52	35-60	1.40-1.60	0.2-0.6	0.12-0.14	6.0-8.9	2.0-4.0	.28	.28			
	52-60	25-38	1.60-1.75	0.6-2	0.13-0.15	3.0-5.9	0.5-1.0	.37	.37			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
625: Lerdal-----	0-7	18-27	1.15-1.25	0.2-0.6	0.18-0.22	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	7-9	25-32	1.15-1.25	0.2-0.6	0.18-0.22	3.0-5.9	0.2-1.5	.37	.37			
	9-47	35-55	1.25-1.35	0.2-0.6	0.13-0.19	6.0-8.9	0.2-0.8	.32	.32			
	47-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
636: Buckney, rarely flooded-----	0-14	10-16	1.20-1.50	2-6	0.08-0.12	0.0-2.9	1.5-2.5	.20	.20	4	3	86
	14-22	4-16	1.20-1.50	2-6	0.04-0.12	0.0-2.9	0.0-1.0	.20	.20			
	22-60	5-15	1.20-1.40	6-20	0.02-0.06	0.0-2.9	0.0-0.5	.17	.17			
636B: Buckney, rarely flooded-----	0-14	10-16	1.20-1.50	2-6	0.08-0.12	0.0-2.9	1.5-2.5	.20	.20	4	3	86
	14-22	4-16	1.20-1.50	2-6	0.04-0.12	0.0-2.9	0.0-1.0	.20	.20			
	22-60	5-15	1.20-1.40	6-20	0.02-0.06	0.0-2.9	0.0-0.5	.17	.17			
638C2: Clarion, moderately eroded-----	0-6	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	2.2-3.2	.28	.28	5	6	48
	6-16	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	1.0-2.0	.32	.32			
	16-35	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	0.5-1.0	.32	.32			
	35-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.1-0.5	.37	.37			
Storden, moderately eroded-----	0-5	18-27	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.5-3.5	.28	.28	5	4L	86
	5-55	18-30	1.35-1.65	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	55-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
650: Joliet-----	0-15	18-27	1.15-1.35	0.6-2	0.17-0.23	0.0-2.9	4.0-5.0	.24	.24	2	6	48
	15-19	23-33	1.35-1.55	0.6-2	0.14-0.20	3.0-5.9	0.5-2.0	.32	.32			
	19-80	---	---	0.06-0.6	---	---	---	---	---			
Faxon-----	0-15	25-30	1.30-1.45	0.6-2	0.20-0.24	3.0-5.9	2.0-6.0	.28	.28	2	6	48
	15-34	18-30	1.40-1.60	0.6-2	0.12-0.19	3.0-5.9	0.0-2.0	.28	.28			
	34-80	---	---	2-20	---	---	---	---	---			
715: Fluvaquents, frequently flooded---	0-9	2-10	1.50-1.55	6-20	---	0.0-2.9	---	.17	.17	5	2	134
	9-80	2-10	1.50-1.75	6-20	---	0.0-2.9	---	.15	.15			
735: Havelock, occasionally flooded-----	0-9	27-35	1.40-1.50	0.6-2	0.20-0.22	6.0-8.9	5.0-7.0	.24	.24	5	4L	86
	9-40	27-35	1.40-1.50	0.6-2	0.20-0.22	6.0-8.9	1.0-4.0	.28	.28			
	40-60	12-28	1.50-1.65	2-6	0.13-0.17	0.0-2.9	0.0-0.5	.28	.28			
740D: Hawick-----	0-7	5-15	1.35-1.55	2-6	0.13-0.15	0.0-2.9	1.0-2.0	.17	.17	3	3	86
	7-11	1-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
	11-80	1-5	1.55-1.65	20-40	0.02-0.06	0.0-2.9	0.0-0.5	.10	.15			
775B: Billett-----	0-8	5-15	1.40-1.70	2-6	0.13-0.18	0.0-0.0	1.0-2.0	.20	.20	4	3	86
	8-13	10-18	1.40-1.70	2-6	0.10-0.15	0.0-0.4	0.5-1.0	.20	.20			
	13-28	10-18	1.40-1.70	2-6	0.10-0.15	0.0-0.4	0.0-0.5	.15	.15			
	28-41	8-18	1.50-1.80	2-6	0.05-0.12	0.0-0.4	0.0-0.5	.15	.15			
	41-47	8-18	1.50-1.80	2-6	0.05-0.12	0.0-0.4	0.0-0.5	.15	.15			
	47-52	2-7	1.60-1.90	6-20	0.02-0.10	0.0-0.0	0.0-0.5	.10	.10			
	52-60	2-7	1.60-1.90	6-20	0.02-0.10	0.0-0.0	0.0-0.5	.10	.10			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
775C:												
Billett-----	0-8	5-15	1.40-1.70	2-6	0.13-0.18	0.0-0.0	1.0-2.0	.20	.20	4	3	86
	8-13	10-18	1.40-1.70	2-6	0.10-0.15	0.0-0.4	0.5-1.0	.20	.20			
	13-28	10-18	1.40-1.70	2-6	0.10-0.15	0.0-0.4	0.0-0.5	.15	.15			
	28-41	8-18	1.50-1.80	2-6	0.05-0.12	0.0-0.4	0.0-0.5	.15	.15			
	41-47	8-18	1.50-1.80	2-6	0.05-0.12	0.0-0.4	0.0-0.5	.15	.15			
	47-52	2-7	1.60-1.90	6-20	0.02-0.10	0.0-0.0	0.0-0.5	.10	.10			
	52-60	2-7	1.60-1.90	6-20	0.02-0.10	0.0-0.0	0.0-0.5	.10	.10			
777B:												
Wapsie-----	0-8	12-20	1.40-1.45	0.6-2	0.18-0.20	0.0-1.0	3.0-4.0	.24	.24	4	5	56
	8-13	12-20	1.40-1.45	0.6-2	0.18-0.20	0.0-1.0	0.5-1.0	.24	.24			
	13-17	15-22	1.45-1.50	0.6-2	0.15-0.17	0.0-1.6	0.0-0.5	.28	.28			
	17-27	15-25	1.45-1.50	0.6-2	0.15-0.17	0.0-1.6	0.0-0.5	.28	.28			
	27-29	15-22	1.45-1.50	0.6-2	0.15-0.17	0.0-1.6	0.0-0.5	.28	.28			
	29-38	2-10	1.50-1.75	20-101	0.02-0.06	0.0-0.0	0.0-0.5	.10	.10			
	38-60	2-10	1.50-1.75	20-101	0.02-0.06	0.0-0.0	0.0-0.5	.10	.10			
835D2:												
Storden, moderately eroded-----	0-5	18-27	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.5-3.5	.28	.28	5	4L	86
	5-55	18-30	1.35-1.65	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	55-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
Omsrud, moderately eroded-----	0-6	20-26	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.24	.24	5	4L	48
	6-20	22-30	1.35-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-2.0	.32	.32			
	20-30	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	30-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
835E2:												
Storden, moderately eroded-----	0-5	18-27	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.5-3.5	.28	.28	5	4L	86
	5-55	18-30	1.35-1.65	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	55-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
Omsrud, moderately eroded-----	0-6	20-26	1.35-1.45	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.24	.24	5	6	48
	6-20	22-30	1.35-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-2.0	.32	.32			
	20-30	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
	30-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
836B:												
Kilkenny-----	0-9	20-35	1.15-1.25	0.6-2	0.17-0.22	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	9-53	35-45	1.25-1.35	0.2-0.6	0.15-0.19	3.0-5.9	0.2-1.0	.28	.28			
	53-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
854D:												
Fens, Aquolls-----	0-35	0-5	0.30-0.50	0.2-6	0.35-0.45	---	55-75	---	---	5	2	134
	35-80	27-30	1.50-1.80	0.2-2	0.14-0.22	0.0-2.9	0.5-4.0	.43	.43			
855:												
Shorewood-----	0-17	30-40	1.20-1.40	0.2-0.6	0.18-0.22	3.0-5.9	4.0-8.0	.28	.28	5	7	38
	17-39	36-55	1.20-1.35	0.2-0.6	0.13-0.16	6.0-8.9	1.0-4.0	.32	.32			
	39-60	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			
956:												
Harps-----	0-8	25-27	1.35-1.40	0.6-2	0.19-0.21	3.0-5.9	4.5-5.5	.24	.24	5	4L	86
	8-16	25-27	1.35-1.40	0.6-2	0.19-0.21	3.0-5.9	4.5-5.5	.24	.24			
	16-42	18-32	1.40-1.50	0.6-2	0.17-0.19	3.0-5.9	2.0-3.0	.32	.32			
	42-60	20-30	1.50-1.70	0.6-2	0.17-0.19	3.0-5.9	0.0-1.0	.32	.32			

Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
956: Okoboji, depressional, ponded-----	0-6	35-40	1.30-1.40	0.2-0.6	0.21-0.23	6.0-8.9	9.0-12	.32	.32	5	4	86
	6-32	35-40	1.30-1.40	0.2-0.6	0.21-0.23	6.0-8.9	3.0-9.0	.32	.32			
	32-56	35-42	1.30-1.40	0.2-0.6	0.18-0.20	6.0-8.9	0.5-3.0	.32	.32			
	56-60	25-35	1.40-1.50	0.6-2	0.18-0.20	2.6-5.8	0.0-0.5	.28	.28			
1007: Cosmos, bouldery-----	0-7	35-50	1.40-1.50	0.06-0.2	0.16-0.22	5.8-10.5	4.0-8.0	.28	.28	5	4	86
	7-20	35-50	1.40-1.50	0.06-0.2	0.16-0.22	5.8-10.5	4.0-8.0	.28	.28			
	20-30	35-60	1.40-1.60	0.06-0.2	0.14-0.19	5.8-13.7	0.5-2.0	.32	.32			
	30-36	35-60	1.40-1.60	0.06-0.2	0.14-0.19	5.8-13.7	0.5-2.0	.32	.32			
	36-60	30-55	1.90-2.00	0.06-0.2	0.11-0.15	4.2-12.1	0.1-0.5	.32	.32			
1055B: Kandiyohi, bouldery---	0-10	35-50	1.30-1.50	0.2-0.6	0.16-0.22	7.3-10.5	4.0-7.0	.28	.28	5	4	86
	10-23	35-60	1.40-1.60	0.2-0.6	0.14-0.19	5.8-13.7	0.5-2.0	.32	.32			
	23-64	30-55	1.50-1.70	0.06-0.2	0.13-0.19	4.2-12.1	0.1-1.0	.37	.37			
	64-80	30-55	1.80-2.00	0.06-0.2	0.11-0.15	4.2-12.1	0.1-1.0	.37	.37			
1138B: Clarion-----	0-7	25-35	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	3.0-4.0	.24	.24	5	6	48
	7-18	18-24	1.40-1.45	0.6-2	0.20-0.22	0.0-2.3	2.0-3.0	.24	.24			
	18-36	24-30	1.50-1.70	0.6-2	0.17-0.19	0.0-2.3	0.5-2.0	.37	.37			
	36-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
1236B: Angus-----	0-8	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.28	.28	5	6	48
	8-35	24-35	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	35-40	24-35	1.55-1.75	0.6-2	0.14-0.19	0.0-2.9	0.0-0.5	.37	.37			
	40-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
1236C: Angus-----	0-8	20-27	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.28	.28	5	6	48
	8-35	24-35	1.45-1.55	0.6-2	0.15-0.19	3.0-5.9	0.5-1.0	.28	.28			
	35-40	24-35	1.55-1.75	0.6-2	0.14-0.19	0.0-2.9	0.0-0.5	.37	.37			
	40-80	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
1259: Biscay, depressional, ponded-----	0-7	25-30	1.20-1.30	0.6-2	0.20-0.22	3.0-5.9	5.5-6.5	.28	.28	4	6	48
	7-20	25-30	1.20-1.30	0.6-2	0.20-0.22	3.0-5.9	1.0-6.0	.28	.28			
	20-28	18-30	1.25-1.35	0.6-2	0.17-0.19	3.0-5.9	0.5-1.0	.28	.28			
	28-38	10-28	1.35-1.55	2-6	0.11-0.17	0.0-2.9	0.0-0.5	.28	.32			
	38-80	1-6	1.55-1.65	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
1507: Brownton-----	0-22	35-40	1.20-1.30	0.06-0.2	0.18-0.22	6.0-8.9	4.0-8.0	.28	.28	5	4	86
	22-38	35-60	1.20-1.30	0.06-0.2	0.13-0.16	6.0-8.9	0.2-1.0	.28	.28			
	38-60	25-35	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.0-2.0	.32	.37			
1555: Nicollet-----	0-10	18-27	1.15-1.25	0.6-2	0.17-0.22	1.3-3.2	5.0-6.0	.24	.24	5	6	48
	10-17	20-30	1.15-1.25	0.6-2	0.17-0.22	1.3-3.2	3.0-5.0	.24	.24			
	17-36	17-30	1.25-1.35	0.6-2	0.15-0.19	0.1-4.2	0.5-2.0	.37	.37			
	36-60	12-22	1.50-1.70	0.6-2	0.17-0.19	0.0-1.6	0.0-0.5	.37	.37			
Guckeen-----	0-15	35-40	1.20-1.30	0.2-0.6	0.16-0.19	6.0-8.9	4.0-6.0	.28	.28	5	4	86
	15-24	35-50	1.25-1.35	0.2-0.6	0.13-0.16	6.0-8.9	0.5-1.5	.28	.28			
	24-30	25-50	1.35-1.80	0.2-0.6	0.15-0.17	3.0-5.9	0.2-0.8	.37	.37			
	30-80	20-30	1.35-1.55	0.6-2	0.15-0.19	1.0-4.2	0.1-0.5	.32	.37			

Chemical Properties

The table described in this section shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
6: Okoboji, depressional, ponded	0-6	41-41	---	6.6-7.8	0-15	0
	6-32	41-41	---	6.6-7.8	0-15	0
	32-56	41-45	---	6.6-7.8	0-15	0
	56-60	30-36	---	7.6-8.4	5-30	0
27B: Terril-----	0-9	20-25	---	6.1-7.3	0	0
	9-36	20-25	---	6.1-7.3	0	0
	36-50	20-25	---	6.1-7.3	0	0
	50-60	20-25	---	7.6-8.4	5-30	0
34: Estherville-----	0-7	15-20	---	5.6-7.3	0	0
	7-18	5.0-20	---	5.6-7.3	0	0
	18-80	0.0-10	---	6.6-8.4	0-20	0
34B: Estherville-----	0-7	15-20	---	5.6-7.3	0	0
	7-18	5.0-20	---	5.6-7.3	0	0
	18-80	0.0-10	---	6.6-8.4	0-20	0
55: Nicollet-----	0-10	20-25	---	6.1-7.3	0	0
	10-17	20-25	---	6.1-7.3	0	0
	17-36	15-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
62F: Storden-----	0-7	15-20	---	7.6-8.4	5-30	0
	7-55	15-20	---	7.6-8.4	5-30	0
	55-80	20-25	---	7.6-8.4	5-30	0
90: Okoboji, mucky, depressional, ponded	0-8	41-41	---	6.1-7.8	0-15	0
	8-20	41-45	---	6.6-7.8	0-15	0
	20-40	41-45	---	6.6-7.8	0-15	0
	40-60	30-36	---	7.6-8.4	5-30	0
95: Harps-----	0-8	36-41	---	7.9-8.4	20-30	0
	8-16	36-41	---	7.9-8.4	20-30	0
	16-42	25-30	---	7.9-8.4	20-30	0
	42-60	20-25	---	7.4-8.4	20-30	0
107: Webster-----	0-8	36-41	---	6.6-7.3	0	0
	8-16	36-41	---	6.6-7.3	0	0
	16-32	35-41	---	7.6-7.8	5-10	0
	32-60	20-25	---	7.6-8.4	5-30	0
108: Wadena-----	0-8	5.0-25	---	6.1-7.3	0	0
	8-13	5.0-25	---	6.1-7.3	0	0
	13-30	5.0-20	---	5.6-7.3	0	0
	30-80	0.0-5.0	---	6.6-8.4	0-15	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
108B:						
Wadena-----	0-7	5.0-25	---	6.1-7.3	0	0
	7-10	5.0-25	---	6.1-7.3	0	0
	10-25	5.0-20	---	5.6-7.3	0	0
	25-80	0.0-5.0	---	6.6-8.4	0-15	0
108C:						
Wadena-----	0-7	5.0-25	---	6.1-7.3	0	0
	7-10	5.0-25	---	6.1-7.3	0	0
	10-25	5.0-20	---	5.6-7.3	0	0
	25-80	0.0-5.0	---	6.6-8.4	0-15	0
135:						
Coland, occasionally flooded-----	0-8	23-30	---	6.1-7.3	0	0
	8-32	30-36	---	6.1-7.3	0	0
	32-40	29-41	---	6.1-7.3	0	0
	40-44	9.0-19	---	6.1-7.3	0	0
	44-52	11-23	---	5.6-7.3	0	0
	52-60	9.0-19	---	6.1-7.3	0	0
136:						
Ankeny, rarely flooded-----	0-7	10-17	---	6.1-7.3	0	0
	7-30	10-17	---	6.1-7.3	0	0
	30-44	8.5-13	---	6.1-7.3	0	0
	44-60	1.6-7.2	---	6.1-7.3	0	0
138B:						
Clarion-----	0-7	20-25	---	5.6-7.3	0	0
	7-18	20-25	---	5.6-7.3	0	0
	18-36	20-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
138C2:						
Clarion, moderately eroded-----	0-6	20-25	---	5.6-7.3	0	0
	6-16	20-25	---	5.6-7.3	0	0
	16-35	20-25	---	5.6-7.8	0-15	0
	35-60	20-25	---	7.6-8.4	5-30	0
201B:						
Coland-----	0-8	23-30	---	6.1-7.3	0	0
	8-32	30-36	---	6.1-7.3	0	0
	32-40	29-41	---	6.1-7.3	0	0
	40-44	9.0-19	---	6.1-7.3	0	0
	44-52	11-23	---	5.6-7.3	0	0
	52-60	9.0-19	---	6.1-7.3	0	0
Terril-----	0-9	20-25	---	6.1-7.3	0	0
	9-36	20-25	---	6.1-7.3	0	0
	36-50	20-25	---	6.1-7.3	0	0
	50-60	20-25	---	7.6-8.4	5-30	0
203:						
Cylinder-----	0-8	20-25	---	5.6-7.3	0	0
	8-18	20-25	---	5.6-7.3	0	0
	18-28	20-25	---	6.1-7.3	0	0
	28-80	5.0-10	---	6.6-8.4	0-25	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
227:						
Wadena, loamy substratum-----	0-7	5.0-25	---	6.1-7.3	0	0
	7-16	5.0-25	---	6.1-7.3	0	0
	16-23	5.0-20	---	5.6-7.3	0	0
	23-30	5.0-20	---	5.6-7.3	0	0
	30-62	0.0-5.0	---	7.4-8.4	0-15	0
	62-80	15-28	---	7.4-8.4	5-20	0
227B:						
Wadena, loamy substratum-----	0-7	5.0-25	---	6.1-7.3	0	0
	7-16	5.0-25	---	6.1-7.3	0	0
	16-23	5.0-20	---	5.6-7.3	0	0
	23-30	5.0-20	---	5.6-7.3	0	0
	30-62	0.0-5.0	---	7.4-8.4	0-15	0
	62-80	15-28	---	7.4-8.4	5-20	0
228:						
Cylinder, loamy substratum-----	0-12	20-25	---	5.6-7.3	0	0
	12-20	20-25	---	5.6-7.3	0	0
	20-34	20-25	---	6.1-7.3	0	0
	34-63	5.0-10	---	6.6-8.4	0-25	0
	63-80	15-28	---	7.4-8.4	5-20	0
236D:						
Lester-----	0-7	10-24	---	5.6-7.3	0	0
	7-38	10-23	---	6.1-7.6	0-5	0
	38-60	10-20	---	7.4-8.4	15-25	0-1
	60-80	20-25	---	7.6-8.4	5-30	0
236E:						
Lester-----	0-7	10-24	---	5.6-7.3	0	0
	7-38	10-23	---	6.1-7.6	0-5	0
	38-60	10-20	---	7.4-8.4	15-25	0-1
	60-80	20-25	---	7.6-8.4	5-30	0
236F:						
Lester-----	0-7	10-24	---	5.6-7.3	0	0
	7-38	10-23	---	6.1-7.6	0-5	0
	38-60	10-20	---	7.4-8.4	15-25	0-1
	60-80	20-25	---	7.6-8.4	5-30	0
259:						
Biscay-----	0-7	30-36	---	6.1-7.8	0-15	0
	7-20	30-36	---	6.1-7.8	0-15	0
	20-28	12-25	---	6.6-7.8	0-15	0
	28-38	5.0-20	---	6.6-7.8	0-15	0
	38-80	1.0-5.0	---	7.6-8.4	5-30	0
262G:						
Lester-----	0-7	10-24	---	5.6-7.3	0	0
	7-38	10-23	---	6.1-7.6	0-5	0
	38-60	10-20	---	7.4-8.4	15-25	0-1
	60-80	20-25	---	7.6-8.4	5-30	0
Belview-----	0-9	11-18	---	7.4-8.4	5-30	0
	9-50	10-20	---	7.4-8.4	15-25	0-1
	50-60	20-25	---	7.6-8.4	5-30	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
274: Rolfe, depressiona l, ponded-----	0-10	20-25	---	5.1-7.3	0	0
	10-21	20-25	---	5.1-7.3	0	0
	21-55	20-30	---	6.1-7.3	0	0
	55-80	20-25	---	6.1-8.4	0-25	0
278: Biscay, loamy substratum-----	0-7	30-36	---	6.1-7.4	0-15	0
	7-22	12-25	---	6.1-7.4	0	0
	22-36	12-25	---	6.6-7.3	0	0
	36-56	1.0-5.0	---	7.6-8.4	5-30	0
	56-74	1.0-5.0	---	7.6-8.4	5-30	0
	74-80	15-28	---	7.6-8.4	5-20	0
307: Dundas-----	0-9	9.1-23	---	5.6-7.3	0	0
	9-15	12-18	---	5.6-7.3	0	0
	15-40	16-27	---	5.1-7.3	0	0
	40-80	20-25	---	7.6-8.4	5-30	0
315B: Udifluvents, occasionally flooded	0-8	10-15	---	6.6-7.2	0	0
	8-60	10-15	---	6.1-7.3	0	0
323B: Fort Dodge-----	0-39	20-25	---	5.6-7.3	0	0
	39-58	20-25	---	6.1-7.3	0	0
	58-80	4.0-10	---	6.1-8.4	0-30	0
325: Le Sueur-----	0-17	15-20	---	5.1-7.3	0	0
	17-37	20-25	---	5.6-7.3	0	0
	37-46	11-25	---	5.1-7.3	0	0
	46-80	8.0-18	---	7.4-8.4	5-30	0
338: Garmore-----	0-6	20-25	---	5.1-7.3	0	0
	6-17	20-25	---	5.1-7.3	0	0
	17-21	20-25	---	5.1-7.3	0	0
	21-49	20-25	---	5.1-7.8	0-15	0
	49-80	20-25	---	6.6-7.8	0-15	0
342: Estherville, loamy substratum-----	0-7	15-20	---	5.6-7.3	0	0
	7-15	5.0-20	---	5.6-7.3	0	0
	15-75	0.0-10	---	6.6-8.4	0-20	0
	75-80	15-28	---	7.4-8.4	5-20	0
342B: Estherville, loamy substratum-----	0-7	15-20	---	5.6-7.3	0	0
	7-15	5.0-20	---	5.6-7.3	0	0
	15-75	0.0-10	---	6.6-8.4	0-20	0
	75-80	15-28	---	7.4-8.4	5-20	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
344B:						
Copaston-----	0-7	10-25	---	5.6-7.3	0	0
	7-11	5.0-15	---	5.6-7.3	0	0
	11-18	5.0-15	---	5.6-7.8	0-15	0
	18-80	---	---	---	---	0
345:						
Copaston-----	0-7	10-25	---	5.6-7.3	0	0
	7-11	5.0-15	---	5.6-7.3	0	0
	11-18	5.0-15	---	5.6-7.8	0-15	0
	18-80	---	---	---	---	0
Jacwin-----	0-7	18-27	---	6.1-7.3	0	0
	7-13	21-27	---	6.1-7.3	0	0
	13-24	17-26	---	6.1-7.3	0	0
	24-37	29-45	---	7.4-8.4	5-30	0
	37-80	---	---	7.4-8.4	---	0
355:						
Luther-----	0-9	9.1-23	---	5.6-7.3	0	0
	9-15	12-18	---	5.6-7.3	0	0
	15-40	16-28	---	5.1-7.3	0	0
	40-80	20-25	---	7.6-8.4	5-30	0
383:						
Marna-----	0-20	26-48	---	6.1-7.3	0	---
	20-32	22-48	---	6.1-7.3	0	---
	32-41	15-25	---	6.6-7.4	0	0
	41-80	10-20	---	7.4-8.4	15-25	0-1
385:						
Guckeen-----	0-15	36-46	---	5.6-7.3	0	0
	15-24	18-35	---	5.6-7.3	0	0
	24-30	10-23	---	6.1-7.3	0	0
	30-80	10-20	---	7.4-8.4	10-20	0-1
386:						
Cordova-----	0-18	20-30	---	6.1-7.3	0	0
	18-38	15-25	---	5.1-6.5	0	0
	38-80	10-20	---	7.4-8.4	10-20	0-1
387B:						
Kamrar-----	0-15	30-36	---	5.6-7.3	0	0
	15-32	30-45	---	5.6-7.3	0	0
	32-54	30-45	---	5.6-7.3	0	0
	54-80	30-36	---	7.4-8.4	5-30	0
413G:						
Gosport-----	0-7	15-20	---	5.1-7.3	0	0
	7-27	---	30-50	3.6-5.5	0	0
	27-80	---	---	---	0	0
Emeline-----	0-9	20-25	---	6.1-8.4	0-25	0
	9-80	---	---	---	---	0
Ridgeton-----	0-29	20-25	---	6.1-7.3	0	0
	29-38	20-25	---	6.1-7.3	0	0
	38-50	15-25	---	6.1-7.3	0-5	0
	50-80	10-20	---	7.4-8.4	10-20	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
457: Du Page, occasionally flooded-----	0-30	17-26	---	6.6-8.4	0-15	0
	30-35	11-22	---	7.4-8.4	5-40	0
	35-80	4.0-17	---	7.4-8.4	5-40	0
485: Spillville, occasionally flooded	0-20	20-25	---	5.6-7.3	0	0
	20-54	20-25	---	5.6-7.3	0	0
	54-80	20-25	---	5.6-7.3	0	0
485B: Spillville, rarely flooded-----	0-20	20-25	---	5.6-7.3	0	0
	20-54	20-25	---	5.6-7.3	0	0
	54-80	20-25	---	5.6-7.3	0	0
506: Wacousta, depressional, ponded	0-9	41-41	---	6.6-7.8	0-15	0
	9-14	41-41	---	6.6-7.8	0-15	0
	14-16	30-35	---	6.6-7.8	0-15	0
	16-80	25-30	---	7.6-8.4	5-30	0
507: Canistee-----	0-10	36-41	---	7.6-8.4	5-15	0
	10-18	36-41	---	7.6-8.4	5-15	0
	18-39	12-29	---	7.6-8.4	12-18	0
	39-80	20-25	---	7.6-8.4	5-30	0
511: Blue Earth, depressional, ponded	0-10	30-70	---	7.6-8.4	5-20	0
	10-68	30-70	---	7.6-8.4	5-40	0
	68-80	10-25	---	7.6-8.4	5-20	0
526: Wacousta, mucky, depressional, ponded	0-7	41-41	---	6.6-7.8	0-15	0
	7-14	41-41	---	6.6-7.8	0-15	0
	14-27	30-35	---	6.6-7.8	0-15	0
	27-80	25-30	---	7.4-8.4	5-30	0
536: Hanlon, occasionally flooded-----	0-7	15-41	---	5.6-7.8	0	0
	7-50	10-15	---	6.1-7.3	0	0
	50-69	5.0-10	---	5.6-7.3	0	0
	69-80	5.0-10	---	5.6-7.8	0-15	0
541C: Estherville-----	0-7	15-20	---	5.6-7.3	0	0
	7-18	5.0-20	---	5.6-7.3	0	0
	18-80	0.0-10	---	6.6-8.4	0-20	0
Hawick-----	0-7	1.0-10	---	6.1-7.8	0-10	0
	7-11	1.0-5.0	---	6.1-7.8	0-10	0
	11-80	1.0-5.0	---	7.6-8.4	5-15	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
551B:						
Calamine-----	0-8	30-36	---	6.1-7.8	0	0
	8-20	30-36	---	6.1-7.8	0	0
	20-27	30-36	---	6.1-7.8	0-30	0
	27-34	36-41	---	7.6-8.6	5-30	0
	34-46	36-41	---	7.6-8.6	5-30	0
	46-60	---	---	---	---	0
551D:						
Calamine-----	0-8	30-36	---	6.1-7.8	0	0
	8-20	30-36	---	6.1-7.8	0	0
	20-27	30-36	---	6.1-7.8	0-30	0
	27-34	36-41	---	7.6-8.6	5-30	0
	34-46	36-41	---	7.6-8.6	5-30	0
	46-60	---	---	---	---	0
559:						
Talcot-----	0-10	30-36	---	7.6-8.4	5-30	0
	10-26	30-36	---	7.6-8.4	5-30	0
	26-30	30-36	---	7.6-8.4	5-30	0
	30-60	1.0-5.0	---	7.6-8.4	5-30	0
561:						
Talcot, loamy substratum-----	0-21	24-31	---	7.6-8.6	5-30	0
	21-37	24-30	---	7.6-8.6	5-30	0
	37-75	1.5-5.0	---	7.6-8.4	5-30	0
	75-80	15-28	---	7.6-8.2	5-20	0
566C:						
Moingona-----	0-16	20-25	---	5.6-7.3	0	0
	16-40	20-25	---	5.6-7.3	0	0
	40-60	20-25	---	5.6-8.4	0-25	0
568D:						
Cokato-----	0-16	15-25	---	5.6-7.3	0	0
	16-41	15-20	---	5.6-7.3	0	0
	41-60	10-15	---	7.4-7.8	10-20	0
	60-80	20-25	---	7.6-8.4	5-30	0
568E:						
Cokato-----	0-16	15-25	---	5.6-7.3	0	0
	16-41	15-20	---	5.6-7.3	0	0
	41-60	10-15	---	7.4-7.8	10-20	0
	60-80	20-25	---	7.6-8.4	5-30	0
583:						
Minnetonka-----	0-13	24-43	---	5.6-7.3	0	0
	13-35	21-47	---	5.6-7.3	0	0
	35-60	15-32	---	7.6-8.2	5-20	0
606:						
Lanyon, depressiona, ponded-----	0-13	41-41	---	6.6-7.8	0-15	0
	13-20	41-45	---	7.9-8.4	20-30	0
	20-52	41-45	---	7.9-8.4	20-30	0
	52-60	30-35	---	7.9-8.4	20-30	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
625:						
Lerdal-----	0-7	18-24	---	5.6-6.5	0	0
	7-9	18-24	---	5.6-6.5	0	0
	9-47	19-30	---	4.5-6.0	0	0
	47-60	10-20	---	7.4-8.4	15-25	0
636:						
Buckney, rarely flooded-----	0-14	10-15	---	6.6-7.8	0-15	0
	14-22	5.0-15	---	6.6-7.8	0-15	0
	22-60	5.0-10	---	7.4-8.4	5-30	0
636B:						
Buckney, rarely flooded-----	0-14	10-15	---	6.6-7.8	0-15	0
	14-22	5.0-15	---	6.6-7.8	0-15	0
	22-60	5.0-10	---	7.4-8.4	5-30	0
638C2:						
Clarion, moderately eroded-----	0-6	20-25	---	5.6-7.3	0	0
	6-16	20-25	---	5.6-7.3	0	0
	16-35	20-25	---	5.6-7.8	0-15	0
	35-60	20-25	---	7.6-8.4	5-30	0
Storden, moderately eroded-----	0-5	15-20	---	7.6-8.4	5-30	0
	5-55	15-20	---	7.6-8.4	5-30	0
	55-80	20-25	---	7.6-8.4	5-30	0
650:						
Joliet-----	0-15	19-27	---	6.1-8.4	0-20	0
	15-19	14-24	---	6.1-8.4	0-20	0
	19-80	---	---	---	---	0
Faxon-----	0-15	10-25	---	6.6-7.2	0	0
	15-34	5.0-15	---	6.6-7.2	0	0
	34-80	---	---	---	---	---
715:						
Fluvaquents, frequently flooded--	0-9	5.0-10	---	5.6-7.3	0	0
	9-80	5.0-10	---	5.6-7.3	0	0
735:						
Havelock, occasionally flooded	0-9	30-36	---	7.6-8.4	5-30	0
	9-40	30-36	---	7.6-8.4	5-30	0
	40-60	10-20	---	7.6-8.4	5-30	0
740D:						
Hawick-----	0-7	1.0-10	---	6.1-7.8	0-10	0
	7-11	1.0-5.0	---	6.1-7.8	0-10	0
	11-80	1.0-5.0	---	7.6-8.4	5-15	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
775B:						
Billett-----	0-8	4.8-13	---	5.1-7.3	0	0
	8-13	8.6-15	---	5.1-6.5	0	0
	13-28	7.6-15	---	5.1-6.5	0	0
	28-41	6.2-15	---	5.6-7.3	0	0
	41-47	6.2-15	---	5.6-7.3	0	0
	47-52	1.8-6.3	---	5.1-7.8	0-20	0
	52-60	1.8-6.3	---	5.1-7.8	0-20	0
775C:						
Billett-----	0-8	4.8-13	---	5.1-7.3	0	0
	8-13	8.6-15	---	5.1-6.5	0	0
	13-28	7.6-15	---	5.1-6.5	0	0
	28-41	6.2-15	---	5.6-7.3	0	0
	41-47	6.2-15	---	5.6-7.3	0	0
	47-52	1.8-6.3	---	5.1-7.8	0-20	0
	52-60	1.8-6.3	---	5.1-7.8	0-20	0
777B:						
Wapsie-----	0-8	20-25	---	5.6-7.3	0	0
	8-13	15-20	---	5.6-7.3	0	0
	13-17	5.0-10	---	5.6-6.0	0	0
	17-27	5.0-10	---	5.6-6.0	0	0
	27-29	5.0-10	---	5.6-6.0	0	0
	29-38	5.0-10	---	5.1-7.3	0	0
	38-60	5.0-10	---	5.1-7.3	0	0
835D2:						
Storden, moderately eroded-----	0-5	15-20	---	7.6-8.4	5-30	0
	5-55	15-20	---	7.6-8.4	5-30	0
	55-80	20-25	---	7.6-8.4	5-30	0
Omsrud, moderately eroded-----	0-6	14-35	---	5.6-7.3	0	0
	6-20	9.0-22	---	5.6-7.3	0	0
	20-30	10-20	---	7.4-8.4	15-25	0-1
	30-80	20-25	---	7.6-8.4	5-30	0
835E2:						
Storden, moderately eroded-----	0-5	15-20	---	7.6-8.4	5-30	0
	5-55	15-20	---	7.6-8.4	5-30	0
	55-80	20-25	---	7.6-8.4	5-30	0
Omsrud, moderately eroded-----	0-6	14-35	---	5.6-7.3	0	0
	6-20	9.0-22	---	5.6-7.3	0	0
	20-30	10-20	---	7.4-8.4	15-25	0-1
	30-80	20-25	---	7.6-8.4	5-30	0
836B:						
Kilkenny-----	0-9	20-30	---	5.6-7.3	0	0
	9-53	25-35	---	6.1-7.6	0-5	0
	53-80	10-20	---	7.4-8.4	10-20	0-1
854D:						
Fens, Aquolls-----	0-35	125-200	---	5.1-7.8	0-20	0
	35-80	4.0-29	---	7.6-8.4	10-30	0

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
855:						
Shorewood-----	0-17	30-45	---	5.6-7.3	0	0
	17-39	25-45	---	5.1-7.3	0	0
	39-60	10-20	---	7.4-8.4	10-20	0-1
956:						
Harps-----	0-8	36-41	---	7.9-8.4	20-30	0
	8-16	36-41	---	7.9-8.4	20-30	0
	16-42	25-30	---	7.9-8.4	20-30	0
	42-60	20-25	---	7.4-8.4	20-30	0
Okoboji, depressional, ponded	0-6	41-41	---	6.6-7.8	0-15	0
	6-32	41-41	---	6.6-7.8	0-15	0
	32-56	41-45	---	6.6-7.8	0-15	0
	56-60	30-36	---	7.6-8.4	5-30	0
1007:						
Cosmos, bouldery----	0-7	30-50	---	6.1-7.3	0	0
	7-20	30-50	---	6.1-7.3	0	0
	20-30	25-45	---	6.1-7.3	0	0
	30-36	25-45	---	7.4-8.4	15-25	0-1
	36-60	15-30	---	7.4-8.4	15-25	0-1
1055B:						
Kandiyohi, bouldery--	0-10	30-50	---	6.1-7.3	0	0
	10-23	25-45	---	6.1-7.3	0	0
	23-64	20-40	---	7.4-8.4	15-30	0-1
	64-80	20-40	---	7.4-8.4	10-20	0-1
1138B:						
Clarion-----	0-7	20-25	---	5.6-7.3	0	0
	7-18	20-25	---	5.6-7.3	0	0
	18-36	20-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
1236B:						
Angus-----	0-8	10-24	---	5.6-7.3	0	---
	8-35	10-23	---	5.1-7.3	0	---
	35-40	8.0-18	---	7.4-8.4	5-20	---
	40-80	20-25	---	7.6-8.4	5-30	0
1236C:						
Angus-----	0-8	10-24	---	5.6-7.3	0	---
	8-35	10-23	---	5.1-7.3	0	---
	35-40	8.0-18	---	7.4-8.4	5-20	---
	40-80	20-25	---	7.6-8.4	5-30	0
1259:						
Biscay, depressional, ponded-----	0-7	30-36	---	6.1-7.8	0-15	0
	7-20	30-36	---	6.1-7.8	0-15	0
	20-28	12-25	---	6.6-7.8	0-15	0
	28-38	5.0-20	---	6.6-7.8	0-15	0
	38-80	1.0-5.0	---	7.6-8.4	5-30	0
1507:						
Brownton-----	0-22	21-28	---	7.4-8.4	10-20	0-1
	22-38	18-31	---	7.4-8.4	10-25	0-1
	38-60	10-20	---	7.4-8.4	10-20	0-1

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
1555:						
Nicollet-----	0-10	20-25	---	6.1-7.3	0	0
	10-17	20-25	---	6.1-7.3	0	0
	17-36	15-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
Guckeen-----	0-15	36-46	---	5.6-7.3	0	0
	15-24	18-36	---	5.6-7.3	0	0
	24-30	10-23	---	6.1-7.3	0	0
	30-80	10-20	---	7.4-8.4	10-20	0-1
1836B:						
Kilkenny-----	0-9	20-30	---	5.6-7.3	0	0
	9-53	25-35	---	6.1-7.6	0-5	0
	53-80	10-20	---	7.4-8.4	10-20	0-1
Shorewood-----	0-17	30-45	---	5.6-7.3	0	0
	17-39	25-45	---	5.1-7.3	0	0
	39-60	10-20	---	7.4-8.4	10-20	0-1
2700C:						
Ridgeton-----	0-29	20-25	---	6.1-7.3	0	0
	29-38	20-25	---	6.1-7.3	0	0
	38-50	15-25	---	6.1-7.3	0-5	0
	50-80	10-20	---	7.4-8.4	10-20	0
2700D:						
Ridgeton-----	0-29	20-25	---	6.1-7.3	0	0
	29-38	20-25	---	6.1-7.3	0	0
	38-50	15-25	---	6.1-7.3	0-5	0
	50-80	10-20	---	7.4-8.4	10-20	0
4000.						
Urban land						
4055:						
Nicollet-----	0-10	20-25	---	6.1-7.3	0	0
	10-17	20-25	---	6.1-7.3	0	0
	17-36	15-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
Urban land.						
4107:						
Webster-----	0-8	36-41	---	6.6-7.3	0	0
	8-16	36-41	---	6.6-7.3	0	0
	16-32	35-41	---	7.6-7.8	5-10	0
	32-60	20-25	---	7.6-8.4	5-30	0
Urban land.						
4138B:						
Clarion-----	0-7	20-25	---	5.6-7.3	0	0
	7-18	20-25	---	5.6-7.3	0	0
	18-36	20-25	---	5.6-7.8	0-15	0
	36-60	20-25	---	7.6-8.4	5-30	0
Urban land.						

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
4235B:						
Angus-----	0-8	10-24	---	5.6-7.3	0	---
	8-35	10-23	---	5.1-7.3	0	---
	35-40	8.0-18	---	7.4-8.4	5-20	---
	40-80	20-25	---	7.6-8.4	5-30	0
Urban land.						
4236D:						
Lester-----	0-7	10-24	---	5.6-7.3	0	0
	7-38	10-23	---	6.1-7.6	0-5	0
	38-60	10-20	---	7.4-8.4	15-25	0-1
	60-80	20-25	---	7.6-8.4	5-30	0
Urban land.						
4325:						
Le Sueur-----	0-17	15-20	---	5.1-7.3	0	0
	17-37	20-25	---	5.6-7.3	0	0
	37-46	11-25	---	5.1-7.3	0	0
	46-80	8.0-18	---	7.4-8.4	5-30	0
Urban land.						
4444:						
Jacwin-----	0-7	18-27	---	6.1-7.3	0	0
	7-13	21-27	---	6.1-7.3	0	0
	13-24	17-26	---	6.1-7.3	0	0
	24-37	29-45	---	7.4-8.4	5-30	0
	37-80	---	---	7.4-8.4	---	0
Urban land.						
4507:						
Canisteeo-----	0-10	36-41	---	7.6-8.4	5-15	0
	10-18	36-41	---	7.6-8.4	5-15	0
	18-39	12-29	---	7.6-8.4	12-18	0
	39-80	20-25	---	7.6-8.4	5-30	0
Urban land.						
4551B:						
Calamine-----	0-8	30-36	---	6.1-7.8	0	0
	8-20	30-36	---	6.1-7.8	0	0
	20-27	30-36	---	6.1-7.8	0-30	0
	27-34	36-41	---	7.6-8.6	5-30	0
	34-46	36-41	---	7.6-8.6	5-30	0
	46-60	---	---	---	---	0
Urban land.						
4551D:						
Calamine-----	0-8	30-36	---	6.1-7.8	0	0
	8-20	30-36	---	6.1-7.8	0	0
	20-27	30-36	---	6.1-7.8	0-30	0
	27-34	36-41	---	7.6-8.6	5-30	0
	34-46	36-41	---	7.6-8.6	5-30	0
	46-60	---	---	---	---	0
Urban land.						

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
4635:						
Buckney-----	0-14	10-15	---	6.6-7.8	0-15	0
	14-22	5.0-15	---	6.6-7.8	0-15	0
	22-60	5.0-10	---	7.4-8.4	5-30	0
Urban land.						
4635B:						
Buckney-----	0-14	10-15	---	6.6-7.8	0-15	0
	14-22	5.0-15	---	6.6-7.8	0-15	0
	22-60	5.0-10	---	7.4-8.4	5-30	0
Urban land.						
4946B:						
Udorthents.						
Highway.						
5010.						
Pits, sand and gravel						
5030.						
Pits, limestone quarries						
5035.						
Pits, gypsum quarries						
5040.						
Udorthents, loamy						
5049:						
Aquolls, ponded.						
Udorthents, loamy.						
5060.						
Pits, clay						
5080.						
Udorthents						
5457:						
Du Page, channeled, frequently flooded--	0-30	17-26	---	6.6-8.4	0-15	0
	30-35	11-22	---	7.4-8.4	5-40	0
	35-80	4.0-17	---	7.4-8.4	5-40	0
5507:						
Corvuso-----	0-20	25-40	---	7.4-8.4	3-20	0
	20-30	15-30	---	7.4-8.4	15-25	0-2
	30-80	15-30	---	7.4-8.4	10-20	0
Brownston-----	0-22	21-28	---	7.4-8.4	10-20	0-1
	22-38	18-31	---	7.4-8.4	10-25	0-1
	38-60	10-20	---	7.4-8.4	10-20	0-1
AW.						
Animal waste lagoon						

Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum
	In	meq/100 g	meq/100 g	pH	Pct	Pct
SL. Sewage lagoon						
W. Water						

Water Features

The table described in this section gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are *negligible, very low, low, medium, high, and very high*.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall

or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
6: Okoboji, depressional, ponded-----	B/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
27B: Terril-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding		
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency	
34: Estherville-----	B	Very low		Ft	Ft	Ft					
			January	---	---	---	---	None	---	None	
			February	---	---	---	---	None	---	None	
			March	---	---	---	---	None	---	None	
			April	---	---	---	---	None	---	None	
			May	---	---	---	---	None	---	None	
			June	---	---	---	---	None	---	None	
			July	---	---	---	---	None	---	None	
			August	---	---	---	---	None	---	None	
			September	---	---	---	---	None	---	None	
			October	---	---	---	---	None	---	None	
			November	---	---	---	---	None	---	None	
			December	---	---	---	---	None	---	None	
34B: Estherville-----	B	Very low									
			January	---	---	---	---	None	---	None	
			February	---	---	---	---	None	---	None	
			March	---	---	---	---	None	---	None	
			April	---	---	---	---	None	---	None	
			May	---	---	---	---	None	---	None	
			June	---	---	---	---	None	---	None	
			July	---	---	---	---	None	---	None	
			August	---	---	---	---	None	---	None	
			September	---	---	---	---	None	---	None	
			October	---	---	---	---	None	---	None	
			November	---	---	---	---	None	---	None	
			December	---	---	---	---	None	---	None	
55: Nicollet-----	B	Low									
			January	3.0-5.5	>6.0	---	---	None	---	None	
			February	2.5-5.0	>6.0	---	---	None	---	None	
			March	1.5-4.0	>6.0	---	---	None	---	None	
			April	1.0-3.5	>6.0	---	---	None	---	None	
			May	1.5-4.0	>6.0	---	---	None	---	None	
			June	2.0-4.5	>6.0	---	---	None	---	None	
			July	3.0-5.5	>6.0	---	---	None	---	None	
			August	3.5-6.0	>6.0	---	---	None	---	None	
			September	4.0-6.5	>6.0	---	---	None	---	None	
			October	3.5-6.0	>6.0	---	---	None	---	None	
			November	2.5-5.0	>6.0	---	---	None	---	None	
			December	3.0-5.5	>6.0	---	---	None	---	None	

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
62F: Storden-----	B	High	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
90: Okoboji, mucky, depressional, ponded-----	B/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
95: Harps-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding		
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency	
107: Webster-----	B/D	Low		Ft	Ft	Ft					
			January	2.0-3.5	>6.0	---	---	None	---	None	
			February	1.5-3.0	>6.0	---	---	None	---	None	
			March	0.5-2.0	>6.0	---	---	None	---	None	
			April	0.0-1.0	>6.0	---	---	None	---	None	
			May	0.5-1.5	>6.0	---	---	None	---	None	
			June	1.0-2.0	>6.0	---	---	None	---	None	
			July	2.0-3.0	>6.0	---	---	None	---	None	
			August	2.5-3.5	>6.0	---	---	None	---	None	
			September	3.0-4.0	>6.0	---	---	None	---	None	
			October	2.5-3.5	>6.0	---	---	None	---	None	
			November	1.5-3.0	>6.0	---	---	None	---	None	
			December	2.0-3.5	>6.0	---	---	None	---	None	
108: Wadena-----	B	Low	January	---	---	---	---	None	---	None	
			February	---	---	---	---	None	---	None	
			March	---	---	---	---	None	---	None	
			April	---	---	---	---	None	---	None	
			May	---	---	---	---	None	---	None	
			June	---	---	---	---	None	---	None	
			July	---	---	---	---	None	---	None	
			August	---	---	---	---	None	---	None	
			September	---	---	---	---	None	---	None	
			October	---	---	---	---	None	---	None	
			November	---	---	---	---	None	---	None	
			December	---	---	---	---	None	---	None	
			108B: Wadena-----	B	Low	January	---	---	---	---	None
February	---	---				---	---	None	---	None	
March	---	---				---	---	None	---	None	
April	---	---				---	---	None	---	None	
May	---	---				---	---	None	---	None	
June	---	---				---	---	None	---	None	
July	---	---				---	---	None	---	None	
August	---	---				---	---	None	---	None	
September	---	---				---	---	None	---	None	
October	---	---				---	---	None	---	None	
November	---	---				---	---	None	---	None	
December	---	---				---	---	None	---	None	

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
108C: Wadena-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
135: Coland, occasionally flooded-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None
136: Ankeny, rarely flooded----	B	Very low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Very brief	Rare
			March	---	---	---	---	None	Very brief	Rare
			April	---	---	---	---	None	Very brief	Rare
			May	---	---	---	---	None	Very brief	Rare
			June	---	---	---	---	None	Very brief	Rare
			July	---	---	---	---	None	Very brief	Rare
			August	---	---	---	---	None	Very brief	Rare
			September	---	---	---	---	None	Very brief	Rare
			October	---	---	---	---	None	Very brief	Rare
			November	---	---	---	---	None	Very brief	Rare
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
138B: Clarion-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
138C2: Clarion, moderately eroded	B	Medium	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
201B: Coland-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
201B: Terril-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
203: Cylinder-----	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
227: Wadena, loamy substratum--	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
227B: Wadena, loamy substratum--	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
228: Cylinder, loamy substratum	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
236D: Lester-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
236E: Lester-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
236F: Lester-----	B	High	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
259: Biscay-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
262G: Lester-----	B	High		Ft	Ft	Ft				
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Belview-----	B	High								
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
274: Rolfe, depressional, ponded-----	C	Negligible								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
278: Biscay, loamy substratum--	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.3-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.3-1.5	>6.0	---	---	None	---	None
			June	0.7-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
307: Dundas-----	B/D	Medium	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
315B: Udifluvents, occasionally flooded-----	A	Very low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Brief	Occasional
			March	---	---	---	---	None	Brief	Occasional
			April	---	---	---	---	None	Brief	Occasional
			May	---	---	---	---	None	Brief	Occasional
			June	---	---	---	---	None	Brief	Occasional
			July	---	---	---	---	None	Brief	Occasional
			August	---	---	---	---	None	Brief	Occasional
			September	---	---	---	---	None	Brief	Occasional
			October	---	---	---	---	None	Brief	Occasional
			November	---	---	---	---	None	Brief	Occasional
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
323B: Fort Dodge-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
325: Le Sueur-----	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
338: Garmore-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
342: Estherville, loamy substratum-----	B	Very low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
			342B: Estherville, loamy substratum-----	B	Very low	January	---	---	---	---
February	---	---				---	---	None	---	None
March	---	---				---	---	None	---	None
April	---	---				---	---	None	---	None
May	---	---				---	---	None	---	None
June	---	---				---	---	None	---	None
July	---	---				---	---	None	---	None
August	---	---				---	---	None	---	None
September	---	---				---	---	None	---	None
October	---	---				---	---	None	---	None
November	---	---				---	---	None	---	None
December	---	---				---	---	None	---	None
344B: Copaston-----	D	Low				January	---	---	---	---
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
345: Copaston-----	D	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Jacwin-----	B	High	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
355: Luther-----	B	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
383: Marna-----	C/D	High	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
385: Guckeen-----	C	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
386: Cordova-----	C/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
387B: Kamrar-----	B	Medium	January	4.0-6.0	>6.0	---	---	None	---	None
			February	3.5-5.5	>6.0	---	---	None	---	None
			March	2.5-4.5	>6.0	---	---	None	---	None
			April	2.0-4.0	>6.0	---	---	None	---	None
			May	2.5-4.5	>6.0	---	---	None	---	None
			June	3.0-5.0	>6.0	---	---	None	---	None
			July	4.0-6.0	>6.0	---	---	None	---	None
			August	4.5-6.5	>6.0	---	---	None	---	None
			September	5.0-6.7	>6.0	---	---	None	---	None
			October	4.5-6.5	>6.0	---	---	None	---	None
			November	3.5-5.5	>6.0	---	---	None	---	None
			December	4.0-6.0	>6.0	---	---	None	---	None
413G: Gosport-----	C	Very high	January	4.0-6.0	>6.0	---	---	None	---	None
			February	3.5-5.5	>6.0	---	---	None	---	None
			March	2.5-4.5	>6.0	---	---	None	---	None
			April	2.0-4.0	>6.0	---	---	None	---	None
			May	2.5-4.5	>6.0	---	---	None	---	None
			June	3.0-5.0	>6.0	---	---	None	---	None
			July	4.0-6.0	>6.0	---	---	None	---	None
			August	4.5-6.5	>6.0	---	---	None	---	None
			September	5.0-6.7	>6.0	---	---	None	---	None
			October	4.5-6.5	>6.0	---	---	None	---	None
			November	3.5-5.5	>6.0	---	---	None	---	None
			December	4.0-6.0	>6.0	---	---	None	---	None
Emeline-----	D	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
413G: Ridgeton-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
457: Du Page, occasionally flooded-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			September	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None
485: Spillville, occasionally flooded-----	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			March	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			April	1.0-3.5	>6.0	---	---	None	Brief	Occasional
			May	1.5-4.0	>6.0	---	---	None	Brief	Occasional
			June	2.0-4.5	>6.0	---	---	None	Brief	Occasional
			July	3.0-5.5	>6.0	---	---	None	Brief	Occasional
			August	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			September	4.0-6.5	>6.0	---	---	None	Brief	Occasional
			October	3.5-6.0	>6.0	---	---	None	Brief	Occasional
			November	2.5-5.0	>6.0	---	---	None	Brief	Occasional
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
485B: Spillville, rarely flooded	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Brief	Rare
			March	4.5-6.5	>6.0	---	---	None	Brief	Rare
			April	4.0-6.0	>6.0	---	---	None	Brief	Rare
			May	4.5-6.5	>6.0	---	---	None	Brief	Rare
			June	5.0-6.7	>6.0	---	---	None	Brief	Rare
			July	6.0-6.7	>6.0	---	---	None	Brief	Rare
			August	6.5-6.7	>6.0	---	---	None	Brief	Rare
			September	6.5-6.7	>6.0	---	---	None	Brief	Rare
			October	6.5-6.7	>6.0	---	---	None	Brief	Rare
			November	5.5-6.7	>6.0	---	---	None	Brief	Rare
			December	6.0-6.7	>6.0	---	---	None	---	None
506: Wacousta, depressional, ponded-----	B/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
507: Canisteeo-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
511: Blue Earth, depressional, ponded-----	B/D	Negligible								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
526: Wacousta, mucky, depressional, ponded-----	B/D	Negligible								
			January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
536: Hanlon, occasionally flooded-----	B	Very low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Very brief	Occasional
			March	4.5-6.5	>6.0	---	---	None	Very brief	Occasional
			April	4.0-6.0	>6.0	---	---	None	Very brief	Occasional
			May	4.5-6.5	>6.0	---	---	None	Very brief	Occasional
			June	5.0-6.7	>6.0	---	---	None	Very brief	Occasional
			July	6.0-6.7	>6.0	---	---	None	Very brief	Occasional
			August	6.5-6.7	>6.0	---	---	None	Very brief	Occasional
			September	6.5-6.7	>6.0	---	---	None	Very brief	Occasional
			October	6.5-6.7	>6.0	---	---	None	Very brief	Occasional
			November	5.5-6.7	>6.0	---	---	None	Very brief	Occasional
			December	6.0-6.7	>6.0	---	---	None	---	None
541C: Estherville-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Hawick-----	A	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
551B: Calamine-----	D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
551D: Calamine-----	D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
559: Talcot-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
561: Talcot, loamy substratum--	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.3-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.3-1.5	>6.0	---	---	None	---	None
			June	0.7-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
566C: Moingona-----	B	Medium	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
568D: Cokato-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
568E: Cokato-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
583: Minnetonka-----	D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
606: Lanyon, depressional, ponded-----	C/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Occasional	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Occasional	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Occasional	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Occasional	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Occasional	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Occasional	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Occasional	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Occasional	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Occasional	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Occasional	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
625: Lerdal-----	C	Very high	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
636: Buckney, rarely flooded---	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Brief	Rare
			March	---	---	---	---	None	Brief	Rare
			April	---	---	---	---	None	Brief	Rare
			May	---	---	---	---	None	Brief	Rare
			June	---	---	---	---	None	Brief	Rare
			July	---	---	---	---	None	Brief	Rare
			August	---	---	---	---	None	Brief	Rare
			September	---	---	---	---	None	Brief	Rare
			October	---	---	---	---	None	Brief	Rare
			November	---	---	---	---	None	Brief	Rare
			December	---	---	---	---	None	---	None
636B: Buckney, rarely flooded---	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	Brief	Rare
			March	---	---	---	---	None	Brief	Rare
			April	---	---	---	---	None	Brief	Rare
			May	---	---	---	---	None	Brief	Rare
			June	---	---	---	---	None	Brief	Rare
			July	---	---	---	---	None	Brief	Rare
			August	---	---	---	---	None	Brief	Rare
			September	---	---	---	---	None	Brief	Rare
			October	---	---	---	---	None	Brief	Rare
			November	---	---	---	---	None	Brief	Rare
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
638C2: Clarion, moderately eroded	B	Medium	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
Storden, moderately eroded	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
650: Joliet-----	D	Medium	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
650: Faxon-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
715: Fluvaquents, frequently flooded-----	A	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Long	Frequent
			March	0.5-2.0	>6.0	---	---	None	Long	Frequent
			April	0.0-1.0	>6.0	---	---	None	Long	Frequent
			May	0.5-1.5	>6.0	---	---	None	Long	Frequent
			June	1.0-2.0	>6.0	---	---	None	Long	Frequent
			July	2.0-3.0	>6.0	---	---	None	Long	Frequent
			August	2.5-3.5	>6.0	---	---	None	Long	Frequent
			September	3.0-4.0	>6.0	---	---	None	Long	Frequent
			October	2.5-3.5	>6.0	---	---	None	Long	Frequent
			November	1.5-3.0	>6.0	---	---	None	Long	Frequent
			December	2.0-3.5	>6.0	---	---	None	---	None
735: Havelock, occasionally flooded-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			March	0.5-2.0	>6.0	---	---	None	Brief	Occasional
			April	0.0-1.0	>6.0	---	---	None	Brief	Occasional
			May	0.5-1.5	>6.0	---	---	None	Brief	Occasional
			June	1.0-2.0	>6.0	---	---	None	Brief	Occasional
			July	2.0-3.0	>6.0	---	---	None	Brief	Occasional
			August	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			September	3.0-4.0	>6.0	---	---	None	Brief	Occasional
			October	2.5-3.5	>6.0	---	---	None	Brief	Occasional
			November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
740D: Hawick-----	A	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
775B: Billett-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
775C: Billett-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
777B: Wapsie-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
835D2: Storden, moderately eroded	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Omsrud, moderately eroded	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
835E2: Storden, moderately eroded	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Omsrud, moderately eroded	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
836B: Kilkenny-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
854D: Fens, Aquolls-----	A/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
855: Shorewood-----	C	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
956: Harps-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
956: Okoboji, depressiona l, ponded-----	B/D	Negligible	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
1007: Cosmos, bouldery-----	C/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
1055B: Kandiyo, bouldery-----	C/D	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
1138B: Clarion-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
1236B: Angus-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
1236C: Angus-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
1259: Biscay, depressional, ponded-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
1507: Brownton-----	C/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
1555: Nicollet-----	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
1555: Guckeen-----	C	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
1836B: Kilkenny-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
Shorewood-----	C	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
2700C: Ridgeton-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
2700D: Ridgeton-----	B	Medium	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
4000. Urban land										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4055: Nicollet-----	B	Low	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
Urban land.										
4107: Webster-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Urban land.										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4138B: Clarion-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	---	None
			March	4.5-6.5	>6.0	---	---	None	---	None
			April	4.0-6.0	>6.0	---	---	None	---	None
			May	4.5-6.5	>6.0	---	---	None	---	None
			June	5.0-6.7	>6.0	---	---	None	---	None
			July	6.0-6.7	>6.0	---	---	None	---	None
			August	6.5-6.7	>6.0	---	---	None	---	None
			September	6.5-6.7	>6.0	---	---	None	---	None
			October	6.5-6.7	>6.0	---	---	None	---	None
			November	5.5-6.7	>6.0	---	---	None	---	None
			December	6.0-6.7	>6.0	---	---	None	---	None
Urban land.										
4235B: Angus-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Urban land.										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
4236D: Lester-----	B	Medium		Ft	Ft	Ft				
			January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Urban land.										
4325: Le Sueur-----	B	Low								
			January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
Urban land.										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4444: Jacwin-----	B	Medium	January	3.0-5.5	>6.0	---	---	None	---	None
			February	2.5-5.0	>6.0	---	---	None	---	None
			March	1.5-4.0	>6.0	---	---	None	---	None
			April	1.0-3.5	>6.0	---	---	None	---	None
			May	1.5-4.0	>6.0	---	---	None	---	None
			June	2.0-4.5	>6.0	---	---	None	---	None
			July	3.0-5.5	>6.0	---	---	None	---	None
			August	3.5-6.0	>6.0	---	---	None	---	None
			September	4.0-6.5	>6.0	---	---	None	---	None
			October	3.5-6.0	>6.0	---	---	None	---	None
			November	2.5-5.0	>6.0	---	---	None	---	None
			December	3.0-5.5	>6.0	---	---	None	---	None
Urban land.										
4507: Canisteo-----	B/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Urban land.										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4551B: Calamine-----	D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Urban land.										
4551D: Calamine-----	D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Urban land.										

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4635: Buckney-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Urban land.										
4635B: Buckney-----	B	Low	January	---	---	---	---	None	---	None
			February	---	---	---	---	None	---	None
			March	---	---	---	---	None	---	None
			April	---	---	---	---	None	---	None
			May	---	---	---	---	None	---	None
			June	---	---	---	---	None	---	None
			July	---	---	---	---	None	---	None
			August	---	---	---	---	None	---	None
			September	---	---	---	---	None	---	None
			October	---	---	---	---	None	---	None
			November	---	---	---	---	None	---	None
			December	---	---	---	---	None	---	None
Urban land.										
4946B. Udorthents-Highway										
5010: Pits, sand and gravel-----	A	---	Jan-Dec	---	---	---	---	None	---	---
5030: Pits, limestone quarries--	A	---	Jan-Dec	---	---	---	---	None	---	---

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
5035: Pits, gypsum quarries-----	A	---	Jan-Dec	---	---	---	---	None	---	---
5040. Udorthents, loamy										
5049: Aquolls, ponded-----	---	---	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			March	0.5-2.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			April	0.0-1.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			May	0.5-2.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			June	1.0-2.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			July	2.0-3.5	>6.0	0.0-1.0	Very long	Frequent	---	None
			August	2.5-3.5	>6.0	0.0-1.0	Very long	Frequent	---	None
			September	3.0-4.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			October	2.5-3.5	>6.0	0.0-1.0	Very long	Frequent	---	None
			November	1.5-3.0	>6.0	0.0-1.0	Very long	Frequent	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Udorthents, loamy.										
5060. Pits, clay										
5080. Udorthents										
5457: Du Page, channeled, frequently flooded-----	B	Low	January	6.0-6.7	>6.0	---	---	None	---	None
			February	5.5-6.7	>6.0	---	---	None	Long	Frequent
			March	4.5-6.5	>6.0	---	---	None	Long	Frequent
			April	4.0-6.0	>6.0	---	---	None	Long	Frequent
			May	4.5-6.5	>6.0	---	---	None	Long	Frequent
			June	5.0-6.7	>6.0	---	---	None	Long	Frequent
			July	6.0-6.7	>6.0	---	---	None	Long	Frequent
			August	6.5-6.7	>6.0	---	---	None	Long	Frequent
			September	6.5-6.7	>6.0	---	---	None	Long	Frequent
			October	6.5-6.7	>6.0	---	---	None	Long	Frequent
			November	5.5-6.7	>6.0	---	---	None	Long	Frequent
			December	6.0-6.7	>6.0	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro- logic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
5507: Corvuso-----	C/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
Brownton-----	C/D	Low	January	2.0-3.5	>6.0	---	---	None	---	None
			February	1.5-3.0	>6.0	---	---	None	---	None
			March	0.5-2.0	>6.0	---	---	None	---	None
			April	0.0-1.0	>6.0	---	---	None	---	None
			May	0.5-1.5	>6.0	---	---	None	---	None
			June	1.0-2.0	>6.0	---	---	None	---	None
			July	2.0-3.0	>6.0	---	---	None	---	None
			August	2.5-3.5	>6.0	---	---	None	---	None
			September	3.0-4.0	>6.0	---	---	None	---	None
			October	2.5-3.5	>6.0	---	---	None	---	None
			November	1.5-3.0	>6.0	---	---	None	---	None
			December	2.0-3.5	>6.0	---	---	None	---	None
AW. Animal waste lagoon										
SL. Sewage lagoon										
W. Water										

Soil Features

The table described in this section 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 of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
6: Okoboji, depressional, ponded-----	---	In	---	In	---	High	High	Low
27B: Terril-----	---	---	---	---	---	Moderate	Moderate	Low
34: Estherville-----	---	---	---	---	---	Low	Low	Low
34B: Estherville-----	---	---	---	---	---	Low	Low	Low
55: Nicollet-----	---	---	---	---	---	High	High	Low
62F: Storden-----	---	---	---	---	---	Moderate	Low	Low
90: Okoboji, mucky, depressional, ponded--	---	---	---	---	---	High	High	Low
95: Harps-----	---	---	---	---	---	High	High	Low
107: Webster-----	---	---	---	---	---	High	High	Low
108: Wadena-----	---	---	---	---	---	Low	Low	Low
108B: Wadena-----	---	---	---	---	---	Low	Low	Low
108C: Wadena-----	---	---	---	---	---	Low	Low	Low
135: Coland, occasionally flooded-----	---	---	---	---	---	High	High	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
136: Ankeny, rarely flooded	---	---	---	---	---	Moderate	Low	Low
138B: Clarion-----	---	---	---	---	---	Moderate	Low	Low
138C2: Clarion, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low
201B: Coland-----	---	---	---	---	---	High	High	Low
Terril-----	---	---	---	---	---	Moderate	Moderate	Low
203: Cylinder-----	---	---	---	---	---	High	Moderate	Low
227: Wadena, loamy substratum-----	---	---	---	---	---	Low	Low	Low
227B: Wadena, loamy substratum-----	---	---	---	---	---	Low	Low	Low
228: Cylinder, loamy substratum-----	---	---	---	---	---	High	Moderate	Low
236D: Lester-----	---	---	---	---	---	Moderate	Low	Moderate
236E: Lester-----	---	---	---	---	---	Moderate	Low	Moderate
236F: Lester-----	---	---	---	---	---	Moderate	Low	Moderate
259: Biscay-----	---	---	---	---	---	High	Moderate	Low
262G: Lester-----	---	---	---	---	---	Moderate	Low	Moderate
Belview-----	---	---	---	---	---	Moderate	Low	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In		In	In			
274: Rolfe, depressional, ponded-----	---	---	---	---	---	High	High	Moderate
278: Biscay, loamy substratum-----	---	---	---	---	---	High	Moderate	Low
307: Dundas-----	---	---	---	---	---	High	High	Moderate
315B. Udifluvents, occasionally flooded								
323B: Fort Dodge-----	---	---	---	---	---	Moderate	Moderate	Low
325: Le Sueur-----	---	---	---	---	---	High	High	Low
338: Garmore-----	---	---	---	---	---	High	Moderate	Moderate
342: Estherville, loamy substratum-----	---	---	---	---	---	Low	Low	Low
342B: Estherville, loamy substratum-----	---	---	---	---	---	Low	Low	Low
344B: Copaston-----	Lithic bedrock	10-20	Strongly cemented	---	---	Moderate	Low	Low
345: Copaston-----	Lithic bedrock	10-20	Strongly cemented	---	---	Moderate	Low	Low
Jacwin-----	Paralithic bedrock	30-50	Strongly cemented	---	---	High	High	Low
355: Luther-----	---	---	---	---	---	High	High	Moderate

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
383: Marna-----	---	---	---	---	---	High	High	Low
385: Guckeen-----	---	---	---	---	---	High	High	Low
386: Cordova-----	---	---	---	---	---	High	High	Low
387B: Kamrar-----	---	---	---	---	---	Moderate	High	Low
413G: Gosport-----	Paralithic bedrock	20-40	Moderately cemented	---	---	Moderate	High	High
Emeline-----	Lithic bedrock	4-12	Strongly cemented	---	---	Moderate	Low	Low
Ridgeton-----	---	---	---	---	---	Moderate	Moderate	Low
457: Du Page, occasionally flooded-----	---	---	---	---	---	Moderate	Low	Low
485: Spillville, occasionally flooded--	---	---	---	---	---	Moderate	High	Moderate
485B: Spillville, rarely flooded-----	---	---	---	---	---	Moderate	High	Moderate
506: Wacousta, depressiona, ponded-----	---	---	---	---	---	High	High	Low
507: Canistee-----	---	---	---	---	---	High	High	Low
511: Blue Earth, depressiona, ponded--	---	---	---	---	---	High	High	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In		In	In			
526: Wacousta, mucky, depressional, ponded--	---	---	---	---	---	High	High	Low
536: Hanlon, occasionally flooded-----	---	---	---	---	---	Moderate	Moderate	Low
541C: Estherville-----	---	---	---	---	---	Low	Low	Low
Hawick-----	---	---	---	---	---	Low	Low	Low
551B: Calamine-----	Paralithic bedrock	40-60	Strongly cemented	---	---	Moderate	High	Moderate
551D: Calamine-----	Paralithic bedrock	40-60	Strongly cemented	---	---	Moderate	High	Moderate
559: Talcot-----	---	---	---	---	---	High	High	Low
561: Talcot, loamy substratum-----	---	---	---	---	---	High	High	Low
566C: Moingona-----	---	---	---	---	---	Moderate	High	Low
568D: Cokato-----	---	---	---	---	---	Moderate	Low	Low
568E: Cokato-----	---	---	---	---	---	Moderate	Low	Low
583: Minnetonka-----	---	---	---	---	---	High	High	Moderate
606: Lanyon, depressional, ponded-----	---	---	---	---	---	High	High	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
625: Lerdal-----	---	---	---	---	---	High	High	High
636: Buckney, rarely flooded	---	---	---	---	---	Low	Low	Low
636B: Buckney, rarely flooded	---	---	---	---	---	Low	Low	Low
638C2: Clarion, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low
Storden, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low
650: Joliet-----	Lithic bedrock	10-20	Strongly cemented	---	---	High	High	Low
Faxon-----	Lithic bedrock	20-40	Strongly cemented	---	---	High	High	Low
715: Fluvaquents, frequently flooded-----	---	---	---	---	---	Low	Low	Moderate
735: Havelock, occasionally flooded-----	---	---	---	---	---	High	High	Low
740D: Hawick-----	---	---	---	---	---	Low	Low	Low
775B: Billett-----	---	---	---	---	---	Moderate	Low	Moderate
775C: Billett-----	---	---	---	---	---	Moderate	Low	Moderate
777B: Wapsie-----	---	---	---	---	---	Low	Low	Moderate
835D2: Storden, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
835D2: Omsrud, moderately eroded-----	---	In	---	In	---	Moderate	Low	Low
835E2: Storden, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low
Omsrud, moderately eroded-----	---	---	---	---	---	Moderate	Low	Low
836B: Kilkenny-----	---	---	---	---	---	Moderate	Moderate	Moderate
854D: Fens, Aquolls-----	---	---	---	2-4	25-32	High	High	Moderate
855: Shorewood-----	---	---	---	---	---	High	High	Moderate
956: Harps-----	---	---	---	---	---	High	High	Low
Okoboji, depressional, ponded-----	---	---	---	---	---	High	High	Low
1007: Cosmos, bouldery-----	---	---	---	---	---	High	High	Low
1055B: Kandiyohi, bouldery----	---	---	---	---	---	High	High	Low
1138B: Clarion-----	---	---	---	---	---	Moderate	Low	Low
1236B: Angus-----	---	---	---	---	---	Moderate	Low	Moderate
1236C: Angus-----	---	---	---	---	---	Moderate	Low	Moderate
1259: Biscay, depressional, ponded-----	---	---	---	---	---	High	Moderate	Low

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
1507: Brownton-----	---	In	---	In	---	High	High	Low
1555: Nicollet-----	---	---	---	---	---	High	High	Low
Guckeen-----	---	---	---	---	---	High	High	Low
1836B: Kilkenny-----	---	---	---	---	---	Moderate	Moderate	Moderate
Shorewood-----	---	---	---	---	---	High	High	Moderate
2700C: Ridgeton-----	---	---	---	---	---	Moderate	Moderate	Low
2700D: Ridgeton-----	---	---	---	---	---	Moderate	Moderate	Low
4000. Urban land								
4055: Nicollet-----	---	---	---	---	---	High	High	Low
Urban land.								
4107: Webster-----	---	---	---	---	---	High	High	Low
Urban land.								
4138B: Clarion-----	---	---	---	---	---	Moderate	Low	Low
Urban land.								
4235B: Angus-----	---	---	---	---	---	Moderate	Low	Moderate
Urban land.								
4236D: Lester-----	---	---	---	---	---	Moderate	Low	Moderate
Urban land.								

Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness	Initial	Total		Uncoated steel	Concrete
		In		In	In			
4325: Le Sueur----- Urban land.	---	---	---	---	---	High	High	Low
4444: Jacwin----- Urban land.	Paralithic bedrock	30-50	Strongly cemented	---	---	High	High	Low
4507: Canisteo----- Urban land.	---	---	---	---	---	High	High	Low
4551B: Calamine----- Urban land.	Paralithic bedrock	40-60	Strongly cemented	---	---	Moderate	High	Moderate
4551D: Calamine----- Urban land.	Paralithic bedrock	40-60	Strongly cemented	---	---	Moderate	High	Moderate
4635: Buckney----- Urban land.	---	---	---	---	---	Low	Low	Low
4635B: Buckney----- Urban land.	---	---	---	---	---	Low	Low	Low
4946B. Udorthents-Highway								
5010. Pits, sand and gravel								

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