

Building Site Development
Grant County, North Dakota

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The following tables show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

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. Slight indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. Moderate 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. Severe 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.

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.

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Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1B: Amor-----	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: area reclaim thin layer
1C: Amor-----	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: area reclaim thin layer
3D: Amor-----	Moderate: slope	Moderate: shrink-swell slope	Moderate: shrink-swell slope	Severe: slope	Severe: low strength	Moderate: large stones slope thin layer
Cabba-----	Moderate: slope	Moderate: shrink-swell slope	Moderate: slope	Severe: slope	Moderate: shrink-swell slope	Moderate: area reclaim slope thin layer
5D: Amor-----	Moderate: slope	Moderate: shrink-swell slope	Moderate: shrink-swell slope	Severe: slope	Severe: low strength	Moderate: area reclaim slope thin layer
Cabba-----	Severe: depth to rock	Moderate: shrink-swell slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: shrink-swell slope depth to rock	Severe: depth to rock
6: Arnegard-----	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Severe: low strength	Slight
6B: Arnegard-----	Slight	Moderate: shrink-swell	Slight	Moderate: shrink-swell slope	Severe: low strength	Slight
7: Banks-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding droughty
8: Breien-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding frost action	Moderate: droughty
9: Bowdle-----	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
10F: Cabba-----	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock
11F: Cabba-----	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock
Brandenburg-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: slope small stones droughty
12C: Chama-----	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: area reclaim thin layer

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Cabba-----	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock	Moderate: shrink-swell slope depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock
12D: Chama-----	Moderate: slope	Moderate: shrink-swell slope	Moderate: shrink-swell slope	Severe: slope	Severe: low strength	Moderate: area reclaim slope thin layer
Cabba-----	Severe: depth to rock	Moderate: shrink-swell slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: shrink-swell slope depth to rock	Severe: depth to rock
13F: Badland-----	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Severe: low strength	Severe: excess salt depth to rock
Cabba-----	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock
15B: Daglum-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
19F: Cabba, stony-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
20B: Desart-----	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Severe: excess sodium
25C: Ekalaka-----	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Severe: excess sodium
Lemert-----	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Severe: excess sodium
30F: Flasher-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: area reclaim slope thin layer
31F: Flasher-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: area reclaim slope thin layer
33: Arveson-----	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
35: Grail-----	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
37: Grail-----	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
Belfield-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
Daglum-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium

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40: Harriet-----	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding low strength wetness	Severe: excess sodium wetness
41: Heil-----	Severe: ponding cutbanks cave	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: low strength shrink-swell ponding	Severe: excess sodium too clayey ponding
42: Lawther-----	Severe: cutbanks cave	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: too clayey
44B: Lihen-----	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
46: Dumps And Pits-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
48B: Moreau-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
48C: Moreau-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
52: Regan-----	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding low strength wetness	Severe: wetness
53B: Regent-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
53C: Regent-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
54B: Regent-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
Rhoades-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
54C: Regent-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: thin layer
Rhoades-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
55C: Rhoades-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium

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Daglun-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
56B: Ruso-----	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
57B: Savage-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
59D: Seroco-----	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Blownout Land-----	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
60: Shambo-----	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: low strength shrink-swell	Slight
60B: Shambo-----	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Moderate: low strength shrink-swell	Slight
62B: Daglun Variant-----	Slight	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: area reclaim excess sodium thin layer
Daglun-----	Moderate: too clayey	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium
63: Straw-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding frost action	Slight
64: Channel-----	---	---	---	---	---	---
Straw-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
65B: Parshall-----	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
68C: Telfer-----	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Seroco-----	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
70B: Beisigl-----	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: thin layer droughty
Lihen-----	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
Flasher-----	Slight	Slight	Slight	Moderate: slope	Slight	Severe: area reclaim thin layer

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70D: Beisigl-----	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope thin layer droughty
Flasher-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: area reclaim thin layer
71B: Sen-----	Moderate: depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell slope	Severe: low strength	Moderate: depth to rock
80B: Vebar-----	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: area reclaim thin layer
Parshall-----	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
80C: Vebar-----	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: area reclaim thin layer
83D: Vebar-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: large stones
84D: Vebar-----	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: area reclaim slope thin layer
Flasher-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: area reclaim thin layer
90: Velva-----	Slight	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding frost action	Slight
91F: Schaller-----	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Cabba-----	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope depth to rock
92: Belfield, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium excess salt
Daglun, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium excess salt
93: Belfield, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium excess salt
Grail, saline-----	Moderate: too clayey wetness	Moderate: shrink-swell	Moderate: shrink-swell wetness	Moderate: shrink-swell	Severe: low strength	Severe: excess salt

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94: Daglum, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium excess salt
Rhoades, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess sodium excess salt
95: Moreau, saline-----	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Severe: excess salt too clayey
96: Parshall, saline-----	Severe: cutbanks cave	Slight	Moderate: wetness	Slight	Moderate: frost action	Severe: excess salt
99D: Amor, Moderately saline-	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: area reclaim thin layer
101: Brisbane-----	Severe: cutbanks cave	Moderate: shrink-swell	Slight	Moderate: shrink-swell	Moderate: frost action low strength shrink-swell	Slight
M-W: Miscellaneous Water-----	---	---	---	---	---	---

