

## Engineering Interpretations

### **Construction Material and Excavating**

Soils are rated as sources for road fill, topsoil, sand, and gravel. Suitability ratings of good, fair, or poor are given for soils used as a source of road fill and topsoil. Ratings of probable and improbable are given for sand and gravel. A rating of probable means that on the basis of the available evidence, the source material is likely to be in or below the soil. A rating of improbable means that the source material is unlikely to be in or below the soil. The ratings for sand and gravel do not consider the quality of the source material because quality depends on how the source material is to be used.

### **Road Fill**

Road fill consists of soil material that is excavated from its original position and used in road embankments elsewhere. The evaluations for road fill are for low embankments that generally are less than 6 feet in height and are less exacting in design than high embankments such as those along superhighways. The rating is given for the whole soil, from the surface to a depth of about 5 feet, based on the assumption that soil horizons will be mixed in loading, dumping, and spreading. Soils are rated as to the amount of material available for excavation, the ease of excavation, and how well the material performs after it is in place.

### **Sand**

Sand as a construction material is usually defined as particles ranging in size from 0.074 mm (sieve #200) to 4.75 mm (sieve #4) in diameter. Sand is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the sand for specific purposes is not evaluated. If the lowest layer of the soil contains sand, the soil is rated as a probable source regardless of thickness. The assumption is that the sand layer below the depth of observation exceeds the minimum thickness.

### **Gravel**

Gravel as a construction material is defined as particles ranging in size from 4.76 mm (sieve #4) to 76 mm (3 inches) in diameter.

Gravel is used in great quantities in many kinds of construction. Specifications for each purpose vary widely. The intent of this rating is to show only the probability of finding material in suitable quantity. The suitability of the gravel for specific purposes is not evaluated. If the lowest layer of the soil contains gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel layer below the depth of observation exceeds the minimum thickness.

### **Topsoil**

The term "topsoil" has several meanings. As used here, the term describes soil material used to cover an area so as to improve soil conditions for establishment and maintenance of adapted vegetation. Generally, the upper part of the soil, which is richest in organic matter, is most desirable; however, material excavated from deeper layers is also used. In this rating, the upper 40 inches of soil material is evaluated for use as topsoil. In the

borrow area, the material below 40 inches is evaluated for its suitability for plant growth after the upper 40 inches is removed. The soil properties that are used to rate the soil as topsoil are those that affect plant growth, the ease of excavation, loading, and spreading, and those that affect the reclamation of the borrow area.

*This subsection includes:*

- **(a) Construction Materials and Excavating**

Grundy County, Missouri: Detailed Soil Map Legend

Construction Materials and Excavating

(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 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
03B: Kilwinning-----	Limited ~wetness (limited)	0.86	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (limited)	0.86	~too clayey (moderately limited)	0.45
							~too acid (slightly limited)	0.12	~cutbanks cave (slightly limited)	0.29
04: Haig-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (limited)	0.86	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (limited)	0.86	~too clayey (moderately limited)	0.45
									~cutbanks cave (slightly limited)	0.29
06: Edina-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (limited)	0.96	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (limited)	0.96	~too clayey (limited)	0.70
									~cutbanks cave (slightly limited)	0.29
11B: Grundy-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (slightly limited)	0.28	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (slightly limited)	0.28	~too clayey (moderately limited)	0.45
									~cutbanks cave (slightly limited)	0.29

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	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12B2: Grundy-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (slightly limited)	0.28	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (slightly limited)	0.28	~too clayey (moderately limited)	0.45
									~cutbanks cave (slightly limited)	0.29
14C: Lamoni-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~too clayey (moderately limited)	0.42
									~cutbanks cave (slightly limited)	0.29
15C2: Lamoni-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~too clayey (moderately limited)	0.42
									~cutbanks cave (slightly limited)	0.29
16D: Shelby-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.64	Limited ~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.08

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	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16E: Shelby-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00
	~slope (slightly limited)	0.25	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (limited)	0.64	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.08
17D2: Shelby-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.64	Limited ~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~slope (limited)	0.63	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.08
17E2: Shelby-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00
	~slope (slightly limited)	0.25	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (limited)	0.64	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.08
21D: Gara-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~slope (limited)	0.63	Limited ~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.58	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.05

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	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21E: Gara-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00
	~slope (slightly limited)	0.25	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.58	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.05
22D2: Gara-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~slope (limited)	0.63	Limited ~slope (limited)	0.63
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.58	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.05
22E2: Gara-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00
	~slope (slightly limited)	0.25	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.58	~cutbanks cave (slightly limited)	0.29
									~too clayey (slightly limited)	0.05
23B: Armstrong-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (moderately limited)	0.48	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~too clayey (moderately limited)	0.54
							~small stones (slightly limited)	0.03	~cutbanks cave (slightly limited)	0.29

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Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
23C: Armstrong-----	Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00  0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~small stones (slightly limited)	1.00  0.48 0.03	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	1.00  0.54 0.29
24B2: Armstrong-----	Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00  0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~small stones (slightly limited)	1.00  0.48 0.03	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	1.00  0.54 0.29
24C2: Armstrong-----	Very limited ~shrink-swell (very limited) ~wetness (moderately limited)	1.00  0.48	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~small stones (slightly limited)	1.00  0.48 0.03	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	1.00  0.54 0.29
25B: Pershing-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~too clayey (very limited)	1.00	Limited ~wetness (limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	0.95  0.34 0.29

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Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
26B2: Pershing-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too clayey (limited)	0.61	Limited ~wetness (limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	0.95 0.29 0.06
33F: Vanmeter-----	Limited ~slope (limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	0.92 0.57 0.47	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~too clayey (very limited) ~slope (very limited) ~large stones (moderately limited)	1.00 1.00 0.48	Very limited ~slope (very limited) ~too clayey (moderately limited) ~cutbanks cave (slightly limited)	1.00 0.60 0.29
45: Humeston-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Very limited ~wetness (very limited) ~too clayey (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~flooding (moderately limited) ~too clayey (moderately limited)	1.00 0.60 0.33
50A: Landes-----	Not limited		Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00 0.99	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00 1.00	Limited ~too sandy (limited) ~small stones (slightly limited)	0.77 0.12	Very limited ~cutbanks cave (very limited) ~flooding (moderately limited)	1.00 0.60

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Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
51: Fatima-----	Not limited		Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Not limited		Limited ~wetness (limited)	0.61
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
52B: Vigar-----	Slightly limited		Very limited		Very limited		Slightly limited		Very limited	
	~wetness (slightly limited)	0.12	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~wetness (slightly limited)	0.12	~wetness (very limited)	1.00
	~shrink-swell (slightly limited)	0.10	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too sandy (slightly limited)	0.06	~cutbanks cave (slightly limited)	0.29
54: Zook-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~shrink-swell (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~wetness (limited)	0.86	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (limited)	0.86	~flooding (moderately limited)	0.60
									~too clayey (moderately limited)	0.31
55: Colo-----	Moderately limited		Very limited		Very limited		Limited		Very limited	
	~wetness (moderately limited)	0.48	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.64	~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29

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Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
56A: Colo-----	Moderately limited ~wetness (moderately limited)	0.48	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~too clayey (limited)	0.64	Very limited ~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (moderately limited)	0.48	~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
58: Wabash-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~too clayey (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (very limited)	1.00	~flooding (moderately limited)	0.60
									~too clayey (moderately limited)	0.60
66: Nodaway-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Not limited		Limited ~wetness (limited)	0.61
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
67: Vesser-----	Moderately limited ~wetness (moderately limited)	0.48	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Moderately limited ~wetness (moderately limited)	0.48	Very limited ~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~flooding (moderately limited)	0.60
									~cutbanks cave (slightly limited)	0.29
88: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	

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Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Rating class and limiting features	Value								
AED:	Not rated									
M-W: Water-----	Not rated									
W: Water-----	Not rated									