Engineering Interpretations

Engineering Index Properties

This table gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey areas. Most soils have layers of contrasting properties within the upper 5 to 6 feet. Information in this table includes depth, USDA texture, Unified and AASHTO Classification, rock fragments larger than 3 inches, percentage passing designated sieves, liquid limit, and plasticity index.

Properties

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

TEXTURE is given in the standard terms used by the USDA. The 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. (Textural terms are defined in Chapter 4, Soil Survey Manual or in the glossary of most soil survey reports) If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

UNIFIED CLASSIFICATION SYSTEM classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content.

AASHTO CLASSIFICATION is the system adopted by the American Association of State Highway and Transportation Officials. It classifies soils according to those properties that affect roadway construction.

ROCK FRAGMENTS, 3 to 10 inches and greater than 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, 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 (Atterbery 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.

This subsection includes:

- **(a) Engineering Index Properties**

Engineering Index Properties
Johnson County, Missouri: Detailed Soil Map Legend

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage Passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BaB:												
Barco----------	0-12	L	CL-ML, ML, CL	A-4	0	0	100	100	85-95	50-75	22-35	2-14
	12-38	L, SCL, CL	CL, SC	A-6	0	0-5	85-100	85-100	75-100	45-80	25-40	11-22
	38-66	WB			---	---	---	---	---	---	---	---
BaC:												
Barco----------	0-9	L	CL-ML, ML, CL	A-4	0	0	100	100	85-95	50-75	22-35	2-14
	9-38	L, SCL, CL	CL, SC	A-6	0	0-5	85-100	85-100	75-100	45-80	25-40	11-22
	38-66	WB			---	---	---	---	---	---	---	---
Bk:												
Blackoar--------	0-22	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	22-43	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	43-65	SIL, SICL	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	85-100	25-40	5-20
BoC2:												
Bolivar---------	0-11	L	ML	A-4	0	0	100	90-100	70-95	55-75	20-30	NP-5
	11-29	L, SCL, CL	CL, SC	A-6	0	0-10	85-100	85-100	70-95	45-80	25-40	10-25
	29-36	WB			---	---	---	---	---	---	---	---
	36-40	UWB			---	---	---	---	---	---	---	---
BoD2:												
Bolivar---------	0-8	FSL	ML	A-4	0	0	100	90-100	70-95	40-55	20-30	NP-5
	8-29	L, SCL, CL	CL, SC	A-6	0	0-10	85-100	85-100	70-95	45-80	25-40	10-25
	29-36	WB			---	---	---	---	---	---	---	---
	36-40	UWB			---	---	---	---	---	---	---	---
Br:												
Bremer----------	0-13	SICL	CH, CL	A-7	0	0	100	100	100	95-100	45-60	25-40
	13-50	SICL, SIC	CH, MH	A-7	0	0	100	100	100	95-100	50-65	20-35
	50-63	SICL	CH, CL	A-7	0	0	100	100	95-100	95-100	45-60	25-40
DpB:												
Deepwater-------	0-10	SIL	CL	A-4, A-6	0	0	100	100	90-100	70-95	25-40	7-15
	10-16	SICL	CL	A-6, A-7	0	0	100	100	90-100	70-95	25-45	10-22
	16-75	SICL	CL	A-6, A-7	0	0	100	85-100	80-100	75-95	35-50	15-26
DpC2:												
Deepwater-------	0-8	SIL	CL	A-4, A-6	0	0	100	100	90-100	70-95	25-40	7-15
	8-16	SICL	CL	A-6, A-7	0	0	100	100	90-100	70-95	25-45	10-22
	16-75	SICL	CL	A-6, A-7	0	0	100	85-100	80-100	75-95	35-50	15-26
Dt:												
Dockery---------	0-9	SICL	CL	A-6	0	0	100	100	90-100	85-100	35-40	15-20
	9-36	SIL, SICL	CL	A-4, A-6	0	0	100	100	90-100	85-95	25-40	8-20
	36-90	SR SL SIL	CL, CL-ML, SC	A-4, A-6	0	0	100	100	65-95	35-85	25-35	5-12
Fs:												
Freeburg--------	0-17	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	90-100	15-35	5-15
	17-82	SICL, CL	CL	A-6, A-7	0	0	100	100	85-100	85-100	30-45	15-25
GoC2:												
Gorin----------	0-5	SIL	CL	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	5-15	SICL, SIC	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-30
	15-26	SIC, SICL	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	26-60	SICL, CL	CL	A-6, A-7	0	0	100	100	80-95	70-90	30-50	12-30

Engineering Index Properties--Continued
Johnson County, Missouri: Detailed Soil Map Legend

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage Passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Hg:												
Haig----------	0-7	SIL	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	7-13	SICL, SIC	CH, CL	A-6, A-7	0	0	100	100	100	95-100	35-55	20-30
	13-38	SIC	CH	A-7	0	0	100	100	100	95-100	50-65	30-40
	38-64	SICL	CH, CL	A-6, A-7	0	0	100	100	100	95-100	35-55	20-30
Hp:												
Haplaquents-----	---	---	---	---	---	---	---	---	---	---	---	---
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
HtA:												
Hartwell--------	0-12	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-100	20-35	5-15
	12-33	C, SIC	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	33-78	SIL, SICL, SIC	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	20-25
HtB2:												
Hartwell--------	0-7	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	80-100	20-35	5-15
	7-33	C, SIC	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	33-78	SIL, SICL, SIC	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	20-25
HxC:												
Higginsville----	0-8	SIL	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-15
	8-11	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-25
	11-50	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	40-50	15-25
	50-69	SICL	CL, ML	A-6, A-7	0	0	100	100	95-100	90-100	35-45	10-20
Ka:												
Kanima----------	0-7	GR-SICL	CL	A-6	0	0-10	50-75	50-75	50-75	40-75	33-40	12-18
	7-60	GRV-CL, GRV-SICL, GRV-L, GRX-SICL	GC, GP-GC	A-2, A-4, A-6	0	0-10	5-50	5-50	5-50	5-49	30-40	8-18
Lg:												
Lightning silt loam----------	0-8	SIL	CL	A-4, A-6	0	0	100	100	95-100	85-98	30-40	8-17
	8-46	SICL, SIC, C	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-70	15-40
	46-60	SICL, SIC, C	CH, CL	A-6, A-7	0	0	100	100	96-100	90-99	37-70	15-40
MaB:												
Macksburg-------	0-8	SIL	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	10-20
	8-38	SICL, SIC	CH, CL	A-7	0	0	100	100	100	95-100	40-60	20-35
	38-58	SICL	CL	A-7	0	0	100	100	100	95-100	35-50	20-30
	58-94	SICL, SIL	CL	A-7	0	0	100	100	100	95-100	35-50	20-30
MdB:												
Mandeville------	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	90-100	85-95	25-35	5-15
	6-29	SICL, SIL, L	CL	A-6	0	0-5	80-90	80-90	70-85	65-80	30-40	11-20
	29-60	WB			---	---	---	---	---	---	---	---
MdC:												
Mandeville------	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	90-100	85-95	25-35	5-15
	6-29	SICL, SIL, L	CL	A-6	0	0-5	80-90	80-90	70-85	65-80	30-40	11-20
	29-60	WB			---	---	---	---	---	---	---	---
Nd:												
Nodaway---------	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	9-60	SIL, SICL	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15

Engineering Index Properties--Continued
Johnson County, Missouri: Detailed Soil Map Legend

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage Passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
NoD:												
Norris----------	0-2	CN-SIL	CL, CL-ML	A-4, A-6	0	0-10	50-80	50-80	50-80	45-75	25-35	5-15
	2-16	SIL, CN-SIL, FL-SIL	CL, CL-ML, GC, SC	A-4, A-6	0	0-15	50-90	50-90	50-90	45-90	25-35	5-15
	16-60	WB			---	---	---	---	---	---	---	---
NoF:												
Norris----------	0-3	CN-SIL	CL, CL-ML	A-4, A-6	0	0-10	50-80	50-80	50-80	45-75	25-35	5-15
	3-11	SIL, CN-SIL, FL-SIL	CL, CL-ML, GC, SC	A-4, A-6	0	0-15	50-90	50-90	50-90	45-90	25-35	5-15
	11-60	WB			---	---	---	---	---	---	---	---
Pd:												
Pits----------	---	---	---	---	---	---	---	---	---	---	---	---
PoB:												
Polo----------	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	9-12	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-25
	12-50	SIC, SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-25
	50-75	SIC, SICL	CL, CH	A-7	0	0	95-100	95-100	90-100	85-100	45-65	25-35
PoC2:												
Polo----------	0-5	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	5-12	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-25
	12-50	SIC, SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-25
	50-75	SIC, SICL	CL, CH	A-7	0	0	95-100	95-100	90-100	85-100	45-65	25-35
SaB:												
Sampsel---------	0-11	SICL	CL	A-6	0	0	100	100	95-100	90-100	35-50	15-25
	11-76	SICL, SIC, C	CH	A-7	0	0	100	100	97-100	95-100	52-75	35-47
SaC:												
Sampsel---------	0-13	SICL	CL	A-6	0	0	100	100	95-100	90-100	35-50	15-25
	13-76	SICL, SIC, C	CH	A-7	0	0	100	100	97-100	95-100	52-75	35-47
SaC3:												
Sampsel---------	0-7	SICL	CL	A-6	0	0	100	100	95-100	90-100	35-50	15-25
	7-76	SICL, SIC, C	CH	A-7	0	0	100	100	97-100	95-100	52-75	35-47
ShB:												
Sharpsburg------	0-10	SIL	CL	A-6	0	0	100	100	100	95-100	25-40	10-20
	10-53	SICL, SIC	CH, CL	A-6, A-7	0	0	100	100	100	95-100	40-60	20-35
	53-85	SICL	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	20-30
SnD2:												
Snead----------	0-2	SICL	CL	A-6, A-7	0	0-10	90-100	90-100	90-100	80-95	35-45	15-25
	2-24	SIC, C, CN-C	CH, CL	A-7	0	0-10	65-100	65-100	60-100	55-100	45-60	25-40
	24-40	WB			---	---	---	---	---	---	---	---
SoD:												
Snead----------	0-5	SICL	CL	A-6, A-7	0	0-10	90-100	90-100	90-100	80-95	35-45	15-25
	5-24	SIC, C, CN-C	CH, CL	A-7	0	0-10	65-100	65-100	60-100	55-100	45-60	25-40
	24-40	WB			---	---	---	---	---	---	---	---
Rock outcrop----	0-60	UWB			---	---	---	---	---	---	---	---
SoF:												
Snead----------	0-3	SICL	CL	A-6, A-7	0	0-10	90-100	90-100	90-100	80-95	35-45	15-25
	3-24	SIC, C, CN-C	CH, CL	A-7	0	0-10	65-100	65-100	60-100	55-100	45-60	25-40
	24-40	WB			---	---	---	---	---	---	---	---

Engineering Index Properties--Continued
Johnson County, Missouri: Detailed Soil Map Legend

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage Passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Rock outcrop----	0-60	UWB			---	---	---	---	---	---	---	---
W:												
Water----------	---	---	---	---	---	---	---	---	---	---	---	---
Wa:												
Wabash----------	0-15	SIC	CH	A-7	0	0	100	100	100	95-100	50-75	30-50
	15-66	SIC, C	CH	A-7	0	0	100	100	100	95-100	52-78	30-55
WdB:												
Weller----------	0-12	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	25-40	5-15
	12-34	SICL, SIC	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	34-76	SICL	CH, CL	A-7	0	0	100	100	100	95-100	35-55	15-30
WfB:												
Winfield--------	0-10	SIL	CL	A-6	0	0	100	100	95-100	90-100	25-40	10-20
	10-11	SICL, SIL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	15-25
	11-78	SICL	CL	A-6, A-7	0	0	100	100	95-100	95-100	35-45	20-25
WfC:												
Winfield--------	0-8	SIL	CL	A-6	0	0	100	100	95-100	90-100	25-40	10-20
	8-11	SICL, SIL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	15-25
	11-78	SICL	CL	A-6, A-7	0	0	100	100	95-100	95-100	35-45	20-25
WfC3:												
Winfield--------	0-6	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	20-25
	6-11	SICL, SIL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-45	15-25
	11-78	SICL	CL	A-6, A-7	0	0	100	100	95-100	95-100	35-45	20-25
Zk:												
Zook----------	0-22	SICL	CH, CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
	22-90	SIC, SICL	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55