

TABLE 4.—Estimated soil properties

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The referring to other series that appear in the first column of this table. The symbol > means

Soil series and map symbols	Hydro-logic soil group	Depth to bedrock	Depth from surface (typical profile)	USDA texture	Classification	
					Unified	AASHTO
*Anthony: A _g ----- For Glendale part, see Glendale series.	B	>60	0-60	Fine sandy loam -----	SM or SC	A-2 or A-4
Badland: B _d . Too variable to be rated.						
*Boracho: B _o B ----- For Espy part, see Espy series.	C	7-18	0-10 10-20 20-48	Gravelly loam ----- Indurated caliche. Very gravelly loam -----	GC or SC GP-GM or GW-GM	A-4 or A-6 A-1 or A-2
*Brewster: B _r F, B _s E ----- For Rock outcrop part of B _r F, see Rock outcrop.	D	4-20	0-7 7	Gravelly loam ----- Fractured rhyolite bedrock.	GC	A-2, A-4, or A-6
*Canutio: C _b D, C _i D ----- For Badland part of C _b D, see Badland. For Nickel part of C _i D, see Nickel series.	B	>60	0-60	Gravelly loam and very gravelly loam.	GP-GC, GP-GM, GM-GC, or GC	A-1 or A-2
*Chispa: C _n C ----- For Nickel part, see Nickel series.	B	>60	0-4 4-44 44-80	Fine sandy loam ----- Sandy clay loam ----- Sandy loam -----	SC or CL CL SC or CL	A-4 or A-6 A-6 or A-7 A-4 or A-6
Dalby ----- Mapped only in association with Verhalen soils.	D	>60	0-70	Clay, silty clay -----	CH or CL	A-7
Ector: E _c F -----	D	5-20	0-8 8-20	Gravelly loam ----- Chalky limestone and fractured bedrock.	GC or SC	A-2
Espy ----- Mapped only in association with Boracho soils.	C	11-20	0-16 16-24 24-48 48-60	Loam, clay loam ----- Indurated caliche. Sandy loam ----- Tuff.	SM or SC GM or SM	A-7 or A-6 A-1 or A-2
Friends ----- Mapped only in association with Hurds soils.	D	>60	0-9 9-75	Loam, fine sandy loam -- Clay -----	SM or SC CH	A-7 A-7
Gageby: G _o -----	B	>60	0-68	Clay loam, silt loam, loam.	CL	A-6 or A-7
Glendale ----- Mapped only in association with Anthony soils.	B	>60	0-12 12-60	Loam ----- Clay loam -----	ML or CL CL	A-4 A-6
Gullied land: G _u . Too variable to be rated.						
Hodgins: H _o A -----	C	>60	0-70	Clay loam, silty clay ----	CL	A-7 or A-6
*Hurds: H _u D ----- For Friends part, see Friends series.	B	>60	0-10 10-40 40-60	Gravelly loam ----- Very gravelly sandy clay loam, very gravelly sandy loam. Very gravelly loamy sand.	GP-GC, GC, GM-GC, SC, SM-SC, GP-GM GP-GC or GC GP-GM or GM	A-2 A-2 A-1

significant to engineering

soils in such mapping units may have different properties, and for this reason it is necessary to follow carefully the instructions for more than, and the symbol < means less than. Absence of data indicates estimates were not made]

Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
<i>Percent</i>					<i>Inches per hour</i>	<i>Inches per inch of soil</i>	<i>pH</i>	
0	95-100	80-100	50-75	25-45	2.0-6.0	0.09-0.12	7.8-8.4	Low.
0-5	60-75	55-70	45-65	36-45	0.6-2.0	0.08-0.12	7.4-8.4	Low.
0-20	30-50	25-45	10-30	5-12	2.0-6.0	0.02-0.06	7.9-8.4	Very low.
3-35	20-55	15-50	15-45	13-40	0.6-2.0	0.07-0.12	6.6-7.8	Low.
10-55	30-50	20-45	15-40	5-25	6.0-20.0	0.04-0.06	7.9-8.4	Low.
0	90-100	85-100	75-90	40-60	0.6-2.0	0.11-0.15	7.9-8.4	Low.
0	90-100	85-100	75-90	50-70	0.6-2.0	0.14-0.17	7.9-8.4	Low.
0	90-100	85-100	75-90	40-60	0.6-2.0	0.10-0.14	7.9-8.4	Low.
0	98-100	95-100	90-100	70-95	<0.06	0.14-0.17	7.9-8.4	Very high.
8-50	30-70	20-65	15-50	13-35	0.6-2.0	0.05-0.10	7.9-8.4	Low.
0-2	70-98	60-95	50-65	40-50	0.6-2.0	0.10-0.15	7.4-8.4	Moderate.
0-5	50-98	45-95	30-40	15-25	2.0-6.0	0.02-0.06	7.9-8.4	Low.
0-3	80-90	70-80	50-60	40-50	0.6-2.0	0.10-0.15	6.1-7.3	Low.
0	90-100	85-100	70-90	51-75	0.06-0.20	0.14-0.18	5.6-8.4	High.
0	95-100	95-100	90-100	80-90	0.6-2.0	0.16-0.20	6.6-8.4	Low.
0	90-100	90-100	85-95	51-65	0.6-2.0	0.13-0.17	7.9-8.4	Low.
0	90-100	90-100	80-95	55-75	0.2-0.6	0.15-0.19	7.9-8.4	Moderate.
0	95-100	90-100	80-90	65-80	0.6-2.0	0.15-0.20	7.9-8.4	Moderate.
0-25	45-85	40-80	20-40	10-30	0.6-2.0	0.06-0.12	6.1-7.3	Low.
2-30	20-60	15-50	10-30	10-25	0.6-2.0	0.10-0.15	5.6-6.5	Low.
2-30	20-50	15-40	10-20	5-15	2.0-6.0	0.04-0.09	6.1-6.5	Very low.

TABLE 4.—Estimated soil properties

Soil series and map symbols	Hydro- logic soil group	Depth to bedrock	Depth from surface (typical profile)	USDA texture	Classification	
					Unified	AASHTO
*Ima: lh8 ----- For Hodgins part, see Hodgins series.	B	>60	0-46	Fine sandy loam -----	SM-SC or SM SW, SP, or SP-SM	A-2
			46-65	Gravelly sand -----		A-1 or A-3
*Kokernot: Kb8 ----- For Brewster part, see Brewster series.	C	12-20	0-3	Gravelly sandy loam ----	SM-SC or SC SC or GC	A-2, A-4, or A-6
			3-18	Gravelly loam or gravelly clay loam		A-2 or A-6
			18-24	Trachyte bedrock.		
*Limpia: Lm8 ----- For Mitre part, see Mitre series.	C	>60	0-12	Gravelly loam -----	GP-GC or GC GP-GC or GC	A-2 or A-6
			12-60	Very gravelly clay -----		A-2 or A-7
*Liv: LrF ----- For Mainstay part, see Mainstay series. Rock outcrop part too variable to be rated.	C	20-40	0-9	Cobbly silt loam -----	GP-GC, GC, or SC GC or CH	A-2, A-6, or A-7
			9-38	Gravelly clay -----		A-2 or A-7
			38-60	Tuffaceous rock.		
Loghouse: Ld -----	B	>60	0-14	Gravelly sandy loam ----	SC or GC GC-GP, GC, or SC	A-2, A-4, or A-6
			14-70	Very gravelly sandy loam.		A-2, A-4, A-6, or A-7
*Lozier: LrC, LuE ----- Rock outcrop part of LuE too variable to be rated.	D	4-12	0-6	Gravelly loam -----	GC or SC	A-2 or A-6
			6-20	Limestone bedrock.		
Madrone ----- Mapped only in association with Puerta soils.	C	21-40	0-9	Cobbly silt loam, cobbly loam.	GC or SC GC or CH	A-2, A-6, or A-7
			9-36	Cobbly clay -----		A-2 or A-7
			36-40	Fractured igneous bedrock.		
*Mainstay: MbE ----- For Brewster part, see Brewster series.	D	10-20	0-3	Cobbly silt loam -----	GC or SC GC or CH	A-2, A-6, or A-7
			3-16	Gravelly clay -----		A-2 or A-7
			16-30	Fractured igneous bed- rock.		
Medley ----- Mapped only in association with Santo Tomas soils.	B	>60	0-65	Gravelly sandy loam, gravelly loam, or loam.	CL or GC	A-4 or A-6
Mitre ----- Mapped only in association with Limpia soils.	C	11-20	0-4	Gravelly loam -----	GP-GC, GC, or SC GC GP-GM or GM	A-2
			4-14	Very gravelly clay loam.		A-2 or A-6
			14-22	Indurated caliche.		
			22-40	Weakly cemented caliche.		A-1 or A-2
Musquiz: Mu -----	C	>60	0-7	Loam -----	CL CL CL or GC	A-6
			7-30	Clay -----		A-7-6
			30-60	Loam, clay loam -----		A-6 or A-2-6
*Nickel: NcC ----- For Chispa part, see Chispa series.	D	>60	0-7	Gravelly loam -----	GP-GC, GC, or SC GP-GM or GW-GM GP-GC	A-2
			7-29	Gravelly caliche -----		A-1 or A-2
			29-40	Very gravelly loam ----		A-2
			40-60	Limy clayey earth.		

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
Percent					Inches per hour	Inches per inch of soil	pH	
0	95-100	90-100	75-90	20-35	2.0-6.0	0.08-0.11	7.9-8.4	Low.
0	80-100	70-95	20-60	0-5	>20.0	0.02-0.05	7.9-8.4	Low.
0-5	65-90	60-90	40-60	30-50	2.0-6.0	0.08-0.12	6.1-7.8	Low.
0-10	55-80	50-75	40-60	30-50	0.6-2.0	0.12-0.14	6.1-7.8	Moderate.
8-55	20-65	15-55	13-50	10-40	0.6-2.0	0.05-0.13	6.6-7.8	Low.
8-55	20-60	15-55	15-55	10-50	0.06-0.2	0.04-0.11	6.6-7.8	Moderate.
8-50	30-80	25-75	15-65	10-50	0.6-2.0	0.10-0.13	6.6-7.3	Low.
8-50	30-80	25-75	20-70	20-60	0.2-0.6	0.12-0.15	6.1-7.3	Moderate.
8-30	50-85	40-75	25-65	13-50	2.0-6.0	0.07-0.12	5.6-7.3	Low.
8-30	20-75	15-70	12-60	8-40	2.0-6.0	0.05-0.12	5.1-6.0	Low.
2-30	30-80	25-75	20-65	15-50	0.6-2.0	0.08-0.12	7.9-8.4	Low.
8-55	40-80	35-75	30-55	20-50	0.6-2.0	0.10-0.13	5.1-7.3	Low to moderate.
8-55	40-80	35-75	30-70	25-60	0.2-0.6	0.12-0.15	4.5-5.5	Moderate.
8-50	40-80	35-75	20-70	13-50	0.6-2.0	0.10-0.13	6.1-7.3	Low.
8-50	40-80	35-75	30-70	25-60	0.6-2.0	0.12-0.15	6.1-7.3	Moderate.
0-8	60-95	55-85	45-80	36-70	0.6-2.0	0.10-0.16	6.6-8.4	Low.
8-55	45-75	30-70	20-50	10-35	0.6-2.0	0.05-0.10	6.6-7.8	Low.
8-55	40-75	35-70	20-60	15-50	0.6-2.0	0.06-0.10	6.6-7.8	Low.
8-55	35-50	25-40	12-30	5-15	2.0-6.0	-----	7.9-8.4	Low.
0-2	80-95	80-90	70-75	51-65	0.6-2.0	0.15-0.19	7.4-7.8	Low.
0-2	90-100	85-95	70-85	55-75	0.2-0.6	0.14-0.18	6.6-7.3	Moderate.
0-5	51-90	40-85	20-80	25-70	0.6-2.0	0.10-0.18	7.9-8.4	Low.
0	45-75	35-65	20-50	10-35	2.0-6.0	0.06-0.12	7.9-8.4	Low.
0	20-50	10-45	10-30	5-12	2.0-6.0	0.02-0.06	7.9-8.4	Low.
0	20-40	10-30	10-25	5-12	6.0-20.0	0.04-0.06	7.9-8.4	Low.

TABLE 4.—Estimated soil properties

Soil series and map symbols	Hydro-logic soil group	Depth to bedrock	Depth from surface (typical profile)	USDA texture	Classification	
					Unified	AASHTO
Phantom: Ph -----	C	>60	0-60	Clay loam, silty clay ----	CL or CH	A-7-6
*Puerta: PmF ----- For Madrone part, see Madrone series.	D	12-20	0-9 9-18 18-30	Gravelly silt loam, gravelly loam. Gravelly clay ----- Fractured igneous bedrock.	GC or SC GC	A-2 A-2 or A-7
*Reagan: Rd ----- For Hodgins part, see Hodgins series.	B	>60	0-26 26-70	Clay loam ----- Clay loam -----	CL CL	A-6 A-6
Redona: Ro -----	B	>60	0-6 6-46 46-66	Sandy loam ----- Sandy clay loam, clay loam. Loam -----	SC or CL CL CL or SC	A-6 or A-7 A-6 or A-7-6 A-6
*Rockhouse: Rh, Rk ----- For Gageby part of Rk, see Gageby series.	A	>60	0-12 12-60	Loam ----- Very cobbly loamy sand, very cobbly sand.	SM-SC, SC, GM-GC, or GM GP-GM, GP, SP-SM, or SM	A-4, A-6, or A-2 A-1
*Rock outcrop: RoF. Too variable to be rated. For Brewster part, see Brewster series.						
*Sanderson: SeC ----- For Upton part, see Upton series.	B	>60	0-50	Gravelly loam -----	GM-GC, GC, SM-SC, or SC	A-2, A-4, or A-6
*Santo Tomas: SmB ----- For Medley part, see Medley series.	B	>60	0-75	Very gravelly loam ----	GP-GC, GC, or SC	A-2
*Sproul: SnB ----- For Mainstay part, see Mainstay series.	D	21-40	0-6 6-26 26-38	Clay loam ----- Clay ----- Tuffaceous bedrock.	CL CH	A-6 A-7
Upton ----- Mapped only in association with Sanderson soils.	C	8-20	0-14 14-20 20-46	Gravelly loam ----- Indurated caliche. Weakly cemented caliche.	SM-SC, SC, CL-ML, or CL GP-GM or GW-GM	A-4, A-6, or A-2 A-1 or A-2
*Vado: VdC ----- For Redona part, see Redona series.	B	>60	0-60	Very gravelly sandy loam, gravelly sandy loam.	GC-GM, GM, GP-GC, GC, or GP-GM	A-2 or A-1
*Verhalen: Ve, Vh, Vm ----- For Dalby part of Vm, see Dalby series.	D	>60	0-75	Clay, clay loam -----	CL or CH	A-7
*Vieja: VnE ----- For Nickel part, see Nickel series.	D	4-20	0-8 8-40	Silty clay ----- Clayey shale.	CL	A-6 or A-7
Volco: VoE -----	D	6-18	0-9 9-20	Gravelly loam ----- Igneous bedrock.	GC-GP or GC	A-2

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
<i>Percent</i>					<i>Inches per hour</i>	<i>Inches per inch of soil</i>	<i>pH</i>	
0	95-100	95-100	90-100	75-95	0.2-0.6	0.15-0.20	6.6-8.4	High.
8-50	40-75	35-70	20-60	13-35	0.6-2.0	0.10-0.13	5.6-7.3	Low.
8-50	40-75	35-70	30-65	20-50	0.6-2.0	0.12-0.15	5.1-5.5	Moderate.
0	95-100	95-100	80-95	60-80	0.6-2.0	0.15-0.20	7.9-8.4	Moderate.
0	95-100	85-100	75-85	51-80	0.6-2.0	0.12-0.16	7.9-8.4	Low.
0-5	80-100	70-90	55-85	40-60	0.6-2.0	0.12-0.16	6.6-7.8	Low.
0-5	90-100	85-100	75-90	51-65	0.6-2.0	0.15-0.18	6.6-8.4	Moderate.
0-5	85-100	80-100	70-90	40-70	0.6-2.0	0.12-0.16	7.9-8.4	Moderate.
3-30	60-95	45-92	30-75	25-50	0.6-2.0	0.07-0.12	6.1-7.8	Low.
15-55	30-75	25-70	10-20	1-7	6.0-20.0	0.02-0.06	6.6-8.4	Very low.
0-30	30-80	20-75	15-65	13-50	0.6-2.0	0.08-0.12	7.9-8.4	Low.
0-35	20-75	10-50	6-50	5-35	0.6-2.0	0.06-0.12	6.6-8.4	Low.
0-2	90-100	80-95	60-80	51-70	0.6-2.0	0.15-0.18	6.1-7.3	Moderate.
0-2	85-100	80-95	65-75	51-70	0.06-0.2	0.14-0.17	6.1-7.3	High.
0-2	65-85	50-75	30-70	20-55	0.6-2.0	0.08-0.12	7.9-8.4	Low.
0-2	30-50	25-45	10-30	5-12	2.0-6.0	0.02-0.06	7.9-8.4	Low.
0-45	20-65	10-55	8-40	5-30	2.0-6.0	0.05-0.10	7.9-8.4	Low.
0	95-100	95-100	90-100	70-95	0.06-0.2	0.14-0.18	7.4-8.4	Very high.
0-2	85-100	80-95	80-95	75-95	0.2-0.6	0.13-0.17	7.9-8.4	High.
2-30	30-65	20-55	15-50	10-35	0.6-2.0	0.07-0.12	7.4-8.4	Low.