

TABLE 5.—Engineering

[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 instructions for referring to other series

Soil series and map symbols	Suitability as a source of—			Corrosivity to uncoated steel	Soil features affecting—		
	Topsoil	Sand and gravel	Road fill		Terraces and diversions	Irrigation	Limitations for local roads and streets
*Anthony: A <sub>9</sub> ----- For Glendale part, see Glendale series.	Good -----	Unsuitable--	Good -----	Moderate ---	Moderate hazard of soil blowing; slightly hummocky in some areas; poor to fair stability.	Moderate hazard of soil blowing; moderate available water capacity; moderate intake rate; hazard of flooding.	Severe: hazard of flooding.
Badland: B <sub>d</sub> . Too variable to be rated.							
*Boracho: B <sub>oB</sub> ----- For Espy part, see Espy series.	Poor: coarse fragments.	Poor: excessive fines.	Good -----	High -----	Indurated caliche at a depth of 7 to 18 inches.	Indurated caliche at a depth of 7 to 18 inches.	Slight -----
*Brewster: B <sub>rF</sub> B <sub>rE</sub> -- For Rock outcrop part of B <sub>rF</sub> , see Rock outcrop.	Poor: coarse fragments.	Unsuitable--	Poor: material 4 to 20 inches in thickness.	Moderate ---	Igneous rock at a depth of 4 to 20 inches.	Features generally unfavorable.	Severe: bedrock at a depth of 4 to 20 inches.
*Canutio: C <sub>bD</sub> C <sub>iD</sub> -- For Badland part of C <sub>bD</sub> , see Badland.	Poor: coarse fragments.	Fair: gravel contains fines.	Good -----	High -----	Coarse fragments.	Features generally unfavorable.	Severe: hazard of flooding.
*Chispa: C <sub>oC</sub> ----- For Nickel part, see Nickel series.	Fair: 2 to 6 inches of fine sandy loam over sandy clay loam.	Unsuitable--	Fair: low shear strength.	High -----	All features favorable.	Undulating ---	Slight -----
Dalby ----- Mapped only in association with Verhalen soils.	Poor: coarse texture.	Unsuitable--	Poor: very high shrink-swell potential; low shear strength.	High -----	Subject to soil cracking; flat slopes.	Slow water intake rate; subject to flooding.	Severe: very high shrink-swell potential; low shear strength.
Ector: E <sub>cE</sub> -----	Poor: coarse fragments.	Unsuitable--	Poor: material 5 to 20 inches in thickness.	High -----	Bedrock at a depth of 5 to 20 inches.	Unsuitable ---	Severe: bedrock at a depth of 5 to 20 inches.



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Soil series and map symbols	Suitability as a source of—			Corrosivity to uncoated steel	Soil features affecting—		
	Topsoil	Sand and gravel	Road fill		Terraces and diversions	Irrigation	Limitations for local roads and streets
Espy ----- Mapped only in association with Boracho soils.	Poor: coarse fragments.	Poor: excessive fines.	Fair: moderate shrink-swell potential.	High -----	Indurated caliche at a depth of 11 to 20 inches.	Indurated caliche at a depth of 11 to 20 inches; moderate intake rate.	Moderate: moderate shrink-swell potential.
Friends ----- Mapped only in association with Hurds soils.	Fair: 4 to 15 inches of loam and fine sandy loam.	Unsuitable--	Poor: high shrink-swell potential.	Subject to soil cracking in substratum.	Slow intake rate.	Severe: high shrink-swell potential.	Slight -----
Gageby: G <sub>a</sub> -----	Fair: 6 to 16 inches of silt loam.	Unsuitable--	Fair: low shear strength.	Moderate ---	All features favorable.	Subject to flooding.	Severe: hazard of flooding.
Glendale ----- Mapped only in association with Anthony soils.	Fair: 10 to 16 inches of loam.	Unsuitable--	Fair: moderate shrink-swell potential.	Moderate ---	All features favorable.	Subject to flooding.	Severe: hazard of flooding.
Gullied land: G <sub>u</sub> . Too variable to be rated.							
Hodgins: H <sub>o</sub> A -----	Fair: clay loam texture.	Unsuitable--	Fair: moderate shrink-swell potential; low shear strength.	High -----	All features favorable.	All features favorable.	Moderate: moderate shrink-swell potential.
*Hurds: H <sub>u</sub> D ----- For Friends part, see Friends series.	Poor: coarse fragments.	Poor in upper 40 inches; fair below that depth; gravel contains fines.	Good -----	Low -----	Slope -----	Slope -----	Moderate: slope.
*Ima: I <sub>h</sub> B ----- For Hodgins part, see Hodgins series.	Good -----	Fair in upper 30 to 50 inches; excessive fines; good below that depth.	Good -----	Moderate ---	Hazard of soil blowing; hummocky; poor stability.	Hazard of soil blowing; high intake rate.	Slight -----
*Kokernot: K <sub>b</sub> B ----- For Brewster part, see Brewster series.	Poor: coarse fragments.	Unsuitable--	Poor: material 12 to 30 inches in thickness.	Low -----	Trachyte bedrock at a depth of 12 to 20 inches.	Unsuitable ---	Severe: bedrock at a depth of 12 to 20 inches.



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*Limpia: LmB ----- For Mitre part, see Mitre series.	Poor: coarse fragments.	Unsuitable..	Fair: stony soil; moderate shrink-swell potential.	High -----	Contains stones and cobbles.	Stony soil; slow intake rate.	Moderate: moderate shrink-swell potential.
*Liv: LrF ----- For Rock outcrop and Mainstay parts, see Rock outcrop and the Mainstay series.	Poor: coarse fragments.	Unsuitable..	Fair: material 20 to 40 inches in thickness.	High -----	Slope; rock outcrops are common.	Unsuitable ---	Severe: slope.
Loghouse: LsD -----	Poor: coarse fragments.	Fair: contains excessive fines.	Good -----	Low -----	Contains coarse fragments.	Contains coarse fragments.	Moderate: slope.
*Lozier: LrC, LrE ---- For Rock outcrop part of LrE, see Rock outcrop.	Poor: coarse fragments.	Unsuitable..	Poor: material 4 to 12 inches in thickness.	High -----	Shallow to limestone.	Unsuitable ---	Severe: bedrock at a depth of 4 to 12 inches.
Madrone ----- Mapped only in association with Puerta soils.	Poor: coarse fragments.	Unsuitable..	Fair: moderate shrink-swell potential.	High -----	Slope; fragments.	Unsuitable ---	Severe: slope; bedrock at a depth of 21 to 40 inches.
*Mainstay: MBE ---- For Brewster part, see Brewster series.	Poor: coarse fragments.	Unsuitable..	Poor: material 10 to 20 inches in thickness.	High -----	Bedrock at a depth of 10 to 20 inches; slope.	Unsuitable ---	Severe: bedrock at a depth of 10 to 20 inches.
Medley ----- Mapped only in association with Santo Tomas soils.	Poor: coarse fragments.	Unsuitable..	Good -----	Moderate ---	All features favorable.	Coarse fragments; slope.	Slight -----
Mitre ----- Mapped only in association with Limpia soils.	Poor: coarse fragments.	Fair: gravel contains fines.	Good -----	High -----	Indurated caliche at a depth of 11 to 20 inches.	Unsuitable ---	Slight -----
Musquiz: Mu -----	Poor: 4 to 80 inches of loam.	Unsuitable..	Fair: moderate shrink-swell potential.	Moderate ---	All features favorable.	Slow intake rate.	Moderate: low shear strength; moderate shrink-swell potential.
*Nickel: NcC ----- For Chispa part, see Chispa series.	Poor: coarse fragments.	Fair: gravel contains fines.	Good -----	High -----	Coarse fragments.	Coarse fragments; low available water capacity.	Slight -----

interpretations—Continued

Degree of limitations and soil features affecting—							
Farm ponds		Dwellings	Septic tank filter fields	Sewage lagoons	Light industry	Sanitary landfills <sup>1</sup>	Shallow excavations
Reservoir areas	Embankments						
Slight -----	Severe: loose stones on surface layer.	Moderate: moderate shrink-swell potential.	Severe: slow permeability.	Severe: coarse fragments.	Severe: high corrosivity.	Severe: clay texture.	Severe: clay texture; coarse fragments.
Moderate: bedrock at a depth of 20 to 40 inches.	Moderate: borrow material 20 to 40 inches in thickness.	Severe: slope; bedrock at a depth of 20 to 40 inches.	Severe: slope; bedrock at a depth of 20 to 40 inches.	Severe: slope; bedrock at a depth of 20 to 40 inches.	Severe: slope; bedrock at a depth of 20 to 40 inches; high corrosivity.	Severe: bedrock at a depth of 20 to 40 inches; slope.	Severe: bedrock at a depth of 20 to 40 inches; slope.
Severe: moderately rapid permeability.	Moderate: fair resistance to piping and erosion.	Moderate: slope.	Moderate: slope.	Severe: moderately rapid permeability.	Severe: slope.	Severe: coarse fragments.	Severe: coarse fragments.
Severe: bedrock at a depth of 4 to 12 inches.	Severe: material 4 to 12 inches in thickness.	Severe: bedrock at a depth of 4 to 12 inches; slope.	Severe: bedrock at a depth of 4 to 12 inches; slope.	Severe: bedrock at a depth of 4 to 12 inches; slope.	Severe: bedrock at a depth of 4 to 12 inches; high corrosivity.	Severe: bedrock at a depth of 4 to 12 inches.	Severe: bedrock at a depth of 4 to 12 inches.
Severe: bedrock at a depth of 21 to 40 inches.	Moderate to severe: stoniness; bedrock at a depth of 21 to 40 inches.	Severe: slope; bedrock at a depth of 21 to 40 inches.	Severe: slope; bedrock at a depth of 21 to 40 inches.	Severe: slope; bedrock at a depth of 21 to 40 inches.	Severe: slope; bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches.
Severe: bedrock at a depth of 10 to 20 inches.	Severe: borrow material 10 to 20 inches in thickness.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches.
Moderate: moderate permeability.	Slight to moderate: slight to medium compressibility.	Slight -----	Slight -----	Moderate: moderate permeability.	Slight -----	Slight -----	Moderate: coarse fragments.
Severe: moderately rapid permeability in substratum.	Severe: borrow material 11 to 20 inches in thickness.	Severe: indurated caliche (rippable) at a depth of 11 to 20 inches.	Severe: indurated caliche (rippable) at a depth of 11 to 20 inches.	Severe: moderately rapid permeability in substratum.	Severe: indurated caliche (rippable) at a depth of 11 to 20 inches.	Slight -----	Severe: indurated caliche (rippable) at a depth of 11 to 20 inches.
Moderate: moderately slow permeability.	Moderate: medium compressibility; fair resistance to piping and erosion.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability.	Slight -----	Moderate: moderate shrink-swell potential.	Severe: clay texture.	Severe: clay texture.
Severe: moderately rapid permeability; calcareous.	Severe: moderately rapid permeability.	Slight -----	Slight -----	Severe: moderately rapid permeability.	Moderate: high conductivity.	Slight -----	Severe: 35 to 80 percent coarse fragments.

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	Topsoil	Sand and gravel	Road fill		Terraces and diversions	Irrigation	Limitations for local roads and streets
Phantom: Ph -----	Fair: clay loam texture.	Unsuitable..	Poor: high shrink-swell potential.	High -----	Subject to cracking.	Moderate: slow intake rate; subject to flooding.	Severe: high shrink-swell potential.
*Puerta: PmF ----- For Madrone part, see Madrone series.	Poor: coarse fragments.	Unsuitable..	Poor: material 12 to 20 inches in thickness.	High -----	Bedrock at a depth of 12 to 20 inches; slope.	Unsuitable ----	Severe: slope; bedrock at a depth of 12 to 20 inches.
*Reagan: Rd ----- For Hodgins part, see Hodgins series.	Fair: clay loam texture.	Unsuitable..	Fair: moderate shrink-swell potential; low shear strength.	High -----	All features favorable.	All features favorable.	Moderate: moderate shrink-swell potential.
Redona: Re -----	Fair: 6 to 12 inches of sandy loam.	Unsuitable..	Fair: moderate shrink-swell potential; low shear strength.	Moderate ---	All features favorable.	All features favorable.	Moderate: moderate shrink-swell potential.
*Rockhouse: Rh, Rk -- For Gageby part of Rk, see Gageby series.	Fair: 6 to 16 inches of loam.	Good: gravel.	Good -----	Low -----	Cobbles and stones.	Cobbles and stones; low available water capacity; subject to flooding.	Severe: hazard of flooding.
*Rock outcrop: RoF. Too variable to be rated. For Brewster part, see Brewster series.							
*Sanderson: SeC ---- For Upton part, see Upton series.	Poor: coarse fragments.	Fair: excessive fines.	Good -----	High -----	Fair resistance to piping and erosion.	Gravelly; low to moderate available water capacity; slope.	Slight -----
*Santo Tomas: SmB -- For Medley part, see Medley series.	Poor: coarse fragments.	Fair: excessive fines in gravel.	Good -----	Low -----	Very gravelly.	Slope; moderate available water capacity.	Slight -----
*Sproul: SsB ----- For Mainstay part, see Mainstay series.	Poor: 3 to 9 inches of clay loam.	Unsuitable..	Poor: high shrink-swell potential.	High -----	Bedrock at a depth of 21 to 40 inches.	Bedrock at a depth of 21 to 40 inches; slow intake rate.	Severe: high shrink-swell potential.

interpretations—Continued

Degree of limitations and soil features affecting—							
Farm ponds		Dwellings	Septic tank filter fields	Sewage lagoons	Light industry	Sanitary landfills <sup>1</sup>	Shallow excavations
Reservoir areas	Embankments						
Moderate: moderately slow permeability.	Moderate: high compressibility; subject to cracking.	Severe: subject to flooding; high shrink-swell potential.	Severe: moderately slow permeability; hazard of flooding.	Slight -----	Severe: high shrink-swell potential; subject to flooding.	Severe: clay loam and silty clay texture; subject to flooding.	Severe: clay loam and silty clay texture; subject to flooding.
Severe: bedrock at a depth of 12 to 20 inches.	Severe: borrow material 12 to 20 inches in thickness.	Severe: slope; bedrock at a depth of 12 to 20 inches.	Severe: slope; bedrock at a depth of 12 to 20 inches.	Severe: slope; bedrock at a depth of 12 to 20 inches.	Severe: slope; bedrock at a depth of 12 to 20 inches.	Severe: slope; bedrock at a depth of 12 to 20 inches.	Severe: slope; bedrock at a depth of 12 to 20 inches.
Moderate: moderate permeability.	Moderate: medium compressibility; fair resistance to piping and erosion.	Moderate: moderate shrink-swell potential.	Slight -----	Severe: seepage; calcareous soil.	Moderate: high corrosivity; moderate shrink-swell potential.	Moderate: clay loam texture.	Moderate: clay loam texture.
Moderate: moderate permeability.	Moderate: medium compressibility.	Moderate: moderate shrink-swell potential.	Slight -----	Moderate: moderate permeability.	Moderate: moderate shrink-swell potential.	Moderate: clay loam texture.	Moderate: clay loam texture.
Severe: rapid permeability in substratum.	Severe: high compacted permeability.	Severe: subject to flooding.	Severe: hazard of flooding.	Severe: rapid permeability in substratum.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding; coarse fragments.
Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	Slight -----	Slight -----	Moderate: slope; moderate permeability.	Slight -----	Moderate: high corrosivity to uncoated steel; slope.	Severe: coarse fragments.
Moderate: moderate permeability.	Slight -----	Slight -----	Slight -----	Severe: coarse fragments.	Slight -----	Slight -----	Severe: very gravelly.
Severe: bedrock at a depth of 21 to 40 inches.	Severe: fair to poor resistance to piping and erosion.	Severe: high shrink-swell potential.	Severe: slow permeability; bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches.	Severe: high shrink-swell potential.	Severe: bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches.

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	Topsoil	Sand and gravel	Road fill		Terraces and diversions	Irrigation	Limitations for local roads and streets
Upton ----- Mapped only in association with Sanderson soils.	Poor: coarse fragments.	Unsuitable--	Good -----	High -----	Indurated caliche at a depth of 8 to 20 inches; poor resistance to piping and erosion.	Shallow to caliche; low available water capacity.	Moderate: indurated caliche at a depth of 8 to 20 inches.
*Vado: VdC ----- For Redona part, see Redona series.	Poor: coarse fragments.	Fair: excessive fines.	Good -----	Moderate ---	Poor resistance to piping and erosion.	Very gravelly; high intake rate; low available water capacity.	Slight -----
*Verhalen: Ve, Vh, Vm. For Dalby part of Vm, see Dalby series.	Poor: clay texture.	Unsuitable--	Poor: very high shrink-swell potential.	High -----	Subject to soil cracking.	Slow intake rate.	Severe: very high shrink-swell potential; low shear strength.
*Vieja: VnE ----- For Nickel part, see Nickel series.	Poor: silty clay texture.	Unsuitable--	Poor: high shrink-swell potential.	High -----	Shale at a depth of 4 to 20 inches; slope.	Unsuitable ---	Severe: steep; high shrink-swell potential.
Volco: VoE -----	Poor: coarse fragments.	Unsuitable--	Poor: 6 to 18 inches of suitable material.	Moderate ---	Bedrock at a depth of 6 to 18 inches; slope.	Unsuitable ---	Severe: slope; bedrock at a depth of 6 to 18 inches.

<sup>1</sup> Onsite deep studies of the underlying strata, water table, and hazard of aquifer pollution and drainage into ground water need to be made for landfills deeper than 5 or 6 feet.

interpretations—Continued

Degree of limitations and soil features affecting—							
Farm ponds		Dwellings	Septic tank filter fields	Sewage lagoons	Light industry	Sanitary landfills <sup>1</sup>	Shallow excavations
Reservoir areas	Embankments						
Severe: moderately rapid permeability in substratum.	Severe: borrow material 8 to 20 inches in thickness.	Moderate: indurated caliche (rippable) at a depth of 8 to 20 inches.	Severe: indurated caliche (rippable) at a depth of 8 to 20 inches.	Severe: shallow to moderately rapidly permeable substratum; indurated caliche (rippable) at a depth of 8 to 20 inches.	Moderate: indurated caliche (rippable) at a depth of 8 to 20 inches.	Severe: indurated caliche (rippable) at a depth of 8 to 20 inches.	Moderate: indurated caliche (rippable) at a depth of 8 to 20 inches.
Severe: moderately rapid permeability.	Moderate: poor resistance to piping and erosion.	Slight -----	Slight -----	Severe: moderately rapid permeability.	Slight -----	Slight -----	Severe: coarse fragments.
Slight -----	Moderate: high compressibility; poor slope stability.	Severe: very high shrink-swell potential.	Severe: slow permeability.	Slight -----	Severe: very high shrink-swell potential.	Severe: clay texture.	Severe: clay texture.
Slight -----	Moderate: medium compressibility.	Severe: high shrink-swell potential.	Severe: very slow permeability in shale.	Severe: slope.	Severe: high shrink-swell potential.	Severe: silty clay texture; slope.	Severe: silty clay texture; slope.
Severe: bedrock at a depth of 6 to 18 inches.	Severe: borrow material 6 to 18 inches in thickness.	Severe: bedrock at a depth of 6 to 18 inches.	Severe: bedrock at a depth of 6 to 18 inches.	Severe: slope; bedrock at a depth of 6 to 18 inches.	Severe: slope; bedrock at a depth of 6 to 18 inches.	Severe: bedrock at a depth of 6 to 18 inches.	Severe: bedrock at a depth of 6 to 18 inches.