

Tables

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Alluvial land.....	1, 179	0. 2	Maverick soils, eroded.....	3, 702	0. 5
Brennan fine sandy loam.....	65, 393	8. 4	Montell clay, saline.....	18, 012	2. 3
Camargo silty clay loam, 0 to 1 percent slopes.....	4, 250	. 5	Pits.....	2, 505	. 3
Camargo silty clay loam, 1 to 3 percent slopes.....	511	(¹)	Ramadero loam.....	19, 158	2. 5
Catarina soils.....	64, 306	8. 3	Reynosa silty clay loam.....	6, 639	. 9
Comitas loamy fine sand.....	6, 145	. 8	Rio Grande silt loam, 0 to 1 percent slopes.....	7, 190	. 9
Copita fine sandy loam.....	96, 250	12. 4	Rio Grande silt loam, 1 to 3 percent slopes.....	2, 455	. 3
Delmita fine sandy loam.....	34, 495	4. 4	Rio Grande silty clay loam.....	2, 801	. 4
Delmita loamy fine sand.....	16, 379	2. 1	Sarita fine sand.....	30, 565	4. 0
Falfurria's fine sand.....	2, 776	. 4	Tiocano-Rio complex.....	2, 561	. 3
Garceno clay loam.....	16, 723	2. 2	Viboras clay.....	1, 455	. 2
Grulla clay.....	3, 519	. 5	Zalla loamy fine sand.....	534	(¹)
Grulla clay, depressional.....	984	. 1	Zapata soils.....	65, 371	8. 4
Jimenez-Quemado association.....	19, 993	2. 6	Water.....	2, 279	. 3
Lagloria silt loam.....	5, 591	. 7			
McAllen fine sandy loam.....	269, 029	34. 6	Total.....	776, 960	100. 0
Matamoros silty clay.....	4, 210	. 5			

¹ Less than 0.1 percent.

TABLE 2.—*Estimated average yields per acre of major crops on nonirrigated and irrigated soils*

[Only soils that are suitable and generally used for crops are listed. Dashes indicate that the soil is not ordinarily used for the crop or that the crop is not grown under the management specified]

Soil	Cotton (lint)		Grain sorghum		Onions, irrigated	Carrots, irrigated	Cantaloups, irrigated
	Non- irrigated	Irrigated	Non- irrigated	Irrigated			
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>50-lb. sacks</i>	<i>Tons</i>	<i>Lb.</i>
Brennan fine sandy loam.....	400	1, 200	3, 000	6, 000	800	15	20, 000
Camargo silty clay loam, 0 to 1 percent.....	300	900	2, 500	7, 000	850	16	20, 000
Camargo silty clay loam, 1 to 3 percent.....	200	900	2, 000	6, 000	800	16	19, 000
Comitas loamy fine sand.....	170		1, 400	4, 500			
Copita fine sandy loam.....		1, 000		6, 000	800	12	
Delmita fine sandy loam.....	200	900	1, 600	6, 000	750	14	19, 000
Delmita loamy fine sand.....	190		1, 400				
Garceno clay loam.....		600		7, 000	800	15	19, 000
Grulla clay.....	220	450	1, 600	5, 000	750	12	
Grulla clay, depressiona.....							
Lagloria silt loam.....	225	1, 000	2, 000	7, 000	800	14	20, 000
McAllen fine sandy loam.....	200	900	1, 600	6, 000	800	15	19, 000
Matamoros silty clay.....	220	850	1, 700	6, 000	800	13	19, 000
Ramadero loam.....	500	1, 000	3, 500	7, 500			
Reynosa silty clay loam.....	300	1, 200	2, 500	7, 500	825	15	20, 000
Rio Grande silt loam, 0 to 1 percent slopes.....	275	1, 100	2, 500	7, 000	800	15	20, 000
Rio Grande silt loam, 1 to 3 percent slopes.....	200	700	2, 000	5, 500	800	13	19, 000
Rio Grande silty clay loam.....	275	1, 100	2, 500	7, 500	825	15	29, 000

TABLE 3.—Estimated engineering properties of soils

[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 soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols	Depth to bedrock	Hydro-logic soil group	Depth from surface	Classification	Classification—Continued		Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
				USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
Alluvial land: Al.....	Inches (1) >60	(1) B	Inches (1) 0-12 12-84	(1)..... Fine sandy loam..... Sandy clay loam.....	(1) SM SC	(1) A-2-4 A-6 or A-2	(1) 100 100	(1) 100 100	(1) 20-35 30-50	(1) 2.0-6.3 0.63-2.0	(1) 0.10-0.14 0.13-0.16	(1) 6.6-7.3 7.4-8.4	(1) Very low to low. Low.
Camargo: Ca A, Ca B.....	>60	B	0-63	Silty clay loam.....	CL or ML	A-7 or A-6	100	100	90-100	0.63-2.0	0.16-0.26	7.9-8.4	Moderate.
Catarina: Cn.....	>60	D	0-21 21-48 48-60	Clay..... Clay..... Clay.....	CH CH CH or SC	A-7 A-7 A-7	95-100 90-95 90-95	95-100 95-100 75-85	75-95 55-95 40-60	0.20-0.63 0.06-0.2 0.06-0.2	0.06-0.20 0.06-0.20 0.06-0.20	7.9-9.0 7.9-8.4 7.9-8.4	Very high. Very high. Very high.
Comitas: Co.....	>60	A	0-22 22-85	Loamy fine sand..... Fine sandy loam.....	SM SM-SC	A-2-4 A-2-4 or A-4	100 100	100 100	15-25 30-50	2.0-6.3 2.0-6.3	0.09-0.10 0.11-0.15	6.6-7.3 6.6-8.4	Very low. Very low.
Copita: Cp.....	25-40	B	0-11 11-37 37-54	Fine sandy loam..... Sandy clay loam..... Sandstone.	SM-SC SC	A-2-4 A-6	100 100	100 100	25-35 35-50	2.0-6.3 0.63-2.0	0.10-0.13 0.13-0.16	7.9-8.4 7.9-8.4	Low. Low.
Delmita: De.....	20-40	C	0-14 14-30 30-60	Fine sandy loam..... Sandy clay loam..... Caliche.	SM SC	A-2-4 A-2-6 or A-6	100 100	100 100	25-35 30-50	0.63-2.0 0.63-2.0	0.10-0.14 0.12-0.15	6.6-7.8 6.6-7.8	Low. Low.
Dm.....	20-40	C	0-17 17-38 38	Loamy fine sand..... Fine sandy loam..... Caliche.	SM SM-SC	A-2 A-2 or A-4	100 100	60-70 60-70	10-20 30-50	2.0-6.3 0.63-2.0	0.08-0.12 0.10-0.16	6.6-7.3 7.4-7.8	Low. Low.

See footnote at end of table.

TABLE 3.—Estimated engineering properties of soils—Continued

Soil series and map symbols	Depth to bedrock	Hydro-logic soil group	Depth from surface	Classification	Classification—Continued		Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
				USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
Falfurrias: Fa.....	Inches >60	A	Inches 0-90	Fine sand.....	SP-SM	A-2-4	100	100	5-12	Inches per hour 6.3-20.0	Inches per inch of soil 0.05-0.08	pH value 6.1-8.4	Very low.
Garcano: Ga.....	>60	C	0-9 9-60	Clay loam..... Clay loam.....	CL CH or CL	A-7 A-7	100 100	95-100 95-100	70-85 80-90	0.63-2.0 0.63-2.0	0.15-0.18 0.15-0.18	7.9-8.4 7.9-8.4	Moderate. Moderate to high.
Grulla: Gr, Gu.....	>60	D	0-65	Clay.....	CH	A-7-6	100	100	97-100	<0.06	0.15-0.18	7.9-8.4	Very high.
*Jimenez: Jq..... For Quemado part of this unit, see Quemado series.	5-15	C	0-10 10-20	Very gravelly loam Caliche, strongly cemented.	GW or GW-GM	A-1	30-50	15-35	0-10	2.0-6.3	0.10-0.15	7.9-8.4	Very low.
Lagloria: La.....	>60	B	0-15 15-45 45-78	Silt loam..... Silt loam..... Silt loam.....	CL ML-CL CL	A-6 A-7 A-6	100 100 100	100 95-100 95-100	85-95 55-70 90-100	0.63-2.0 0.63-2.0 0.63-2.0	0.14-0.18 0.14-0.18 0.14-0.18	7.9-8.4 7.9-8.4 7.9-8.4	Low. Low. Low.
McAllen: Mc.....	>60	B	0-17 17-60	Fine sandy loam..... Sandy clay loam.....	CL or SC SC or CL	A-6 A-6	99 90-100	95-100 78-100	40-55 35-55	0.63-2.0 0.63-2.0	0.10-0.14 0.12-0.17	7.9-8.4 7.9-8.4	Low. Low to moderate.
Matamoros: Mm.....	>60	C	0-63	Silty clay.....	CH or CL	A-7-6	100	100	95-100	0.06-0.2	0.15-0.20	7.9-8.4	Very high.
Maverick: Mu2.....	20-36	C	0-6 6-25 25-60	Clay..... Clay..... Shale, weathered.	CH CH CH	A-7 A-7 A-7	100 100	90-100 90-100	75-95 75-95	0.06-0.2 0.06-0.2	0.17-0.20 0.15-0.18	7.9-8.4 7.9-8.4	Very high. Very high.
Montell: Mt.....	60	D	0-63	Clay.....	CH	A-7-6	98-100	95-100	80-95	<0.06	0.15-0.20	7.9-8.4	Very high.
Pits: Pt.....	(¹)	(¹)	(¹)	(¹).....	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)	(¹)	(¹).
Quemado.....	8-15	C	0-12 12-24	Very gravelly loam Caliche, strongly cemented.	GW or GW-GM	A-1	30-50	15-35	0-10	2.0-6.3	0.10-0.15	6.6-7.3	Very low.
Ramadero: Ra.....	>60	B	0-4 4-11 11-80	Loam..... Sandy clay loam..... Sandy clay loam.....	CL or SC CL or SC SC or CL	A-6 A-6 A-6 or A-7	100 100 100	100 100 100	40-65 45-65 45-65	0.63-2.0 0.63-2.0 0.63-2.0	0.18-0.22 0.12-0.20 0.15-0.20	7.4-7.8 7.4-7.8 7.9-8.4	Low. Low. Low.
Reynosa: Re.....	>60	B	0-73	Silty clay loam (stratified at depth of 47 to 63 inches).	CL	A-6	100	100	80-95	0.63-2.0	0.12-0.15	7.9-8.4	Low.
Rio.....	>60	D	0-11 11-23 23-34 34-63	Sandy clay loam..... Sandy clay..... Sandy clay loam..... Clay loam.....	SC or CL CH CL or CH CH	A-6 or A-7 A-7 A-6 or A-7 A-7	100 100 100 100	100 100 100 100	45-60 85-95 55-65 85-95	0.63-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.15-0.18 0.15-0.20 0.15-0.20 0.15-0.20	7.9-8.4 7.9-8.4 7.9-8.4 7.9-8.4	Moderate. High. Moderate. High.
Rio Grande: RgA, RgB.....	>60	B	0-63	Silt loam.....	CL or ML-CL	A-6	100	100	70-95	0.63-2.0	0.12-0.15	7.9-8.4	Low.
Rr.....	>60	B	0-7 7-63	Silty clay loam..... Silt loam, stratified.....	CL CL-ML	A-7 A-6	100 100	100 100	85-95 70-90	0.63-2.0 0.63-2.0	0.15-0.20 0.12-0.15	7.9-8.4 7.9-8.4	Moderate. Low.
Sarita: Sa.....	>60	A	0-46 46-75	Fine sand..... Sandy clay loam.....	SM-SP SC	A-2-4 A-2-6	100 100	100 100	5-12 25-35	6.3-20.0 0.63-2.0	0.08-0.11 0.10-0.18	6.6-7.3 6.6-8.4	Very low. Low.
*Tiocono: Tr..... For Rio part, see Rio series.	>60	D	0-66	Clay.....	CH	A-7-6	100	100	95-100	<0.06	0.15-0.20	7.9-8.4	Very high.
Viboras: Vc.....	34	D	0-34 34	Clay..... Shale, clayey.	CH	A-7-6	100	100	95-100	<0.06	0.10-0.15	7.9-8.4	Very high.
Zalla: Za.....	60	A	0-63	Loamy fine sand.....	SM or SW-SM	A-2-4	100	100	10-25	6.3-20.0	0.05-0.10	7.9-8.4	Very low.
Zapata: Zp.....	2-10	C	0-8 8	Loam..... Caliche.	SC-CL	A-4 or A-6	85-95	75-95	40-65	0.63-2.0	0.10-0.15	7.9-8.4	Low.

¹ Soil material is too variable for reliable evaluation.

TABLE 4.—Engineering interpretations

[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 soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols	Suitability as source of—		Degree of limitation and soil features affecting—				Degree of limitation and soil features affecting—Continued		Soil features affecting—			Corrosivity to—	
	Topsoil	Road subgrade	Highway location	Foundations for low buildings ¹	Septic tank filter fields	Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
							Reservoir area	Embankment					
Alluvial land: Al*	Fair in silty clay loam. Poor in loamy fine sand.	Good.....	Severe: flooding once every 1 to 3 years.	Severe: flooding once every 1 to 3 years.	Severe: flooding once every 1 to 3 years.	Severe: flooding once every 1 to 3 years.	(?).....	(?).....	Flooding.....	Flooding.....	Flooding.....	(?).....	(?).....
Brennan: Br.....	Good.....	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: fair bearing capacity.	Slight.....	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Low.....	Low.
Camargo: Ca A, Ca B.	Fair in silty clay loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential; flooding once in 10 years.	Severe: flooding once in 10 years.	Moderate: moderate permeability; flooding once in 10 years.	Moderate: moderate permeability.	Severe: moderate permeability; stratification with sediments high in content of lime.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate: conductivity.	Low.
Catarina: Cn.....	Poor: clayey.	Poor: very high shrink-swell potential.	Severe: very high shrink-swell potential.	Severe: very high shrink-swell potential.	Severe: slow permeability.	Slight.....	Slight.....	Moderate: stability of slope.	Undulating topography; slow intake rate; salinity.	Clayey; subject to siltation.	Erodible, clayey; salinity.	Very high: conductivity.	High: salinity.
Comitas: Co.....	Poor: loamy fine sand.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: fair bearing capacity.	Slight.....	Severe: moderately rapid permeability.	Severe: moderately rapid permeability.	Moderate: stability of slope; poor resistance to piping and erosion.	Rapid intake rate; low available water capacity.	Stability of soil material; erodible.	Erodible; low available water capacity.	Low.....	Low.
Copita: Cp.....	Fair: sandy clay loam.	Fair: fair traffic-supporting capacity; 25 to 40 inches of material.	Moderate: fair traffic-supporting capacity.	Moderate at depth above 25 to 40 inches; fair bearing capacity. Severe at depth below 25 to 40 inches; bed-rock.	Severe: bed-rock at depth of 25 to 40 inches.	Severe: bed-rock at depth of 25 to 40 inches.	Moderate: moderate permeability.	Moderate: stability of slope; borrow material is 25 to 40 inches thick; fair resistance to piping and erosion.	Moderate permeability; gently undulating topography.	All features favorable.	All features favorable.	High to very high conductivity.	Low.
Delmita: De.....	Fair: less than 20 inches of suitable material.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; indurated caliche at depth of 20 to 40 inches; caliche is rippable.	Moderate: fair bearing capacity.	Severe: indurated caliche at depth of 20 to 40 inches.	Severe: indurated caliche at depth of 20 to 40 inches.	Severe: moderate permeability; indurated caliche at depth of 20 to 40 inches.	Moderate: borrow material is 20 to 40 inches thick; fair resistance to piping and erosion.	Gently sloping topography; soil blowing.	Shallow soil in spots.	All features favorable.	Moderate: conductivity.	Low.
Dm.....	Poor: loamy fine sand.	Good.....	Moderate: fair traffic-supporting capacity; indurated caliche at depth of 20 to 40 inches; caliche is rippable.	Moderate: fair bearing capacity.	Severe: indurated caliche at depth of 20 to 40 inches.	Severe: indurated caliche at depth of 20 to 40 inches.	Severe: moderate permeability; indurated caliche at depth of 20 to 40 inches.	Moderate: borrow material is 20 to 40 inches thick; fair resistance to piping and erosion.	Gently sloping topography; soil blowing.	Stability of soil material; erodible.	Stability of soil material; erodible.	Moderate: conductivity.	Low.

See footnotes at end of table.

TABLE 4.—Engineering interpretations—Continued

Soil series and map symbols	Suitability as source of—		Degree of limitation and soil features affecting—				Degree of limitation and soil features affecting—Continued		Soil features affecting—			Corrosivity to—	
	Topsoil	Road subgrade	Highway location	Foundations for low buildings ¹	Septic tank filter fields	Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
							Reservoir area	Embankment					
Falfurrias: Fa....	Poor: fine sand.	Good.....	Slight.....	Slight.....	Severe: rapid permeability; inadequate filtration.	Severe: rapid permeability.	Severe: rapid permeability.	Severe: poor resistance to piping and erosion.	Rapid intake rate; low available water capacity.	Stability of soil material; erodible.	Stability of soil material; erodible.	Low.....	Low.
Gareeno: Ga.....	Fair: clay loam.	Poor: poor traffic-supporting capacity; moderate to high shrink-swell potential.	Severe: moderate to high shrink-swell potential; poor traffic-supporting capacity.	Severe: poor bearing strength; moderate to high shrink-swell potential.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: medium compressibility.	Slow intake rate; susceptible to salt accumulation.	All features favorable.	All features favorable.	High: conductivity.	Low.
Grulla: Gr, Gu....	Poor: clayey..	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential; flooding twice in 5 years.	Severe: somewhat poorly drained; flooding twice in 5 years; very high shrink-swell potential.	Severe: very slow permeability; flooding twice in 5 years.	Severe: flooding twice in 5 years.	Slight.....	Moderate: fair stability of slope; high compressibility.	Very slow intake rate; susceptible to salt accumulation.	Depressional position.	Clayey; drainage.	Very high drainage.	Low.
*Jimenez: Jq..... For Quemado part, see Quemado series.	Poor: more than 10 percent coarse fragments.	Good.....	Severe: slopes of 3 to 20 percent; bedrock at depth of 5 to 15 inches.	Severe: slopes of 3 to 20 percent; bedrock at depth of 5 to 15 inches.	Severe: slopes of 3 to 20 percent; bedrock at depth of 5 to 15 inches.	Severe: moderately rapid permeability; bedrock at depth of 5 to 15 inches; slopes of 3 to 20 percent.	Severe: moderately rapid permeability; bedrock at depth of 5 to 15 inches.	Severe: borrow material is 3 to 15 inches thick.	Shallow soil; gravelly.	Shallow soil; gravelly.	Shallow soil; gravelly; slope.	Low.....	Low.
Lagloria: La.....	Good.....	Fair: fair traffic-supporting capacity; low shrink-swell potential.	Moderate: fair traffic-supporting capacity; low shrink-swell potential.	Moderate: fair bearing strength; low shrink-swell potential.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair stability of slope; fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	High to very high conductivity.	Low.
McAllen: Mc.....	Fair: less than 20 inches of suitable material.	Fair: fair traffic-supporting capacity; low shrink-swell potential.	Moderate: fair traffic-supporting capacity; low shrink-swell potential.	Moderate: fair bearing strength; low shrink-swell potential.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	High to very high conductivity.	Low.
Matamoras: Mm..	Fair: silty clay.	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: very high shrink-swell potential; infrequent flooding.	Severe: slow permeability.	Slight.....	Slight.....	Moderate: fair stability of slope; high compressibility.	All features favorable.	All features favorable.	All features favorable.	High conductivity.	Low.
Maverick: Mu2...	Poor: clayey; salinity.	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: very high shrink-swell potential.	Severe: slow permeability.	Severe: shale bedrock at depth of 20 to 36 inches.	Severe: shale bedrock at depth of 20 to 36 inches.	Moderate: fair stability of slope; borrow material is 20 to 40 inches thick.	Slow intake rate; salinity.	Steep; short slopes; susceptible to siltation.	Clayey; salinity.	Very high: conductivity.	High: salinity.
Montell: Mt.....	Poor: clayey; salinity.	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: very high shrink-swell potential.	Severe: very slow permeability.	Slight.....	Slight.....	Moderate: fair stability of slope; high compressibility.	Very slow intake rate.	Clayey soils.....	Clayey; salinity.	Very high: conductivity; resistivity; texture.	Moderate: saline.

See footnotes at end of table.

TABLE 4.—Engineering interpretations—Continued

Soil series and map symbols	Suitability as source of—		Degree of limitation and soil features affecting—				Degree of limitation and soil features affecting—Continued		Soil features affecting—			Corrosivity to—	
	Topsoil	Road subgrade	Highway location	Foundations for low buildings ¹	Septic tank filter fields	Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
							Reservoir area	Embankment					
Pits: Pt.....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....	(?).....
Quemado.....	Poor: more than 10 percent coarse fragments.	Good.....	Severe: slopes of 3 to 20 percent; strongly cemented caliche at depth of 5 to 15 inches.	Severe: slopes of 3 to 20 percent.	Severe: strongly cemented caliche at depth of 5 to 15 inches.	Severe: moderately rapid permeability; strongly cemented caliche at depth of 5 to 15 inches; slopes of 3 to 20 percent; coarse fragments.	Severe: moderately rapid permeability; strongly cemented caliche at depth of 5 to 15 inches.	Severe: borrow material is 5 to 15 inches thick; moderate stability of slope; poor resistance to piping and erosion.	Shallow soil; gravelly.	Shallow soil; gravelly.	Shallow soil; gravelly.	Low.....	Low.
Ramadero: Ra....	Fair: sandy clay loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; occasional flooding.	Severe: occasional flooding.	Slight.....	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: fair stability of slope.	Susceptible to seasonal flooding.	Susceptible to siltation.	All features favorable.	High: conductivity.	Low.
Reynosa: Re....	Fair: silty clay loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: fair bearing strength.	Slight.....	Moderate: moderate permeability.	Severe: moderate permeability; stratification.	Moderate: fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	High to very high conductivity.	Low.
Rio.....	Fair: sandy clay loam.	Poor: poor traffic-supporting capacity; high shrink-swell potential.	Severe: poor traffic-supporting capacity; high shrink-swell potential.	Severe: somewhat poorly drained; high shrink-swell potential.	Severe: slow permeability.	Slight.....	Slight.....	Moderate: fair stability of slope.	Slow intake rate.	Depressional position.	Depressional position.	High: conductivity.	Low.
Rio Grande: RgA, RgB.....	Good.....	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity; flooding once in 10 years.	Severe: flooding once in 10 years.	Moderate: moderate permeability.	Severe: flooding once in 10 years; high seepage loss.	Severe: high seepage loss.	Moderate: fair stability of slope; fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate to high conductivity.	Low.
Rr.....	Fair: silty clay loam and silt loam; less than 20 inches of silt loam.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential; flooding once in 10 years.	Severe: flooding once in 10 years.	Moderate: moderate permeability; flooding once in 10 years.	Severe: flooding once in 10 years; high seepage loss.	Severe: high seepage loss.	Moderate: fair stability of slope; fair resistance to piping and erosion.	All features favorable.	All features favorable.	All features favorable.	Moderate to high conductivity.	Low.
Sarita: Sa.....	Poor: fine sand.	Fair: thickness of surface layer.	Slight.....	Moderate: fair bearing strength.	Slight.....	Severe: rapid permeability in surface layer.	Severe: rapid permeability and seepage in surface layer.	Severe: fair stability of slope; poor resistance to piping and erosion.	Rapid intake rate; low available water capacity.	Stability of soil material; erodible.	Erodible; low available water capacity.	Low.....	Low.
*Tiocano: Tr.... For Rio part see Rio series.	Poor: clayey..	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: flooding; very high shrink-swell potential; somewhat poorly drained.	Severe: very slow permeability; flooding each year.	Slight.....	Slight.....	Moderate: fair stability of slope; high compressibility.	Very slow intake rate.	Depressional position.	Depressional position.	Very high conductivity.	Low.
Viboras: Vc.....	Poor: clayey..	Poor: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: poor traffic-supporting capacity; very high shrink-swell potential.	Severe: very high shrink-swell potential.	Severe: very slow permeability.	Slight.....	Slight.....	Moderate: fair stability of slope.	All features favorable.	All features favorable.	All features favorable.	Very high conductivity; resistivity; texture.	Low.

See footnotes at end of table.

TABLE 4.—Engineering interpretations—Continued

Soil series and map symbols	Suitability as source of—		Degree of limitation and soil features affecting—				Degree of limitation and soil features affecting—Continued		Soil features affecting—			Corrosivity to—	
	Topsoil	Road subgrade	Highway location	Foundations for low buildings ¹	Septic tank filter fields	Sewage lagoons	Farm ponds		Irrigation	Terraces and diversions	Waterways	Uncoated steel	Concrete
							Reservoir area	Embankment					
Zalla: Za.....	Poor: sandy..	Good.....	Moderate: flooding 1 year in 5.	Severe: flooding 1 year in 5.	Moderate: flooding 1 year in 5.	Severe: rapid permeability.	Severe: rapid permeability.	Severe: fair stability of slope; poor resistance to piping and erosion.	Rapid intake rate; low available water capacity; flooding 1 year in 5.	Stability of soil material; erodible.	Erodible; low available water capacity.	Very low.....	Low.
Zapata: Zp.....	Poor: more than 30 percent calcium carbonate.	Good.....	Moderate: indurated caliche at depth of 2 to 10 inches; caliche is rippable.	Severe: indurated caliche at depth of 2 to 10 inches.	Severe: indurated caliche at depth of 2 to 10 inches.	Severe: indurated caliche at depth of 2 to 10 inches.	Severe: indurated caliche at depth of 2 to 10 inches.	Severe: borrow material is 2 to 10 inches thick.	Very shallow soil.	Very shallow soil.	Very shallow soil.	Moderate conductivity.	Low.

¹ Engineers and others should not apply specific values to the estimates given for bearing capacity of soils.

² Not rated, because the soil material is too variable for reliable evaluation.

TABLE 5.—Engineering test data

[Tests performed by the Texas Highway Department in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (1)]

Soil name and location	Parent material	Texas report No.	Depth from surface	Shrinkage limit	Lineal shrinkage	Shrinkage ratio	Mechanical analysis ¹									Liquid limit	Plasticity index	Classification	
							Percentage passing sieve—					Percentage smaller than—			AASHO ²			Unified ³	
							¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.005 mm.	0.002 mm.					
Catarina clay: An area of Catarina soils 10 miles N. of U.S. Highway 83 on Loma Blanca Road. (Modal)	Calcareous clay, high salt content.	63-176-R	Inches 10-21	Percent 13	Percent 22.5	1.94	100	99	98	94	90	81	51	42	Percent 72	50	A-7-6(20)	CH	
		63-177-R	35-48	14	20.5	1.90	100	92	79	62	55	35	34	30	66	47	A-7-6(14)	CH	
Garceno clay loam: 9 miles N. of U.S. Highway 83 on Loma Blanca Road, at NE. corner of intersection with county road. (Modal)	Old alluvium.	63-180-R	3-11	13	15.9	1.91	100	97	96	94	81	77	57	49	49	30	A-7-6(18)	CL	
		63-181-R	23-41	14	18.5	2.00	-----	-----	100	99	90	89	66	54	53	37	A-7-6(19)	CH	
Lagloria silt loam: 0.5 mile E. and ¾ mile S. of Garciasville. (Modal)	Alluvium.	63-169-R	6-16	18	8.0	1.76	-----	-----	-----	100	90	86	31	23	34	15	A-6(10)	CL	
		63-170-R	27-36	19	3.4	1.68	-----	-----	-----	100	63	55	12	9	24	4	A-4(6)	ML-CL	
		63-171-R	36-63	19	7.0	1.73	-----	-----	-----	100	98	94	29	22	33	12	A-6(9)	CL	
McAllen fine sandy loam: 7 miles NE. of Rio Grande City on Farm Road 755 and 400 feet NW. on county road. (Modal)	Old alluvium.	63-187-R	7-17	15	5.7	1.82	100	99	97	95	51	40	22	17	26	11	A-6(4)	CL	
		63-188-R	28-60	15	8.0	1.84	100	90	78	74	49	44	25	21	30	16	A-6(5)	SC	
Matamoros silty clay: 0.75 mile S. of Garciasville. (Modal)	Alluvium.	63-172-R	8-18	19	16.1	1.80	-----	-----	-----	-----	100	98	69	49	58	35	A-7-6(20)	CH	
		63-173-R	30-52	18	12.3	1.80	-----	-----	-----	-----	100	98	56	39	44	23	A-7-6(14)	CH	
1.12 miles S. of Garciasville and 0.25 mile W. (Finer textured than modal)	Alluvium.	63-174-R	8-29	17	14.2	1.88	-----	-----	-----	-----	100	100	62	44	48	27	A-7-6(16)	CL	
		63-175-R	29-63	16	17.5	1.88	-----	-----	-----	-----	100	98	70	53	58	35	A-7-6(20)	CH	
Montell clay: 9 miles N. of U.S. Highway 83 on Loma Blanca Road, and 2.5 miles E. on county road. (Modal)	Old alluvium, Pleistocene age.	63-178-R	9-18	13	17.7	1.95	-----	-----	100	99	82	78	61	53	54	36	A-7-6(19)	CH	
		63-179-R	34-74	12	19.1	2.00	-----	-----	100	98	87	77	59	52	56	39	A-7-6(19)	CH	

¹ Mechanical analyses according to AASHO Designation: T 88-57(1). Results by this procedure differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

² Based on AASHO Designation M 145-49 (1).

³ Based on MIL-STD-619B (11). SCS and BPR have agreed that any soil having a plasticity index within 2 points of A-line is to be given a borderline classification. ML-CL is an example of such a classification.

TABLE 6.—*Soil series classified by higher categories*

Soil series	Family	Subgroup	Order
Brennan	Fine-loamy, mixed, hyperthermic	Aridic Haplustalfs	Alfisols.
Camargo	Fine-silty, mixed (calcareous), hyperthermic	Typic Ustifluvents	Entisols.
Catarina	Fine, montmorillonitic, hyperthermic	Paleustollic Torrerts	Vertisols.
Comitas	Loamy, mixed, hyperthermic	Arenic Aridic Haplustalfs	Alfisols.
Copita	Fine-loamy, mixed, hyperthermic	Ustochreptic Camborthids	Aridisols.
Delmita	Fine-loamy, mixed, hyperthermic	Aridic Petrocalcic Paleustalfs	Alfisols.
Falfurrias	Mixed, hyperthermic	Typic Ustipsamments	Entisols.
Garceno	Fine, mixed, hyperthermic	Ustollic Camborthids	Aridisols.
Grulla	Fine, mixed (calcareous), hyperthermic	Vertic Fluvaquents	Entisols.
Jimenez	Loamy-skeletal, mixed, hyperthermic, shallow	Ustollic Paleorthids	Aridisols.
Lagloria	Coarse-silty, mixed, hyperthermic	Fluventic Ustochrepts	Inceptisols.
McAllen	Fine-loamy, mixed, hyperthermic	Typic Ustochrepts	Inceptisols.
Matamoros	Fine, mixed (calcareous), hyperthermic	Vertic Ustifluvents	Entisols.
Maverick	Fine, mixed, hyperthermic	Ustollic Camborthids	Aridisols.
Montell	Fine, montmorillonitic, hyperthermic	Entic Pellusterts	Vertisols.
Quemado	Loamy-skeletal, mixed, hyperthermic, shallow	Petrocalcic Ustalfic Paleargids	Aridisols.
Ramadero	Fine-loamy, mixed, hyperthermic	Pachic Argiustolls	Mollisols.
Reynosa	Fine-silty, mixed, hyperthermic	Fluventic Ustochrepts	Inceptisols.
Rio	Fine, mixed, hyperthermic	Typic Argiaquolls	Mollisols.
Rio Grande	Coarse-silty, mixed (calcareous), hyperthermic	Typic Ustifluvents	Entisols.
Sarita	Loamy, mixed, hyperthermic	Grossarenic Paleustalfs	Alfisols.
Tiicano	Fine, montmorillonitic, hyperthermic	Udic Pellusterts	Vertisols.
Viboras	Fine, mixed, hyperthermic	Ustertic Camborthids	Aridisols.
Zalla	Sandy, mixed, hyperthermic	Typic Ustifluvents	Entisols.
Zapata	Loamy, carbonatic, hyperthermic, shallow	Ustollic Paleorthids	Aridisols.

TABLE 7.—*Precipitation data*

[All data from Rio Grande City; elevation 170 feet]

Month	Average total ¹	Precipitation in—		One year in 4 will have—	
		1902 (driest year)	1941 (wettest year)	Less than—	More than—
	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
December-----	0. 68	-----	1. 77	0. 21	0. 99
January-----	. 94	0. 02	2. 40	. 26	1. 42
February-----	. 79	-----	. 82	. 22	1. 11
Winter-----	2. 41	. 02	4. 99	. 69	3. 52
March-----	. 85	-----	1. 45	. 29	1. 26
April-----	1. 26	2. 25	3. 29	. 43	1. 99
May-----	2. 10	. 70	3. 19	. 86	2. 86
Spring-----	4. 21	2. 95	7. 93	1. 58	6. 11
June-----	2. 01	-----	5. 63	. 23	1. 13
July-----	1. 37	. 10	1. 56	. 47	2. 21
August-----	1. 69	-----	. 52	. 47	2. 51
Summer-----	5. 07	. 10	7. 71	1. 17	5. 85
September-----	3. 13	1. 75	7. 94	1. 34	4. 46
October-----	1. 84	. 05	1. 50	. 49	2. 46
November-----	. 61	. 41	. 44	. 15	. 90
Fall-----	5. 58	2. 21	9. 88	1. 98	7. 82
Year-----	17. 27	5. 28	30. 51	13. 62	20. 35

¹ Based on a 31-year record, through 1962.TABLE 8.—*Temperature data*

[All data from Rio Grande City; elevation 170 feet; based on record for the period 1931-62]

Month	Average maximum	Average minimum
	^{°F.}	^{°F.}
January-----	71. 1	46. 2
February-----	76. 0	49. 7
March-----	82. 1	54. 7
April-----	89. 6	62. 0
May-----	94. 0	68. 8
June-----	97. 8	73. 0
July-----	99. 7	74. 3
August-----	100. 3	73. 8
September-----	94. 5	70. 5
October-----	88. 8	62. 8
November-----	78. 5	52. 6
December-----	72. 4	47. 6
Annual-----	87. 1	61. 3