

Ector soils are lighter colored and less clayey than Tarrant soils.

Typical profile of Ector stony loam, in a pasture north of a highway located 15.4 miles south of Sonora on U.S. Highway No. 277 and then 17.95 miles southwest on farm-to-market road 189:

A1—0 to 6 inches, grayish-brown (10YR 5/2) stony loam, very dark grayish brown (10YR 3/2) when moist; weak subangular blocky and moderate, very fine, granular structure; slightly hard when dry, friable when moist, slightly sticky when wet; fine roots common; about 40 percent angular caliche and limestone fragments ranging from 1/16 inch to 10 inches in diameter; few to common stones on the surface or protruding from it; strongly cemented, platy caliche fragments make up most of the lower 1 inch or 2 inches; moderately alkaline; calcareous; abrupt, irregular boundary.

R—6 inches +, fractured limestone; thin coatings of calcium carbonate in most crevices.

Limestone and caliche fragments ranging from 1/16 inch to 10 inches in diameter make up 35 to 65 percent of the soil mass. The thickness of the A1 horizon ranges from 1 inch to 2 inches near rock outcrops up to 10 inches in fractures and in deeper patches between ledges. The texture ranges from silty clay loam on northern exposures to silt loam on southern exposures. The color ranges from brown to very dark grayish brown. The soils on the northern exposures are deeper, darker colored, and more clayey than those on southern exposures. Also, they support more vegetation.

FRIO SERIES

The Frio series consists of grayish-brown to very dark grayish-brown, moderately fine textured, well-drained soils on the flood plains of streams that drain limestone areas. These soils are friable and calcareous and, in many places, are gravelly. They are gently sloping along old sediment-filled channels and are nearly level along the North Llano River, the Devils River, and the larger tributaries of these streams. These soils are flooded at infrequent intervals and generally are under water less than 24 hours. Live oak, walnut, and hackberry trees grow along the streambanks. Many pecan trees grow on the flood plain of the North Llano River.

Frio soils are darker colored than Reagan soils and are darker colored and less clayey than Knippa soils. Frio soils are much less gravelly than Dev soils, which are more than 50 percent gravel and cobblestones.

Typical profile of Frio silty clay loam, 35 miles south-west of Sonora on farm-to-market road 189 and then 0.2 mile north on a county road:

A1—0 to 20 inches, dark grayish-brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak subangular blocky structure; firm when moist, slightly hard when dry; a few waterworn pebbles ranging from 1/4 inch to 2 inches in diameter; moderately alkaline; calcareous; diffuse boundary.

AC—20 to 50 inches, brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) when moist; moderate, very fine to medium, subangular blocky structure; firm when moist, hard when dry; about 10 percent waterworn gravel ranging from 1/4 inch to 2 inches in diameter; moderately alkaline; calcareous; diffuse boundary.

C—50 to 60 inches +, yellowish-brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) when moist; firm when moist, hard when dry; about 10 percent waterworn gravel ranging from 1/4 inch to 2 inches in diameter; moderately alkaline; calcareous.

Knippa soils are at a lower elevation than Reagan soils and are darker colored and more clayey. Knippa soils are less gravelly and more clayey than Frio and Dev soils, which are subject to flooding. Knippa soils are also associated with the very shallow Tarrant and Ector soils on slopes leading up from the valleys.

Typical profile of Knippa silty clay, 6.14 miles north of Sonora on U.S. Highway No. 277 and then 1 mile west on a county road and 0.5 mile south:

A11—0 to 8 inches, dark grayish-brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, very fine and fine, subangular blocky and granular structure; hard when dry, firm when moist; many fine roots; few earthworm casts and burrows; few tubes and pores; few to common limestone fragments up to half an inch and a few up to 3 or 4 inches in diameter; moderately alkaline; calcareous; clear boundary.

A12—8 to 18 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) when moist; moderate, fine and medium, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; common fine roots; common earthworm casts and burrows; many tubes and pores; common limestone fragments up to half an inch in diameter; moderately alkaline; calcareous; gradual boundary.

B2—18 to 40 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) when moist; moderate, fine and medium, subangular and irregular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; few fine roots; many tubes and pores; few earthworm casts and burrows; common limestone fragments up to half an inch in diameter; few fine concretions of calcium carbonate; moderately alkaline; calcareous; gradual boundary.

C1ca—40 to 50 inches, very pale brown (10YR 7/4) silty clay, yellowish brown (10YR 5/4) when moist; hard when dry, firm when moist, sticky when wet; common limestone fragments coated with calcium carbonate up to half an inch in diameter; 20 to 30 percent soft lumps and concretions of calcium carbonate up to half an inch in diameter; moderately alkaline; very strongly calcareous; diffuse boundary.

C2—50 inches +, gravel and boulders mixed with clay.

A few small, waterworn pebbles and a few limestone fragments ranging up to 4 inches in diameter occur through the profile. The A horizon ranges from light silty clay to clay in texture and from 12 to 32 inches in thickness. In some profiles there are a few small, wedge-shaped peds. There is a thin surface crust in most pedons.

The B2 horizon is silty clay or clay in texture and ranges from 18 to 28 inches in thickness. When these soils are dry, this layer ranges from brown to dark yellowish brown in color. In some pedons there are wedge-shaped pods with shiny, grooved surfaces.

The C1ca horizon begins at a depth of 28 to 50 inches and ranges from about 6 to 30 inches in thickness. The texture ranges from heavy silty clay loam to clay. Soft lumps and concretions of calcium carbonate 1/16 to 1/2 inch in diameter make up 10 to 50 percent of this layer.

RANDALL SERIES

The Randall series consists of nearly level or concave, poorly drained, calcareous clay soils in small intermittent lakes. These soils range from 4 acres up to nearly 30 acres in size. The average size is about 7 acres. These soils collect water through runoff and remain under water for several days to a few months during rainy periods. Drainage is mainly through holes and crevices in the underlying limestone. The collected water helps to recharge the underground water supply.

Randall soils are below Tobosa, Valera, and Tarrant soils. They are more poorly drained and grayer than Tobosa soils.

Typical profile of Randall clay, about 4 miles east of Sonora on U.S. Highway No. 290 and then 6 miles northeast on farm-to-market road 864:

A11—0 to 7 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) when moist; moderate, coarse, granular and moderate, fine, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; many very fine roots; many tubes and pores; few earthworm casts and burrows; few to common limestone fragments ranging from 1/2 inch to 3 inches in diameter; moderately alkaline; calcareous; clearly boundary.

A12—7 to 20 inches, gray (10YR 4.5/1) heavy clay, very dark gray (10YR 3.5/1) when moist; moderate, medium and coarse, blocky structure; very hard when dry, very firm when moist, very sticky and plastic when wet; common fine roots, mostly on faces of peds; few limestone fragments ranging from 1/4 inch to 1 inch in diameter; moderately alkaline; calcareous; gradual boundary.

AC—20 to 54 inches, gray (10YR 5/1) heavy clay, dark gray (10YR 4/1) when moist; weak to moderate, medium and coarse, blocky structure; very hard when dry, very firm when moist, very sticky and plastic when wet; few very fine roots; few tubes and pores, moderately alkaline; calcareous; abrupt boundary.

R—54 inches +, hard limestone.

Alternate swelling and shrinking of these soils causes heaving, which results in gilgai microrelief. Limestone fragments make up 20 to 30 percent or more of the volume. The fragments range from pebbles to boulders in size.

The A horizon ranges from 5 to 38 inches in thickness. In some pedons the structure is irregularly blocky in the lower part. The AC horizon ranges from 16 to 36 inches or more in thickness. It has weak irregular blocky structure in some places.

REAGAN SERIES

The Reagan series consists of deep, gently sloping, well drained, calcareous soils. These soils are on smooth stream terraces and alluvial fans. They are underlain by silty to gravelly old alluvium, or outwash material. The topography slightly convex to plane.

Reagan soils are lighter colored and less clayey than Knippa soils. Unlike Frio soils, Reagan soils are above normal flooding. They are also near Ector and Tarrant soils, which are on hillsides and are very shallow.

Typical profile of Reagan silty clay loam, 8.4 miles west of Sonora on U.S. Highway No. 290 as far as its intersection with farm-to-market road 1989; then 11.45 miles southwest on 1989 and a county road; then 0.3 mile west along a powerline; and then 100 feet north:

A1—0 to 8 inches, grayish-brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) when moist; moderate, very fine and fine, subangular blocky and granular structure; slightly hard when dry, friable when moist, slightly sticky when wet; common fine roots; common tubes and pores; common earthworm casts and burrows; few to common limestone fragments, mostly less than one-fourth of an inch in diameter; few concretions of calcium carbonate less than one-fourth of an inch in diameter; moderately alkaline; calcareous; gradual boundary.

B21—8 to 21 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate, very fine and fine, subangular blocky and granular

structure; slightly hard when dry, friable when moist, slightly sticky when wet; common fine roots; common tubes and pores; common earthworm casts and burrows; few to common limestone fragments less than one-fourth of an inch in diameter; few concretions of calcium carbonate up to one-fourth of an inch in diameter; few caliche pebbles up to 3 inches in diameter; moderately alkaline; calcareous; diffuse boundary.

B22—21 to 34 inches, light-brown (7.5YR 5.5/4) silty clay loam, dark brown (7.5YR 4/4) when moist; weak to moderate, very fine and fine, subangular blocky and granular structure; slightly hard when dry, friable when moist, slightly sticky when wet; few fine roots; few tubes and pores; few earthworm casts and burrows; few to common limestone fragments, coated with calcium carbonate, less than one-fourth of an inch in diameter; common concretions, soft lumps, films, and threads of calcium carbonate; few caliche pebbles up to 3 inches in diameter; moderately alkaline; calcareous; gradual boundary.

C1ca—34 to 54 inches, pink (7.5YR 8/4) silty clay loam, light brown (7.5YR 6/4) when moist; weak subangular blocky and granular structure; slightly hard when dry, friable when moist, slightly sticky when wet; many calcium carbonate concretions and rounded pebbles; moderately alkaline; very strongly calcareous; gradual boundary.

C2—54 to 72 inches +, light-brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) when moist; slightly hard when dry, friable when moist, slightly sticky when wet; common very fine to medium calcium carbonate concretions; common limestone fragments and caliche pebbles up to 3 inches in diameter; moderately alkaline; calcareous.

Limestone fragments coated with calcium carbonate are numerous in most profiles. The A1 horizon is silty clay loam or clay loam in texture and ranges from 6 to 12 inches in thickness. The structure ranges from weak to moderate. When this layer is dry, the color ranges from grayish brown to dark grayish brown. A few limestone fragments up to 3 inches in diameter occur on the surface, which in most pedons has a crust as much as half an inch thick.

The B2 horizon is silty clay loam or light silty clay that ranges from 18 to 38 inches in thickness. When this layer is dry, it ranges from dark grayish brown in the uppermost few inches to pale brown in the lower part.

The C1ca horizon begins at a depth of 24 to 50 inches and ranges from 4 to 26 inches in thickness. It ranges from silty clay loam to light silty clay in texture and, when dry, from pink to pale brown in color. Caliche pebbles and soft lumps and concretions of calcium carbonate make up 20 to 50 percent of this layer.

The C2 horizon is calcareous, silty outwash material mixed with various amounts of gravel and boulders. The depth to bedrock is 72 inches or more.

TARRANT SERIES

The Tarrant series consists of very shallow, nearly level to steep, dark-colored, friable, clayey and stony soils. Stones, cobblestones, and gravel are common on the surface and in the profile. The underlying material is fractured hard limestone and is interbedded with marl in a few places.

Tarrant soils are steeper and shallower than Kavett and Valera soils. They are darker colored and finer textured than Ector soils.

Typical profile of Tarrant stony clay, 1.0 mile west of Sonora on U.S. Highway No. 290 and then 100 feet south:

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) stony clay, very dark brown (10YR 2/2) when moist; moderate, fine, granular structure; slightly hard when dry, friable when moist; about 60 percent of surface covered

with limestone fragments up to 3 feet across, most are about 6 to 8 inches long and 1 inch to 2 inches thick; many fine roots and earthworm casts; moderately alkaline; calcareous; abrupt boundary.

R&A1—5 to 7 inches, dark grayish-brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) when moist; moderate, fine, granular structure; friable when moist, hard when dry; about 75 percent limestone fragments, about 4 to 6 inches long and 1 inch to 2 inches thick; moderately alkaline; calcareous; abrupt boundary.

R—7 to 10 inches +, fractured hard limestone; 1 percent fines extending downward into fractures.

The thickness of the A1 horizon ranges from about 2 inches to 12 inches. It is shallowest near rock outcrops. The structure is both granular and subangular blocky. It ranges from weak to moderate in distinctness and from very fine to medium in size. When this layer is dry, the color ranges from dark grayish brown to very dark grayish brown. The texture ranges from clay to silty clay loam and is dominantly clay or silty clay. The reaction ranges from neutral to moderately alkaline. Irregularly shaped limestone rocks, from 10 inches to about 3 feet along the longest axis, are scattered on the surface. Coarse fragments make up about 20 to 50 percent of the horizon.

In the deeper profiles is a transitional horizon ranging from 2 to 5 inches in thickness. This horizon ranges from weak to moderate subangular blocky to weak to moderate granular in structure. When dry, it is dark grayish brown to dark brown. Flattened, caliche-coated limestone fragments make up 75 to 95 percent of this layer. These fragments are smooth on top and rough and knobby underneath.

TOBOSA SERIES

The Tobosa series consists of deep, nearly level to gently sloping, calcareous, clayey soils over limestone. These soils have a level to weakly concave surface and, in some pedons, a weak gilgai microrelief. Runoff is very slow, and permeability is slow. Cracks as much as 3 inches wide and 3 feet deep form as these soils dry.

Tobosa soils are deeper, more clayey, and less permeable than Valera soils, which they adjoin in some places. Tobosa soils are slightly lower on the landscape. They are better drained and less gray than Randall soils.

Typical profile of Tobosa clay, 3.48 miles east of Sonora on U.S. Highway No. 290 to farm-to-market road 864; then 1.3 miles northeast on 864 to its intersection with a county road; then 7.01 miles north and northeast on a county road; then 20 feet north:

A11—0 to 7 inches, dark grayish-brown (10YR 4/2) clay, very dark brown (10YR 2/2) when moist; moderate, very fine and fine, subangular blocky and granular structure; hard when dry, firm when moist, sticky and plastic when wet; many fine roots; common tubes and pores; few earthworm casts and burrows; few limestone fragments up to 2 inches in diameter on the surface; weak gilgai microrelief at surface; moderately alkaline; calcareous; clear boundary.

A12—7 to 18 inches, dark grayish-brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) when moist; moderate, medium, blocky structure; very hard when dry, very firm when moist, very sticky and plastic when wet; common fine roots; many tubes and pores; few earthworm casts and burrows; few small, wedge-shaped peds with shiny, grooved surfaces; few limestone fragments up to 1 inch in diameter; moderately alkaline; calcareous; gradual boundary.

AC1—18 to 33 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) when moist; moderate, medium, blocky structure; extremely hard when dry, very firm when moist, very sticky and plastic when wet; moderately

distinct, wedge-shaped peds, 3 to 5 inches wide, with shiny, grooved surfaces; few fine roots; many tubes and pores; few earthworm casts and burrows; few limestone fragments up to 2 inches in diameter; moderately alkaline; calcareous; gradual boundary.

AC2—33 to 40 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) when moist; weak, medium, blocky structure; extremely hard when dry, very firm when moist, sticky and plastic when wet; few fine roots; common tubes and pores; few soft lumps and concretions of calcium carbonate; moderately alkaline; calcareous; gradual boundary.

Cca—40 to 50 inches, light yellowish-brown (10YR 6/4) silty clay, yellowish brown (10YR 5/4) when moist; weak blocky structure; hard when dry, firm when moist, sticky and plastic when wet; about 10 percent soft lumps and concretions of calcium carbonate; moderately alkaline; very strongly calcareous; abrupt boundary.

R-50 inches +, hard limestone with thin coating of caliche.

The A horizon ranges from 10 to 33 inches in thickness and, when dry, from grayish brown to dark grayish brown in color. It contains scattered boulders up to 3 feet in diameter in a few areas.

The AC horizon ranges from 22 to 30 inches in thickness. Where the texture is finest, some slickensides are 1 foot or more in width. Small limestone fragments are few to common.

The Cca horizon is silty clay or clay. It begins at a depth of 32 to 50 inches and ranges from 6 to 20 inches in thickness. When this horizon is dry, it ranges from pink to yellowish brown, in hues of 7.5YR to 10YR.

The depth to the R horizon ranges from 38 to more than 60 inches. This horizon is underlain by yellow to gray marl or is interbedded with marl.

VALERA SERIES

The Valera series consists of moderately deep, nearly level to gently sloping, well-drained, brownish silty clays and clays on divides. These soils are underlain by limestone interbedded with caliche or marl. Those that formed over limestone are slightly darker colored, finer textured, and less calcareous than those that formed over caliche or marl.

Valera soils are shallower, slightly less clayey, and more permeable than Tobosa soils and are slightly higher in elevation. Valera soils are deeper than Kavett soils. They are less gray than Randall soils, which are in intermittent lakes.

Typical profile of Valera silty clay, in a pasture 3.48 miles east of Sonora on U.S. Highway No. 290; then 4.9 miles northeast on farm-to-market road 864; then 0.5 mile north on a private road; then 30 feet west:

A1—0 to 11 inches, dark grayish-brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, very fine and fine, subangular blocky and granular structure; hard when dry, firm when moist, sticky when wet; common fine roots; few to common limestone fragments about one-fourth of an inch in diameter and a few up to 4 inches in diameter; surface crust one-fourth of an inch thick; moderately alkaline; calcareous; gradual, smooth boundary.

AC—11 to 24 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) when moist; moderate, fine, blocky structure; hard when dry, firm when moist, sticky when wet; common limestone fragments and calcium carbonate concretions less than one-fourth of an inch in diameter and a few larger fragments; common fine roots; moderately alkaline; calcareous; clear, wavy boundary.

Cca—24 to 29 inches, pink (7.5YR 8/4) silty clay, light brown (7.5YR 6/4) when moist; weak subangular blocky structure; hard when dry, firm when moist, sticky when wet; ranges from soft caliche to strongly cemented caliche within depth of a few inches; moderately alkaline; very strongly calcareous; abrupt, wavy boundary.

R—29 inches +, hard limestone with a thin coating of caliche.

The A1 horizon is silty clay or clay that ranges from 10 to 15 inches in thickness and, when dry, from grayish brown to very dark grayish brown in color. The structure ranges from weak to moderate. The limestone fragments and calcium carbonate concretions in this horizon and on the surface are slightly more numerous where these soils are shallower than normal.

The AC horizon ranges from 10 to 30 inches in thickness, from silty clay to clay in texture, and, when dry, from grayish brown to dark brown in hues of 10YR and 7.5YR. The structure ranges from moderate, fine, blocky to moderate, very fine to medium, blocky and irregular blocky. The limestone fragments and calcium carbonate concretions range from few to common in the deeper profiles and generally are common in the shallower profiles. The larger fragments range up to 8 inches along the longer axis.

The Cca horizon ranges from silty clay loam to silty clay in texture and from 4 to 22 inches in thickness. It is discontinuous in some pedons. When this horizon is dry, the color ranges from pink to brown. Soft lumps, films, threads, and concretions of calcium carbonate make up 10 to 60 percent of this horizon.

The depth to the R horizon ranges from 20 to 38 inches.

Additional Facts About the County

In 1852 the Federal Government established Fort Terrett at the head of the North Llano River for the protection of the early settlers. Settlement was slow, and the fort was manned only until 1854. About the only inhabitants until the early 1880's were Mexican herders who drifted flocks of sheep in and out of the area. Settlement increased after wells were dug and windmills were introduced. By 1890, no free range remained.

Sutton County was created in 1887. It was named for John S. Sutton, a Confederate officer, who later was active as a Texas Ranger. Sonora, the only town in the county, was laid out in 1888 and was made the county seat in 1889. The population of the county was 658 in 1890 and 1,727 in 1900. By 1960, it had increased to 3,738, of which 2,619 lived in Sonora. Sonora is the marketing and shipping point for wool, mohair, cattle, and lambs. Also, the Ranch Experiment Station, substation No. 14, of the Texas Agricultural Experiment Stations, is near Sonora.

The central and northwestern parts of the county consist of a rolling to nearly level tableland. The southwestern part is broken by streams that lead into the Devils River, and the eastern part is broken by the North Llano River. Some parts are prairies, but most parts have mesquite, live oak, and cedar trees. Pecan and walnut trees grow along the streams.

Climate

This section was written by Robert B. Orton, State climatologist, U.S. Weather Bureau.

The climate of Sutton County is warm and semiarid. Table 8 presents data on average and extreme temperatures and average and extreme amounts of rain, snow, and sleet. These data are from records kept at the local Weather Bureau Station at Sonora.

- Cobblestones.** Rounded or partly rounded rock fragments ranging from 3 to 10 inches in diameter.
- Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.
- Gilgai.** Microrelief of clays that have a high coefficient of expansion and contraction with changes in moisture: usually a succession of microbasins and microknolls, in nearly level areas, or of microvalleys and microridges that run with the slope.
- Gravel.** Rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.
- Horizon, soil.** A layer of soil, approximately parallel to the surface. that has distinct characteristics produced by soil-forming processes.
- Mapping unit.** Areas of soil of the same kind outlined on the soil map and identified by a symbol.
- Marl.** An earthy, unconsolidated deposit that consists chiefly of calcium carbonate mixed with various amounts of clay or other impurities.
- Ped.** An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.
- Pedon.** The smallest volume that can be called "a soil." It is three dimensional and large enough to permit study of all horizons. Its area ranges from 1 to 10 square meters.
- Permeability.** The quality that enables a soil to transmit water and air. The terms used to express permeability rates are—

<i>In. per hr.</i>	
Less than 0.05 -----	Very slow.
0.05 to 0.20-----	Slow.
0.20 to 0.80-----	Moderately slow.
0.80 to 2.50-----	Moderate.
2.50 to 5.00 -----	Moderately rapid.
5.00 to 10.00-----	Rapid.
Over 10.00-----	Very rapid.

- Phase, soil.** A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.
- Profile, soil.** A vertical section of the soil through all its horizons and extending into the parent material.
- Reaction soil.** The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. In words, the degrees of acidity or alkalinity are expressed thus:

<i>pH</i>	
Extremely acid.....	Below 4.5
Very strongly acid.....	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid.....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline.....	7.4 to 7.8
Moderately alkaline	7.9 to 8.4

Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stones. Rock fragments greater than 10 inches in diameter if rounded, and greater than 15 inches along the longer axis if flat.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Type, soil. A subdivision of the soil series, made on the basis of differences in the texture of the surface layer.

Tables

The Tables in this soil survey contain information that affects land use planning in this survey area. Current data tables may be available within the Web Soil Survey.

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

Soil	Area	Extent
	Acres	Percent
Ector-rock outcrop complex	45,100	4.7
Ector soils	14,500	1.5
Frio-Dev association	22,300	2.3
Kavett-Tarrant complex	203,920	21.4
Kavett-Valera association	37,300	3.9
Knippa silty clay	69,100	7.2
Randall clay	1,500	.2
Reagan silty clay loam	13,500	1.4
Tarrant-rock outcrop complex	97,900	10.3
Tarrant soils	436,600	45.7
Tobosa clay	13,800	1.4
Total	955,520	100.0

TABLE 2.—Predicted average acre yields of major crops under a high level of management [Only the soils suitable for crops are listed in this table]

Soil	Oats	Wheat	Grain sorghum
	Bu.	Bu.	Lb.
Frio-Dev association:			
Frio component	20	15	1,500
Kavett-Tarrant complex:			
Kavett component	15	10	800
Kavett-Valera association:			
Kavett component	15	10	800
Valera component	20	15	1,000
Knippa silty clay	20	15	1,000
Randall clay	15	10	800
Tobosa clay	15	10	1,000

TABLE 3.—Engineering test data

(Tests performed by the Texas Highway Department, in accordance with standard procedure of the American Association of State Highway Officials (AASHTO))

Soil name and location	Parent material	Test report No.	Depth	Horizon	Shrinkage			Mechanical analysis ¹										Classification			
					Limit	Ratio	Liquid	Percentage passing sieve ²					Percentage smaller than—					Liquid limit	Plasticity index	AASHTO	Unified ³
								2-in.	N. in.	No. 4 (4.75 mm.)	No. 10 (2.0 mm.)	No. 40 (0.425 mm.)	No. 200 (0.075 mm.)	0.05 mm.	0.005 mm.	0.002 mm.					
Knippa silty clay 300 feet E. of a ranch road, at a point 1.02 mile W. of its intersection with U.S. Highway 277. This intersection is 0.14 mile N. of the intersection of U.S. Highway 290 and 277.	Alluvium	61-442-II	0 to 10	Al	13	1.97	18.8	100	99	96	95	92	86	41	29	22	A-7-6(20)	CH			
		61-443-II	15 to 31	AC1	11	1.96	21.5	100	99	96	95	92	85	33	64	35	A-7-6(20)	CH			
		61-444-II	37 to 57	Ubc	21	1.66	8.6	100	100	79	71	61	37	37	63	34	40	17	A-6(7)	CL	
3.5 mile N. of courthouse at Bonora.	Alluvium	61-424-II	7 to 21	AC	13	1.90	17.1	100	99	97	93	88	86	55	45	52	26	A-7-6(17)	CH		
		61-425-II	21 to 27	Cm	18	1.93	13.2	100	99	95	91	87	85	53	59	46	44	24	A-7-6(14)	CL	
		61-426-II	62 to 70	C	13	1.93	13.2	100	99	80	73	73	71	70	69	45	35	49	29	A-7-6(14)	CL
Tobosa clay 20 feet N. of a county road, at a point 7.01 mile NNE of its intersection with FM 864. This intersection is 1.26 mile NE of the intersection of Texas Highway 964 and U.S. Highway 290.	Limestone	61-445-I	4 to 13	A12	11	1.95	20.6	100	99	99	98	95	93	92	68	55	64	38	A-7-6(20)	CH	
		61-446-I	14 to 33	AC1	11	2.01	22.2	100	99	99	98	95	94	91	72	60	68	43	A-7-6(20)	CH	
		61-447-I	6 to 18	A12	12	1.97	21.0	100	99	99	98	95	94	91	90	65	54	64	40	A-7-6(20)	CH
From Bonora, go 0.46 mile E. on U.S. Highway 290, then 1.3 mile NE on FM 864, then 1.84 mile N. on a county road, then 0.23 mile S. on a ranch road. This site is 29 feet east of the point.	Limestone	61-430-II	4 to 24	A12	11	2.01	21.6	100	99	99	98	96	95	94	72	61	63	41	A-7-6(20)	CH	
		61-431-II	24 to 45	AC	12	2.03	20.9	100	99	97	96	96	94	93	69	74	63	49	45	A-7-6(20)	CH
		61-432-II	45 to 64	Cm	19	2.01	21.0	100	99	96	96	96	92	85	64	31	61	39	A-7-6(20)	CH	
300 feet E. of a ranch road, at a point 1.2 mile N. of the intersection with FM 864. The ranch road and FM 864 intersect at 1.3 mile NE of the intersection of FM 864 and U.S. Highway 290.	Limestone	61-447-II	6 to 18	A12	12	1.97	21.0	100	99	99	98	95	94	91	90	65	54	64	40	A-7-6(20)	CH
		61-448-II	18 to 40	AC	11	1.93	20.2	100	99	96	96	96	92	85	63	72	59	61	27	A-7-6(20)	CH
		61-449-II	40 to 52	Cm	13	1.97	17.1	100	99	97	96	92	90	88	71	55	51	36	A-7-6(18)	CH	
Reagan silty clay loam 100 feet N. of an electric powerline, at a point 0.2 mile W. of FM 1959. This point is FM 1959 is 11.40 miles west of the intersection with U.S. Highway 290.	Alluvium	61-439-II	0 to 5	Al	17	1.76	11.2	100	99	96	97	93	83	41	41	29	41	29	23	A-7-6(12)	CL
		61-440-II	5 to 28	AC2	15	1.83	12.8	100	98	94	89	88	88	85	41	40	25	41	25	A-7-6(13)	CL
		61-441-II	24 to 34	C	17	1.80	12.8	100	94	90	87	84	84	80	60	42	37	18	A-6(1)	CL	
100 feet N. of FM 1959, at a point 17.91 mile SW of the intersection with U.S. Highway 290.	Alluvium	61-430-II	7 to 26	AC	16	1.82	12.9	100	99	95	98	94	83	81	46	38	44	23	A-7-6(14)	CL	
		61-431-II	26 to 28	Cm	12	1.88	13.1	100	98	93	90	88	86	85	42	42	25	44	24	A-7-6(14)	CL
		61-432-II	38 to 50	C	14	1.87	12.8	100	99	90	77	73	72	69	42	32	41	25	A-7-6(13)	CL	
50 feet N. of a county road, at a point 390 feet W. of the intersection with U.S. Highway 277. This intersection is 11.12 mile S. of Bonora.	Alluvium	61-427-II	0 to 32	AC	16	1.79	12.3	100	98	83	76	69	65	41	37	39	43	22	A-7-6(11)	CL	
		61-428-II	31 to 38	Cm	20	1.72	8.2	100	98	87	77	71	68	63	43	31	37	17	A-6(9)	CL	
		61-429-II	38 to 72	C	19	1.71	7.4	100	87	77	67	58	51	48	29	18	35	14	A-6(10)	CL	
Valera silty clay 30 feet W. of a ranch road, at a point 0.5 mile N. of FM 864. The intersection of the ranch road and FM 864 is 1.8 mile NE of the intersection of FM 864 and U.S. Highway 290.	Limestone	61-427-II	0 to 19	Al	12	1.87	10.0	100	99	98	92	86	80	42	33	33	33	30	A-7-5(20)	MH-CH	
		61-428-II	19 to 23	AC	11	1.96	20.2	100	98	98	91	88	83	59	29	42	39	40	30	A-7-6(20)	CH
		61-429-II	23 to 25	Cm	18	1.76	10.4	100	98	93	89	88	88	85	42	42	25	44	24	A-7-6(13)	CL
40 feet N. of FM 864, at a point 2.91 mile NE of the intersection with U.S. Highway 290.	Limestone	61-433-II	11 to 21	A12	15	1.92	18.6	100	98	99	91	89	87	65	52	50	31	A-7-6(20)	CH		
		61-434-II	21 to 22	Cm	18	1.76	10.4	100	98	78	69	64	64	60	48	31	40	20	A-6(9)	CL	
		61-435-II	28 to 72	C	15	1.83	14.8	100	99	99	97	88	86	84	63	48	48	24	A-7-6(13)	CL	
0.1 mile E. of a ranch road, at a point 1.7 mile N. of FM 864. The intersection of the ranch road and FM 864 is 7.2 mile E. of the intersection of FM 864 and U.S. Highway 290.	Limestone	61-434-II	28 to 72	C	17	1.79	11.8	100	99	93	90	86	84	82	65	46	42	21	A-7-6(13)	CL	
		61-435-II	72 to 80	C	17	1.79	11.8	100	99	93	90	86	84	82	65	46	42	21	A-7-6(13)	CL	
		61-436-II	80 to 88	C	17	1.79	11.8	100	99	93	90	86	84	82	65	46	42	21	A-7-6(13)	CL	

¹ According to AASHTO Designation T 98. Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO 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 analysis data used in this table are not suitable for use in naming procedures of the Soil Conservation Service (SCS). In the AASHTO 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. An example of a borderline classification obtained by this use is MH-CH.

TABLE 4.—Brief description of soils and estimates of properties significant in engineering

Soil series and symbols	Description of soil and site	Depth from surface	Classification			Percentage passing sieve—				Permeability	Available water capacity	Shrink-swell potential
			USDA texture	Unified	AASHO	No. 4 (4.75 mm.)	No. 10 (2.0 mm.)	No. 200 (0.075 mm.)	Index number 1.0 to 3.0			
Dev.....	Deep, dark-colored, mainly nearly level, very gravelly soils; subject to flooding; gravel content ranges from 50 to 80 percent; underlying material very gravelly and, in most places, stratified; bedrock at depth of 2 to 20 feet.	0 to 48	Very gravelly clay loam.....	GC.....	A-2.....	15 to 50	10 to 45	10 to 35			0.05	Low to medium.
Enter (E, E ₁) (Interpretations not made for rock outcrop part of E ₁).....	Gently sloping to steep stony loam; less than 10 inches deep over hard limestone.	0 to 6	Stony loam.....	CL.....	A-6.....	90 to 100	90 to 100	50 to 60	0.2 to 0.8		.15	Moderate.
Fris (F ₁) (For Dev part, see Dev soils).....	Deep, dark-colored, nearly level silty clay loam; subject to flooding; gravel content about 10 percent; bedrock at depth of 3 to 20 feet.	0 to 20	Silty clay loam.....	CL or CH.....	A-2.....	85 to 95	85 to 95	85 to 95	0.8 to 1.5		.18	Moderate.
Kavett (K ₁ , K ₂) (For Tarrant part of K ₁ , see Tarrant soils; for Valera part of K ₂ , see Valera soils).....	Nearly level to gently sloping, clayey soils; in higher parts of county; 10 to 20 inches deep over limestone; few limestone fragments on surface.	0 to 16	Clay.....	CL.....	A-7.....	90 to 100	90 to 100	75 to 95	0.4 to 1.0		.17	Moderate.
Krippa (K ₃).....	Deep, nearly level to gently sloping, clayey soils; in valleys above overflow layer that is 20 percent lime at depth of about 40 inches; underlain by clayey, gravelly, stony valley-fill material.	0 to 40	Silty clay.....	CL or CH.....	A-7.....	90 to 100	85 to 100	75 to 90	0.4 to 1.0		.19	High.
Randall (Ra).....	Deep, nearly level, clay soils; in intermittent lakes in higher parts of county; under water for periods of a few days to months; many feet deep to limestone in most places.	0 to 54	Clay.....	CH.....	A-7.....	90 to 100	90 to 100	85 to 95	0.05 to 0.2		.20	High.
Beagan (Be).....	Deep, gently sloping silty clay loam, in valleys above overflow; underlain by gravelly and silty valley-fill material many feet thick.	0 to 34	Silty clay loam.....	CL.....	A-2.....	85 to 100	75 to 95	65 to 90	0.8 to 2.5		.17	Moderate.
Tarrant (T ₁ , T ₂) (Interpretations not made for rock outcrop part of T ₂).....	Gently sloping to steep, stony clays; less than 10 inches deep over hard limestone.	0 to 20	Silty clay.....	CL.....	A-2.....	85 to 100	85 to 95	80 to 95	0.6 to 0.2		.16	Moderate.
Tobasa (To).....	Dark-colored, nearly level to gently sloping clay soils, in higher parts of county; limestone bedrock at depth of 3 to 7 feet.	0 to 40	Clay.....	CH.....	A-2.....	95 to 100	95 to 100	90 to 100	0.1 to 0.2		.20	Very high.
Valera.....	Dark-colored, nearly level to gently sloping, clayey soils; in higher parts of county; closely associated with Kavett soils; limestone at depth of 20 to 28 inches.	0 to 24	Silty clay.....	CL.....	A-6 or A-7.....	95 to 90	90 to 100	80 to 90	0.5 to 1.5		.20	High.
		24 to 20	Silty clay.....	CL.....	A-6.....	70 to 95	65 to 90	55 to 85	0.2 to 0.8		.18	High.

TABLE 5.—Engineering interpretations

Soil series and symbols	Suitability as source of—					Degree of limitation and features affecting—									
	Topsoil	Gravel	Road fill	Filter beds for septic tanks	Lagoons	Highway locations	Farm ponds		Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings			
							Reservoir areas	Embankments							
Dev.....	Poor; gravelly; low water storage capacity.	Good up to 50 percent fines; well graded.	Fair to good.	Severe; occasional flooding.	Severe; rapid permeability.	Subject to flooding.	Material too porous to hold water.	Fair stability; good compaction; slight compressibility.	Low water-storage capacity; rapid permeability; subject to hard to establish.	Subject to flooding.	Low water-storage capacity; rapid permeability; subject to hard to establish.	Subject to flooding.			
Enter (E, E ₁) (Interpretations not made for rock outcrop part of E ₁).....	Poor; gravelly and stony; very shallow.	Not suitable.	Poor.	Severe; steep slopes; eroded material; limestone bedrock at depth of 6 inches.	Severe; steep slopes; limestone bedrock at depth of 6 inches.	Steep slopes; limestone bedrock at depth of 6 inches.	Limestone bedrock at depth of 6 inches.	Bedrock at depth of 6 inches.	Not applicable.	Not applicable.	Not applicable.	Limestone bedrock at depth of 6 inches.			

TABLE 5.—Engineering interpretations—Continued

Soil series and symbols	Suitability as source of—					Degree of limitation and features affecting—									
	Topsoil	Gravel	Road fill	Filter beds for septic tanks	Lagoons	Highway locations	Farm ponds		Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings			
							Reservoir areas	Embankments							
Fris (F ₁) (For Dev part, see Dev soils).....	Good.....	Poor; extensive hard stones, cobbles, and boulders below depth of 30 inches.	Poor.....	Severe; occasional flooding.	Moderate; moderate permeability; unstable as fill material.	Subject to flooding.	Previous subsidence requires a compacted and blanket subgrade to prevent settlement.	Medium to high compaction; fair stability.	Subject to flooding.	Subject to flooding.	Subject to flooding.	Fair bearing capacity; moderate shrink-swell potential; fair shear strength; subject to flooding.			
Kavett (K ₁ , K ₂) (For Tarrant part of K ₁ , see Tarrant soils; for Valera part of K ₂ , see Valera soils).....	Good to depth of 9 inches.	Not suitable; possible source of sand and limestone for crushing.	Poor.....	Severe; fractured limestone at depth of less than 20 inches; subject to waterlogging.	Severe; fractured limestone at depth of less than 20 inches.	Unstable material; limestone at depth of less than 20 inches.	Shallowness over fractured limestone; compacted and blanket required.	Limited amount of fill material; fair compaction; fair stability.	Moderate water-storage capacity; shallowness; slow water-intake rate.	Shallowness.....	Shallowness; moderate water-storage capacity.	Fair bearing capacity; moderate shrink-swell potential.			
Krippa (K ₃).....	Good to depth of 10 inches.	Not suitable.	Poor.....	Moderate; moderately slow permeability.	Moderate; unstable as fill material.	Unstable material; fair bearing capacity.	Compacted soil blanket required.	Clayey material; fair compaction; fair stability.	Slow water-intake rate.	None.....	Vegetation hard to establish.	Fair bearing capacity; high shrink-swell potential.			
Randall (Ra).....	Good to depth of 7 inches.	Not suitable.	Very poor.....	Severe; slow permeability; subject to flooding and waterlogging.	Moderate; unstable as fill material; limestone bedrock at depth of 54 inches.	Intermittent lakebeds; high plasticity; unstable material.	Hard to excavate.	Clayey material; high volume change; poor compaction; fair stability.	Slow water-intake rate; subject to ponding with out proper control.	Not applicable.....	Not applicable.....	Intermittent lakebeds.			
Beagan (Be).....	Good.....	Not suitable.	Poor or very poor.....	None.....	Moderate; moderate permeability; unstable as fill material.	Plasticity.....	Compacted soil blanket required.	Fair stability; medium to high compressibility.	None.....	None.....	Vegetation hard to establish.	Fair bearing capacity; moderate shrink-swell potential.			
Tarrant (T ₁ , T ₂) (Interpretations not made for rock outcrop part of T ₂).....	Poor; gravelly and stony; very shallow.	Not suitable.	Poor.....	Severe; steep slopes; eroded material; limestone bedrock at average depth of 7 inches.	Severe; steep slopes; limestone bedrock at average depth of 7 inches.	Steep slopes; limestone bedrock at average depth of 7 inches.	Limestone bedrock at depth of less than 7 inches.	Coarse fragments at depth of less than 7 inches.	Not applicable.....	Not applicable.....	Not applicable.....	Limestone bedrock at average depth of 7 inches.			
Tobasa (To).....	Good to depth of 7 inches.	Not suitable.	Very poor.....	Severe; slow permeability; subject to waterlogging.	Moderate; limestone bedrock at depth of 38 to 60 inches; unstable as fill material.	High plasticity; unstable material.	Limestone bedrock at depth of 38 to 60 inches.	Clayey material; high volume change; poor compaction; fair stability.	Slow water-intake rate; high water-storage capacity.	None.....	Vegetation hard to establish.	Limestone bedrock at depth of 38 to 60 inches; poor bearing capacity in surface strata; very high shrink-swell potential; poor shear strength.			
Valera.....	Good to depth of 11 inches.	Not suitable; possible source of limestone for crushing.	Very poor.....	Severe; limestone bedrock at depth of less than 10 inches; subject to waterlogging.	Severe; limestone bedrock at depth of less than 10 inches.	High plasticity; unstable material; steep slopes bedrock at depth of less than 30 inches.	Too shallow for excavation; compacted soil blanket required.	Clayey material; high volume change; poor compaction; fair stability.	Moderate water-storage capacity.	None.....	Vegetation hard to establish.	Fair bearing capacity; high shrink-swell potential; limestone bedrock at depth of less than 30 inches.			

TABLE 6.—Physical properties of composite samples of Kavett and Tarrant soils

[Tests performed by the Texas Highway Department. Blank spaces mean absence of data]

Soil name and map symbol	Location sampled	Use for which tested	Liq-uid limit	Plas-ticity index	Field mois-ture equi-valent	Shrinkage			AASHO classification	Soil binder (material passing No. 40 sieve—0.42 mm.)
						Lineal	Limit	Ratio		
Kavett-Tarrant complex (Kt).	Marl pit, 20 miles SW. of Sonora on farm-to-market road 189.	Foundation course.	24	7	Percent 19	18	3.3	1.78	A-2	Percent 15
	Caliche pit, 7½ miles N. of Sonora on U.S. Highway 277.	Foundation course.	21	7	16	15	3.9	1.92	A-2	22
	Caliche pit, 25 miles NE. of Sonora at intersection of farm-to-market roads 2597 and 864.	Intersection and foundation course.	21	4	18	18	2.0	1.79	A-2	27
Tarrant-rock out-crop complex (Tr).	Caliche pit, 7 miles S. of Sonora on U.S. Highway 277.	Foundation course.	32	13	24	20	6.2	1.74	A-2-4	55
	Caliche pit, 15 miles SW. of Sonora on U.S. Highway 277.	Foundation course.	35	14	27	21	7.0	1.71	A-4	39
	Caliche pit, 9 miles SW. of Sonora on U.S. Highway 277.	Foundation course.	33	6	29	26	3.2	1.52	A-2	21
	Limestone quarry, 6 miles N. of Sonora.	Flexible base and foundation course.	20.5	4.8			2.0			13.1

TABLE 7.—Soil series classified according to the current system of classification and the 1938 system

Series	Current system			1938 system
	Family	Subgroup	Order	Great soil group
Dev	Loamy-skeletal, carbonatic, thermic	Fluventic Haplustolls	Mollisols	Alluvial soils.
Ector	Loamy-skeletal, carbonatic, thermic	Lithic Haplustolls	Mollisols	Lithosols.
Frio	Fine, mixed, thermic	Cumulic Haplustolls	Mollisols	Alluvial soils.
Kavett	Fine, montmorillonitic, thermic, shallow	Petrocalcic Calcicustolls	Mollisols	Grumusols.
Knippa	Fine, mixed, thermic	Vertic Calcicustolls	Mollisols	Grumusols.
Randall	Fine, montmorillonitic, thermic	Udic Pellusterts	Vertisols	Grumusols.
Reagan	Fine-carbonatic, thermic	Mollic Calcicorthids	Aridisols	Calcisols.
Tarrant	Clayey-skeletal, montmorillonitic, thermic	Lithic Haplustolls	Mollisols	Lithosols.
Tobosa	Fine, montmorillonitic, thermic	Typic Chromusterts	Vertisols	Grumusols.
Valera	Fine, mixed, thermic	Petrocalcic Calcicustolls	Mollisols	Grumusols.

TABLE 8.—Temperature and precipitation data

[From records kept at the local Weather Bureau Station in the period 1949-61. Elevation 2,120 feet]

Month	Temperature					Precipitation						
	Average daily maximum ¹	Average daily minimum ¹	Monthly average ¹	Average number of days with—		Average monthly ³	Greatest daily ⁴	Year of occurrence	Average number of days with 0.1 inch or more ⁴	Snow and sleet		
				Maximum of 90 degrees or higher ²	Minimum of 32 degrees or lower ²					Average monthly ⁵	Greatest monthly ⁵	Year of occurrence
January	63.4	34.8	49.1	0	12	In. 0.84	In. 0.94	⁵ 1961	3	In. 0.3	In. 2.0	1956
February	66.3	38.4	52.4	0	8	1.02	2.52	1958	2	.9	4.0	⁵ 1961
March	74.3	43.8	59.1	1	4	.59	.80	1951	1	(⁶)	(⁶)	⁵ 1960
April	80.6	51.7	66.2	5	1	1.54	2.33	1953	3	(⁶)	(⁶)	⁵ 1952
May	87.2	60.9	74.1	11	0	2.91	3.84	1957	4	0	0	
June	92.9	67.8	80.4	26	0	2.75	2.34	1958	3	0	0	
July	94.6	69.1	81.9	27	0	1.73	3.50	1953	3	0	0	
August	94.7	67.9	81.3	28	0	1.43	1.73	1953	3	0	0	
September	89.4	63.0	76.2	16	0	1.42	1.65	1957	3	0	0	
October	80.3	52.9	66.6	3	(⁷)	2.66	5.15	1957	4	0	0	
November	68.9	40.0	54.5	0	6	.67	1.43	1957	2	.8	6.9	1957
December	63.5	34.0	48.8	(⁷)	13	.77	1.30	1949	2	(⁶)	.3	1958
Year	79.7	52.0	65.9	(⁷)	117	18.33	5.15	1957	33	2.0	6.9	1957

¹ Based on 11 years of record.
² Based on 9 years of record.
³ Based on 13 years of record.
⁴ Based on 8 years of record.

⁵ Also occurred in earlier years.
⁶ Trace.
⁷ Less than one-half day.

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