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MINERAL RESOURCE SURVEY
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The information contained in this circular was gathered by a unit of the WPA Mineral Resource survey of Texas, a project sponsored by The University of Texas at Austin, Bureau of Economic Geology. The purpose of this survey is to assemble information concerning mineral products and to gather other geological data and make them available to the public. With this information in the hands of the public, it is reasonable to suppose that industries of value to the State may be developed. The following report is based on work done in Travis County by Work Project No. 3181, from January 27, 1936, to April 25, 1936, and from July 28, 1936, to the middle of October of the same year.

REPORT ON THE MINERAL RESOURCES OF TRAVIS COUNTY, TEXAS*

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BUILDING STONE

Requienia marble. — Two beds of limestone, 25 feet apart, near the top of the Edwards formation contain abundant *Requienia* (or related fossils). These limestones take a good polish and therefore are classified as commercial marbles. These beds vary in quality and in many places are of high quality.

Requienia marble may be seen in some of the older buildings in Austin — as flags at the east entrance to the Driskill Hotel; in the foundation of the (old) Federal building at West Sixth and Colorado Streets; as newel posts at the front entrance to the Elks' Club, 400 West 7th St.; and forming the door frame at the east entrance to the basement of the Capitol building. Its many years of service in these places is sufficient comment on its wearing qualities. The newel posts at the Elk's Club are said to have been set in 1885 and are still in good condition, retaining a fair amount of their original polish.

A description of *Requienia* marble and other marble localities follows:

Requienia marble crops out on the E. C. Gaines ranch, 3½ miles southwest of Austin, and half a mile north of the Fredericksburg highway, at the head of a ravine. The ravine is 30 feet deep at its head and rapidly deepens to 150 feet toward Barton Creek. Eighteen feet below the surface is a massive limestone 15 feet thick. The *Requienia* marble forms the upper 3½ feet of this limestone, being separated from the lower part by a bedding plane which does not show plainly on the weathered surface of the ledge. Above the *Requienia* marble are several poorly defined layers of limestone of irregular texture, hardness, and thickness, separated from each other by intervals of clay several inches thick. If excavation were carried back into the ravine wall an additional 20 feet, the entire section might be composed of limestone, in layers varying from 6 to 18 inches in thickness, and of a texture and hardness suitable for use as crushed rock for highway or concrete work. Some of it may prove to be good enough for building stone. At this location the *Requienia* marble was uncovered along the bedding for 50 feet. It is hard, highly fossiliferous, and takes an excellent polish. Samples of it are numbered T-16 in The University of Texas at Austin Bureau of Engineering Research collection of building stones. The successful operation of a quarry for *Requienia* marble at this location may depend on the utilization of the overlying beds of limestone for crushed rock, to pay for the handling of the overburden. The strata are nearly horizontal, and the ground is nearly level; consequently, the thickness of overburden will not vary appreciably.

The same limestone was uncovered 600 feet to the northeast of locality No. 1. The ravine at this point is 150 feet deep and would be convenient for the disposal of waste. Twelve feet or more of limestone beneath the *Requienia* marble was uncovered at this locality. More work should be done to determine the value of this apparently high quality, somewhat fossiliferous limestone. These limestone beds must extend over a wide area, as indicated by their extensive outcrop along the ravine wall. Erosion has removed soil and debris from the upper part of the ledge, exposing solid limestone from the *Requienia* marble to the surface. This supports the suggestion that solid limestone will be encountered elsewhere back from the outcrop.

A deposit of limestone is located on the Charlos F. Delana ranch, 2 miles west of Austin and 200 feet north of the Bee Cave road. The outcropping limestone is much weathered, but under cover it should be firm and of good quality. The bed is 3 feet thick with from 5 to 6 feet of overburden on it.

A deposit of highly fossiliferous limestone is located on the Delana ranch 1.5 miles south of the highway and on a bluff overlooking Barton Creek. This deposit is about 1.5 miles upstream from Barton Springs. This is the same bed of limestone which underlies the *Requienia* marble on the Gaines ranch. A section including the building stone beds is as follows:

	Thickness	
	Feet	*Inches*
5. Overburden, thin beds of limestone and soil	3	
4. Limestone, hard, no particular value	1	
3. Limestone, light gray, hard, many *Turritella* fossils	3	
2. Sandy limestone, soft, yellow		4
1. Limestone, gray, fossiliferous (*Turritella*), many small cavities	6	
Total	13	4

*Assistance in the preparation of these materials was furnished by the personnel of Works Progress Administration Official Project No. 65-66-4894, and Work Projects Administration Official Project No. 665-66-3-233.

Bed No. 3 may prove to be of value. The middle 15 inches of No. 3 is highly fossiliferous with abundant *Turritella*-like fossils being in a horizontal position. The stone should be cut parallel to the bedding to obtain the best cross sections of the fossils. This limestone takes a good polish, which from the point of utilization classifies it as a marble. Polished samples numbered T-16 of this marble are contained in The University of Texas Bureau of Engineering Research building stone collection. Bed No. 1 contains abundant fossils and much porosity and is of value as a special decorative building stone.

Limestone flags on the Delana ranch. — In some places the interval between the two beds of *Requienia* marble is occupied by many thin beds of limestone, from 1 inch to 6 inches thick, hard, fine grained, and weathering to a pure white. They may be seen in a road cut near the entrance to Barton Springs park. This stone is shipped from the Delana ranch to Houston for use as flags. No doubt flags of this kind may be found in many other places in Travis County.

Building stone on the J. G. Burney ranch. — The Burney ranch is about 5 miles northwest of Austin. Some prospecting was done here with Mr. G. A. Parkinson of the Bureau of Engineering Research, and a location was selected for uncovering two beds of limestone that may be used for building stone. It is on the south side of the road and north of the Stillhouse spring. Here at the surface is a large amount of limestone containing many cavities commonly called "honeycomb" rock, which is popular for decorative use in yards and gardens. It occurs near the top of the Edwards limestone.

At the location selected, the lower bed of limestone is 3 feet thick, white, medium hard, fine grained, and takes a fairly good polish. The upper bed is 2 feet thick, white, medium hard, and may be split into slabs from 4 to 6 inches thick, so that it may be used for flags of high quality. These two beds are separated by about 1 foot of a dense, hard, fine-grained limestone which might be of value for some special uses. These beds were uncovered enough to show their thickness and quality, but more work will be required to show their possibilities for commercial quarrying. Samples of building stone from the Burney ranch are given the number T-27 in the Bureau of Engineering Research.

Near this location a ravine exposes 25 feet of limestone including three beds from 4 to 6 feet thick, which are of good quality, medium hard, and from cream to white in color.

Near Stillhouse spring on the Burney ranch is a limestone that is a light yellow color when freshly broken but changes to a cream-white color after exposure and drying. This stone is soft enough to be easily worked. It was uncovered at a location about 800 feet south of the spring, where the bed is 2½ feet thick, with only 2 feet of overburden.

Some travertine of a rich brown color was found on the Burney ranch. It takes a beautiful polish. If one could fine it in large amount, it would be a valuable stone for decorative work.

On the west part of the Burney ranch there is a 3-foot bed of high-grade limestone, white, soft enough to be easily worked, a beautiful stone for either interior or exterior work. It was found on a steep hill slope in a place too difficult to reach for quarrying. But the topography indicates that this bed may be found in a more accessible location. This area has the disadvantage of being 10 miles from the business district of Austin, but the high quality of the rock may justify production at some time in the future.

TERRACES OF COLORADO RIVER

Colorado River flows through Travis County in a southeast direction. Northwest of Austin the valley is narrow, with steep walls where the river winds its way through the hilly eastern part of the Edwards Plateau. At Austin the valley is 6 miles wide and includes seven terraces that were deposited by Colorado River. They have been subjected to much erosion so that they are now represented by isolated remnants. These terraces are briefly described as follows:

No. 1: A narrow sandy flood plain about 15 feet above the river level. It is composed of sand and gravel and is usually not more than about 1 block wide.

No. 2: A terrace about 4 blocks wide east of East Avenue, about 27 feet above the river, apparently subject to overflow. Composed of silt underlain by gravel.

No. 3: A terrace about 4 or 5 blocks wide east of East Avenue and about 42 feet above the river. Thickness about 12 feet. Composed of gravel in the lower part, overlain by a few feet of silt. East First Street east of East Avenue is on this terrace.

No. 4: A terrace from 2 to 3 blocks wide east of East Avenue and about 57 feet above the river. The railroad tracks and East 5th Street east of East Avenue are on this terrace. Upper part consists of silt, lower part not observed.

No. 5: A terrace which has been called the Capitol terrace because the State Capitol is located on it. From 115 to 127 feet above the river. Well developed east of East Avenue, especially east of Navasota Street and north of East 11th Street. The Negro high school at Comal Street and Pennsylvania Avenue is located on this terrace. Maximum observd thickness, 45 feet near the east city limits. Characterized by a red sandy soil with gravel of flint and quartz and many post-oak trees.

No. 6: This terrace may be seen in a small area north of The University Campus on West 27th Street between Whitis Avenue and University Avenue. It resembles the Capitol terrace in surface appearance.

No. 7: This terrace has been named the Asylum terrace because the State Hospital for the Insane is located on it. It resembles the Capitol terrace in surface appearance and tree growth. In Austin, this terrace is from 182 to 203 feet above the river.

The Capitol and the Asylum terraces have the greatest width and slope toward the river. This slope was found to be about 14 feet per mile, resulting in different elevations above the river for different parts of the same terrace.

Two cross sections are included in this report to show the relative positions of the terraces at Austin and Webberville. The section for Austin is based on elevations obtained from the City Engineering Department. The section for Webberville is based on a plane-table traverse. Other elevations used for identifying terraces were taken from a topographic map or were obtained by hand-leveling up from the river.

On the south side of the river in Austin some of the terraces are not present. Above the levels for terraces of Colorado River there is gravel of the Uvalde formation. The term Uvalde is used as a general name for gravels of flint and Cretaceous limestone, deposited by streams which flowed from the Edwards Plateau out onto the Gulf Coastal Plain. They were deposited under various conditions, perhaps as alluvial fans in some cases. The Uvalde therefore includes gravels at different elevations above the present streams. The position shown for the Uvalde gravel in the Austin cross section is based on elevations obtained from the State Highway Department, on the St. Elmo divide about 1¼ miles south of Austin city limits. The Uvalde gravel is 52 feet above the level for the Asylum terrace.

The profile sheet shows the gradient of the river and the relative positions of the Asylum and Capitol terraces and illustrates the following points: (1) The gradient of the river is not so steep after it passes through the Balcones fault zone near Austin. (2) The terraces show no effect of faulting, therefore they were deposited after the faulting of the Balcones fault zone. (3) From the east boundary of the county to Bull Creek the terraces tend to approach the river level, and they do so more rapidly where the river gradient is steeper between Austin and Bull Creek. In drawing the profiles, elevations for the base of the terraces were used. This was necessary in order to have a uniform basis for comparison, because it was found that wide areas of terraces slope toward the river. The Capitol terrace in Austin east of East Avenue slopes toward the river at a rate of 13 feet per mile. In making the calculations given beow, the elevation for Lohman crossing is not used because it is too high to fit into the general picture. These caluclations are intended to show the rate at which the terraces approach the river level.

The Asylum Terrace.....

At Webberville	190 feet above the river
At Austin	182 feet above the river
	8 feet in a distance of 30 miles
	0.26 feet per mile, rate of approach
At Austin	182 feet above the river level
At Bull Creek	175 feet above the river level
	7 feet in a distance of 8 miles
	0.87 feet per mile, rate of approach
At Webberville	190 feet above the river
At Bull Creek	175 feet above the river
	15 feet in a distance of 38 miles
	0.39 feet per mile, rate of approach

The Capitol Terrace.....

At Webberville	115 feet above the river
At Auston	115 feet above the river
At Austin	115 feet above the river
At Marshall Ford	110 feet above the river
	5 feet in a distance of 22 miles
	0.227 feet per miles, rate of approach

SAND AND GRAVEL DEPOSITS

Samples. — During the first part of the field work, samples of gravel were collected for use in correlating different gravel deposits. The samples were usually taken on the surface where weathering had exposed and cleaned the gravel in sufficient quantity so that small amounts could be scraped together. Several such small samples were collected and screened for further cleaning and sorting. For screening in the field, ½-inch mesh hardware cloth was fastened as a bottom on a wooden box, the inside measurements being 8x8x13 inches. Pebbles larger than 1½-inch diameter were thrown out. Such a sample would usually contain about 1,200 pebbles. The samples were taken to the laboratory, washed, and sorted for classification of the pebbles, and the percentages of different kinds of pebbles were calculated.

The Giles gravel pit. — Elevation 605 feet; 182 feet above the river. This pit is northeast of Austin near the city limits, on the property of Mr. J. B. Giles and is in the Asylum terrace. It is an old pit from which a great amount of gravel has been taken. The gravel is 15 feet thick. In many places it has been recemented, forming irregular hard masses sometimes called cement rock. Near the recemented parts there are limestone pebbles that have weathered out of the recemented material after its exposure by excavation. However, a sample of gravel taken from several places short distances away from the recemented parts showed no limestone pebbles. A sample containing 1,192 pebbles included 25 which appeared to be limestone, but they did not effervesce with a 20-percent solution of hydrochloric acid and were classified as weathered chert. The following percentages were shown:

	Percent
Flint	66.94
Quartz	25.25
Igneous	7.21
Hickory sandstone	.....6 pebbles

The gravel in the pit shows some pebbles of black chert, but none happened to be in the sample. The pebbles classified as igneous were derived from red granite. A careful search discovered one pebble of blue opaline granite. The Hickory sandstone and the blue opaline granite pebbles are believed to have come from the Central Mineral Region, indicating that these formations were exposed to erosion previous to or at the time these gravels were deposited.

The Asylum gravel pit. — Elevation 617 feet; 194 feet above the river. The Asylum gravel pit is located south of the State Hospital for the Insane in Austin, at West Avenue and West 38th Street. This is an old pit from which a large amount of gravel has been taken. The deposit is 10 feet thick. Two samples of gravel were taken from this pit, the combined percentages being as follows:†

	Percent
Flint	66.25
Quartz	26.31
Igneous	7.34
Black chert	.....3 pebbles

†Pebbles classified as igneous were usually derived from red granite, presumably from the Central Mineral Region.

These percentages are very nearly the same as those for the Giles pit and suggest that such sampling may be used for purposes of correlating different parts of the same terrace. This terrace may be traced from the Giles pit to the Asylum pit.

The Clayton gravel pit. — Elevation 626 feet; 203 feet above the river. The Clayton gravel pit is located in the northwest part of Austin, south of West 31st Street and west of Blanco Road and Jefferson Street. There is an old pit of small size, but the sample was taken from an eroded place near the surface where the gravel had been weathered out clean. Apparently there is a considerable amount of good gravel here. The percentages are as follows:

	Percent
Flint	68.6
Quartz	23.1
Igneous	8.1

These percentages correspond closely with those for the Giles and the Asylum pits. The terrace may be traced from the Asylum pit westward for a few blocks, but it has been destroyed by erosion in the vicinity of Shoal Creek, leaving the Clayton gravel as an isolated patch half a mile west of the well-defined part of the terrace east of Shoal Creek. This deposit is 15 feet thick. It is in the Asylum terrace.

The Poor Farm gravel. — Elevation 611 feet; 177 feet above the former river level (before the dam on the river at Austin was built). This pit is across the Missouri Pacific Railroad track and about 1 mile south of the Clayton gravel pit. The sample gave the following percentages:

	Percent
Flint	51.29
Quartz	25.23
Igneous	23.26

As compared to the samples listed above, this sample shows an increase of igneous pebbles with a corresponding decrease in the proportion of flint. This difference may be due to some local phase of deposition, but it is not serious enough to cast any doubt on the correlation. The thickness of this deposit is about 15 feet. It is correlated as being a part of the Asylum terrace.

The Burney gravel. — The Burney gravel, on the J. G. Burney ranch, is on the north side of the river, about 4 miles northwest of the Poor Farm and the Clayton gravels. It is but a remnant, covering not more than 5 acres, with a maximum thickness of 5 feet. It contains much red flint, which gives it the appearance of having a large percentage of feldspar or red granite pebbles, although the sample shows only a few pebbles containing feldspar. It gave the following percentages:

	Percent
Flint	70.67
Quartz	28.25
Hickory sandstone	4 pebbles
Igneous	7 pebbles
Black chert	2 pebbles

The elevation of this gravel above the normal river level is calculated as follows:

146 feet from present water level, by hand leveling.
29 feet to former river level, before dam now known as the Tom Miller dam was built.

175

It is correlated as being part of the Asylum terrace.

The Marshall gravel. — Elevation 595 feet; 110 feet above the river. This gravel is located on the Marshall ranch 14 miles upstream from the Burney gravel. It is a small isolated patch of gravel on a bench on which the ranch house is located. It is not more than 5 acres in area. The sample gave the following percentages:

	Percent
Flint	79.27
Quartz	19.92
Limestone	9 pebbles
Hickory sandstone	2 pebbles

The limestone pebbles appear to be from near-by outcrops of Cretaceous limestone. Like the Burney gravel, the Marshall gravel contains much red flint. This gravel is correlated as being part of the Capitol terrace. Thickness is 5 feet.

There is a small amount of gravel at a higher elevation, 140 feet above the river, containing a few pebbles of red granite and a few of Hickory sandstone. It may be part of an eroded remnant of the Asylum terrace.

The Lohman gravel. — Elevation 666 feet; 126 feet above the river. The gravel is located at Lohman crossing, 21 miles upstream from the Marshall gravel. The sample gave the following percentages:

	Percent
Flint	82.53
Quartz	15.49
Igneous	1.36
Hickory sandstone	4 pebbles
Black chert	4 pebbles

This gravel is the farthest west of those studied. It may be possible to find other patches of gravel upstream. The area of the Lohman gravel was not determined, but ten acres of it may be seen from the road. It is correlated as being part of the Capitol terrace. Thickness is 10 feet.

In the hill country on the south side of the river above the Tom Miller dam, remnants of two terraces were found at elevations of 8 and 150 feet above the present river level. These gravels are estimated to be 109 and 175 feet above the present river level, before the dam was built. They may be seen opposite the mouth of Bull Creek, and they are used in the profile sheet. The gravel at the higher elevation (175 feet) is composed almost entirely of flint and quartz, some of the flint pebbles being from 2 to 4 inches in diameter. It resembles some of the Uvalde gravel in appearance, but it contains some pebbles of Hickory sandstone and some black chert. As it occurs nearly opposite the Burney gravel and at the same elevation, it is correlated as belonging to the same terrace deposit as the Burney gravel and therefore as part of the Asylum terrace. The gravel at an elevation of 109 feet above the former river level resembles the Capitol terrace gravel as seen in Austin and is correlated as being part of the Capitol terrace.

In this area there is a lower terrace 35 feet above the present river level, or an estimated 64 feet above the former river level. It is composed of silt and is cultivated in some places in small fields. It is correlated as being part of terrace No. 4 in Austin.

The Airport gravel. — Elevation 600 feet; 177 feet above the river. The Airport gravel is located northeast of Austin, about a mile east of the Giles gravel pit. The Asylum terrace may be easily traced from the Giles pit to the Airport pit, so there is no question about correlating them as belonging to the same terrace. The percentages are as follows:

	Percent
Flint	55.66
Quartz	24.01
Igneous	20.31

The thickness is 15 feet, and it is underlain by Taylor marl. This pit contains some recemented material like that found in the Giles pit. The percentages are similar to those of the Poor Farm gravel and may represent the same phase of deposition.

The Allen gravel. — Elevation 550 feet; 130 feet above the river. The Allen gravel is located east of Austin near the city limits. The percentages are as follows:

	Percent
Flint	69.74
Quartz	19.79
Igneous	9.33
Hickory sandstone	6 pebbles
Black chert	6 pebbles

The gravel is 35 feet thick and is underlain by Taylor marl. This is an old pit from which a great amount of gravel has been taken, but there appears to be much more available on this and adjoining properties. Although the percentages for this gravel are similar to those for some pits on the Asylum terrace, it is correlated as being part of the Capitol terrace on account of its location and elevation. The Capitol terrace forms the high bluff on the north side of the cultivated river bottoms east of Austin, and it may be seen in this relative position at several points eastward to the county line. It is especially noticeable for a few miles east of Austin and near Webberville.

The Harvey gravel. — Elevation 550 feet; 130 feet above the river. The Harvey gravel pit is about one-half mile east of the Allen pit. It is part of the Capitol terrace. In part of this pit there is some recemented material similar to that found in the Giles pit. Two samples were taken, one from near an exposure of recemented material and one from the surface.

Sample from near recemented material.....

	Percent
Flint	22.10
Quartz	7.39
Igneous	8.11
Limestone	58.35
Sandstone	3.04

Sample taken at the surface.....

	Percent
Flint	65.63
Quartz	19.81
Igneous	12.90
Limestone	8 pebbles
Sandstone	6 pebbles
Black chert	4 pebbles

The large percentage of limestone pebbles in the sample taken from near the recemented material suggests that the recementing may take place only in spots where limestone pebbles happened to be deposited, or that circulating ground waters may have dissolved out the limestone pebbles from some parts of the gravel and deposited it as a cement in other parts. These two samples suggest that in taking samples for purposes of correlating different parts of the same terrace, they should be taken from the same relative parts of the terrace. As pits are not always present the samples would usually be taken from near the surface. The gravel in the Harvey pit is 45 feet thick and is underlain by Taylor marl. Four pebbles of blue opaline granite were found in the Harvey pit.

The Hungry Hill gravel. — Elevation 550 feet; 130 feet above the river. The Hungry Hill gravel is part of the Capitol terrace about 2 miles east of the Austin city limits. The sample showed the following percentages:

	Percent
Flint	63.20
Quartz	17.20
Igneous	5.51
Limestone	13.51
Sandstone	.....4 pebbles
Black chert	.....2 pebbles

These percentages may be regarded as a rough approximation to the two Harvey samples combined, which give the following average:

	Percent
Flint	43.86
Quartz	13.60
Igneous	10.55
Limestone	29.00

No suitable place was found for taking a sample of gravel at the surface at this location, so it was taken from the road cut in the face of the terrace. This may explain its resemblance to an average for the two samples from the Harvey pit.

It may be possible to open up a commercial gravel pit on the top of Hungry Hill. The crew dug a hole about 8 feet deep, finding coarse sand and fine gravel from the surface to the bottom of the hole. The gravel is of the type that readily packs when used for road material.

The road cut shows a thickness of 35 feet for all terrace material including gravel and red clay.

The Spillman gravel. — Elevation 575 feet; 175 feet above the river. The Spillman gravel is the one farthest east from which a sample was taken. It is part of the Asylum terrace, at the location of the Spillman store, about 5 miles east of Austin on the Webberville road. Thickness 15 feet. The sample showed the following percentages:

	Percent
Flint	73.59
Quartz	16.37
Igneous	9.75
Limestone	.....1 pebble
Sandstone	.....1 pebble
Black chert	.....2 pebbles

The gravels in the terraces of Colorado River contain a large proportion of flint and may be called flint gravels, in contrast to the gravels found on the tributaries of the Colorado, which are composed chiefly of limestone. The terraces of Colorado River in the vicinity of Austin contain large amounts of gravel suitable for building roads and for concrete work.

In the table on the following page the proportion of different types of pebbles in a sample of gravel is expressed in terms of percentage.

Commercial gravel pits along Colorado River in Austin. — The R. E. Janes Gravel Company, Inc., is located in Austin on the south side of Colorado River east of the bridge on Congress Avenue. Sand and gravel are taken from the stream bed by a drag line shovel and hauled by trucks to the plant for washing and screening. Equipment includes crushers for crushing the larger pebbles and small boulders. Production for 1935 was reported at 17,511 cubic yards of sand of the grades used for structural concrete, paving, and road construction and 13,102 cubic yards of gravel of the grades used for the same purposes. The reported value of these products for the year was $35,613.00. One pile of gravel made up of pebbles from 1 to 1½-inch diameter showed limestone pebbles predominating, with a small proportion of flints and a few of igneous origin evidently from the Llano country. The supply of the raw material appears to be abundant, as the big shovel works many days on one location. It seems that the stream carries a new supply of sand and gravel into the place of excavation continuously and especially in times of high water. At the time the plant was visited it was a busy place, with the shovel working steadily, keeping four trucks hauling to the screening plant, from which other trucks were hauling to construction jobs.

The Austin Sand and Gravel Company is located on the south side of Colorado River west of the bridge on Congress Avenue in Austin. The products and values were reported as follows:

Product	*Amount (annual) (cu. yds.)*	*Value (per yd.)*
Sand	12,000	$1.00
Gravel	12,000	$1.25
Crushed stone	2,000	$1.50

The sand and gravel are taken from the bed of the river and run through the plant for washing and screening. The over-sized pebbles are run through the crusher for crushed rock, part of the product having been used recently as a top dressing for macadam roads. The crushed rock is somewhat of the nature of a by-product of producing sand and gravel in that it is produced from the over-sized pebbles, and the annual production is small as compared to the total production of sand and gravel. The two plants mentioned above are conveniently located for supplying the Austin market, as they are near the center of the city. This fact should be taken into consideration by prospective operators of building stone quarries in the Austin district who may plan to market some of their waste material in the form of crushed rock.

The R. W. Robinson Sand and Gravel Company is located on the north side of Colorado River east of the city limits of Austin, near the Montopolis bridge. Their equipment was formerly on lower ground and was so damaged by high water recently that the site was moved to its present location, above ordinary flood stage. Their equipment includes a drag line shovel for taking the sand and gravel

from the lowest river terrace with good machinery for washing, screening, and crushing. It appears that this plant may be able to continue production at times when high water may have flooded out the other plants.

The Deats Estate sells a large amount of sand and gravel from terrace No. 1 at the north end of the Montopolis bridge. There is no equipment for washing or screening the product. Most of it is shoveled by hand into trucks, some of which are provided with their own small screens. Much of this material is used in Austin as the price is lower than the washed and screened products from the regular plants.

Other sources for gravels. — Large amounts of gravel used in Travis County on county roads are obtained from small creek terraces located near the road construction. This gravel is predominantly of limestone and does not ordinarily contain any binding material such as clay. However, it seems to be a popular material at the present time. Onion Creek terraces have supplied very large amounts of this type of gravel, and it appears that very large amounts are still available.

South of Barton Springs park there is a large gravel pit on the property of W. T. and Mayme Rabb. The gravel is predominantly of limestone pebbles, poorly sorted, and containing some clay which acts as a binder. A thickness of 20 feet is shown in the pit. It has recently been used for surfacing some of the city streets.

South of Austin on the Oak Hill Highway (State Highway No. 20) about a mile or two beyond the city limits, there is a gravel pit on the property of H. E. Brody. This material was used on the highway. The gravel is predominantly of limestone, with some flint, and shows a thickness of about 10 feet. It is near the usual elevation of the Uvalde gravel for this area but was not classified as to probably origin.

One mile south of Austin, on State Highway No. 2, is a large gravel pit on the west side of the highway. Excavation here shows the north bank of an old stream channel cut in the Austin chalk and filled with cross-bedded sand and gravel. Although excavation has been carried southward for a distance of 580 feet from the north bank, the south bank of the stream channel has not been reached. The gravel is made up largely of limestone pebbles, with some flint and a small amount of quartz. Some of the limestone pebbles resemble material from the Ellenburger limestone, and some that appeared to be Hickory sandstone were found, so part of the gravel may have originated in the Central Mineral Region. A small amount of a similar gravel that may represent a part of this same stream channel is exposed in a road cut about a mile east of the gravel pit. This gravel lies at a higher elevation than the Asylum gravel and is overlain by remnants of the Uvalde formation. Thi old stream channel, 2½ miles south of the present Colorado River, and 200 feet higher than the present stream level, may represent an older phase of the present Colorado River, or it may be a part of a drainage system which developed before the present Colorado system existed.

ELEVATIONS FOR TRAVIS COUNTY

Copied from Precise Leveling in Texas, U. S. Coast & Geodetic Survey, Special Publication No. 77, Revised Edition, pp. 32-33:

At Littig, Travis County, in the southwest corner of the yard of section house 115, of the Houston & Texas Central Railroad, almost opposite the east end of the switch and about 8 meters north of the main track, about 1.2 meters north and east respectively, of the south and west fences bounding the yard. A stone post with square hole in top. (140.544 meters or 461.101 feet.)

At Manor, Travis County, in the front wall of the brick building owned by Mr. Harris and occupied by W. H. Richardson, hardware and general merchandise, facing on the main street of the town; the center of a cross cut in the face of a copper bolt, unlettered, leaded horizontally, about 1.4 meters above the sidewalk and about 0.6 meter west of the show window. (163.002 meters or 534.783 feet.)

At Daffan, Travis County, about 445 meters (1,760 feet) west of the Houston & Texas Central Railroad depot, 56 meters (184 feet) west of the first cattle guard west of the station, 1 meter south of the line of telegraph poles and 7 meters north of the main track. A stone post with square hole in top (185.453 meters or 608.440 feet.)

About 5.5 miles east of the Houston & Texas Central Railroad depot at Austin, Travis County, 1.35 meters north of the main track on the west stone abutments of the railway bridge over Walnut Creek, the top of a copper bolt leaded vertically into the top of the stone, 0.18 meter west of the east edge, and roughly letter "U.S.B.M." (137.145 meters or 449.950 feet.)

At Austin, Travis County, in the Driskill Hotel building on the corner of Brazos and Sixth Streets, the top of a copper bolt, unlettered, leaded vertically into the top of the limestone step to the first door west of the entrance to the American National Bank, about 1.2 meters from the door and 1.5 meter from the wall. (149.448 meters or 490.314 feet.)

At Austin, Travis County, in the passenger depot of the Houston & Texas Central Railroad, on the corner of Congress Avenue and East Third Street, in the face of the south wall, bay projection, just west of the large door to the general truck or baggage room, about 1.75 meters from the ground and 0.2 meter from the inside corner. A copper bolt. (146.092 meters or 479.304 feet.)

Geol. Austin (U.S.G.S.). — At Austin, Travis County, in the freight yard of the Houston & Texas Central Railroad, 60 meters (197 feet) west of the office door of the freight depot. An iron post close to a telegraph pole and 5 meters north of the northernmost track. (141.897 meters or 465.541 feet.)

North meridian mark. — At Austin, Travis County, on Capitol Hill, a cross on the copper bolt in the center of the top of the square stone pillar marking the north end of the meridian line established in 1872. (166.100 meters or 544.947 feet.)

508 Austin (U.S.G.S.). — At Austin, Travis County, on the southwest corner of the (old) post office facing Colorado Street. A disk. (153.043 meters or 502.109 feet.)

476 Austin (U.S.G.S.). — At Austin, Travis County, in the west end of the south rock pier of the highway bridge over Colorado River. A copper bolt marked "476 feet." (143.243 meters or 469.956 feet.)

Barton (triangulation station).— About 6 miles W. 19° N. jof Austin, Travis County, on a prominent wooded hill on the north side of the Austin and Bee Cave road, abreast and north of the 8-mile post from Austin. A chisel mark on the rim of a 2-inch iron pipe embedded in and filled with concrete, with a nail projecting from the concrete. (315.700 meters or 1,035.759 feet.)

Copied from Spirit Leveling in Texas, U.S. Coast & Geodetic Survey, Bulletin 635, pp. 66-67:

Austin Quadrangle

From Kyle to McNeil along International & Great Northern Railroad:

Buda, 1,000 feet north of station, 7 feet south of telegraph pole. 35 feet east of track, 60 feet south of crossing of old San Antonio and Austin road; iron post stamped "711" ..... 705.619 ft.
Bear Creek, International & Great Northern Railroad bridge, 1 mile southwest of Manchaca, in east end of north rock pier; copper bolt stamped "U.S.G.S. B.M." 645.175
Manchaca, in front of a station; center of track 696.9
Williamson Creek railroad bridge, 6 miles north of Manchaca and 5 miles south of Austin, top of east end of south rock pier; copper bolt stamped "U.S.G.S. 641 B.M." 633.180
Austin highway bridge over Colorado River, in west end of south rock pier; copper bolt stamped "U.S.G.S. 476 B.M." 469.956
Austin, second telegraph pole west of the Houston & Texas Central Railroad freight depot, 5 feet west of; iron post stamped "471" 465.541
Austin, in southwest corner of (old) post office, facing Colorado Street; bronze tablet stamped "508" 502.109
Austin, 5 miles north of, south side of Bull Creek road, 750 feet north of signboard at Hooper switch, 27 feet wet of track; iron post stamped "702 SA" 694.029
Duval, 2.75 miles south of, south side of Fiskville public road, 250 feet south of Amboy station, 22 feet west of track; iron post stamped "758 SA" 749.977
Amboy, in front of station; top of rail 750.700
Duval, 100 feet north of switch head block, 42 feet west of track, 6 feet south of telegraph pole, top of flat limestone rock 15 inches in diameter; bronze tablet stamped "797 SA" 789.173
McNeil, 75 feet north of intersection of International & Great Northern Railroad and Houston & Texas Central Railroad, 22 feet northeast of the latter's track, top of and near acute point of triangular limestone rock; bronze tablet stamped "836 SA" 828.401

From McNeil northwest along Houston & Texas Central Railroad western division:

McNeil, 3.25 miles northwest of, west side of public road, 22 feet south of track, 500 feet east of section house; iron post stamped "857 SA" 849.150

From Elysium via Garfield and Creedmoor to Manchaca:

Texas Hill triangulation station, 2.3 miles southwest of Elysium post office; rock marked "U.S.G.S." 602.590
Pilot Knob, 1 mile east of, 3.77 miles from Cedar Creek and Austin road, at intersection of Creedmoor road with Luling and Austin road, in corner of fence; iron post stamped "534" 529.100
Creedmoor, junction of Creedmoor-Austin and Creedmoor-Manchaca roads, 5.6 miles southwest of the lower Luling and Austin road, in southwest corner of field fence; iron post stamped "637" 631.508
Manchaca, 2 miles southeast of, at intersection of Creedmoor-Manchaca and old San Antonio-Austin roads, north side; iron post stamped "649" 643.493

From Austin to Cedar Valley via Oak Hill:

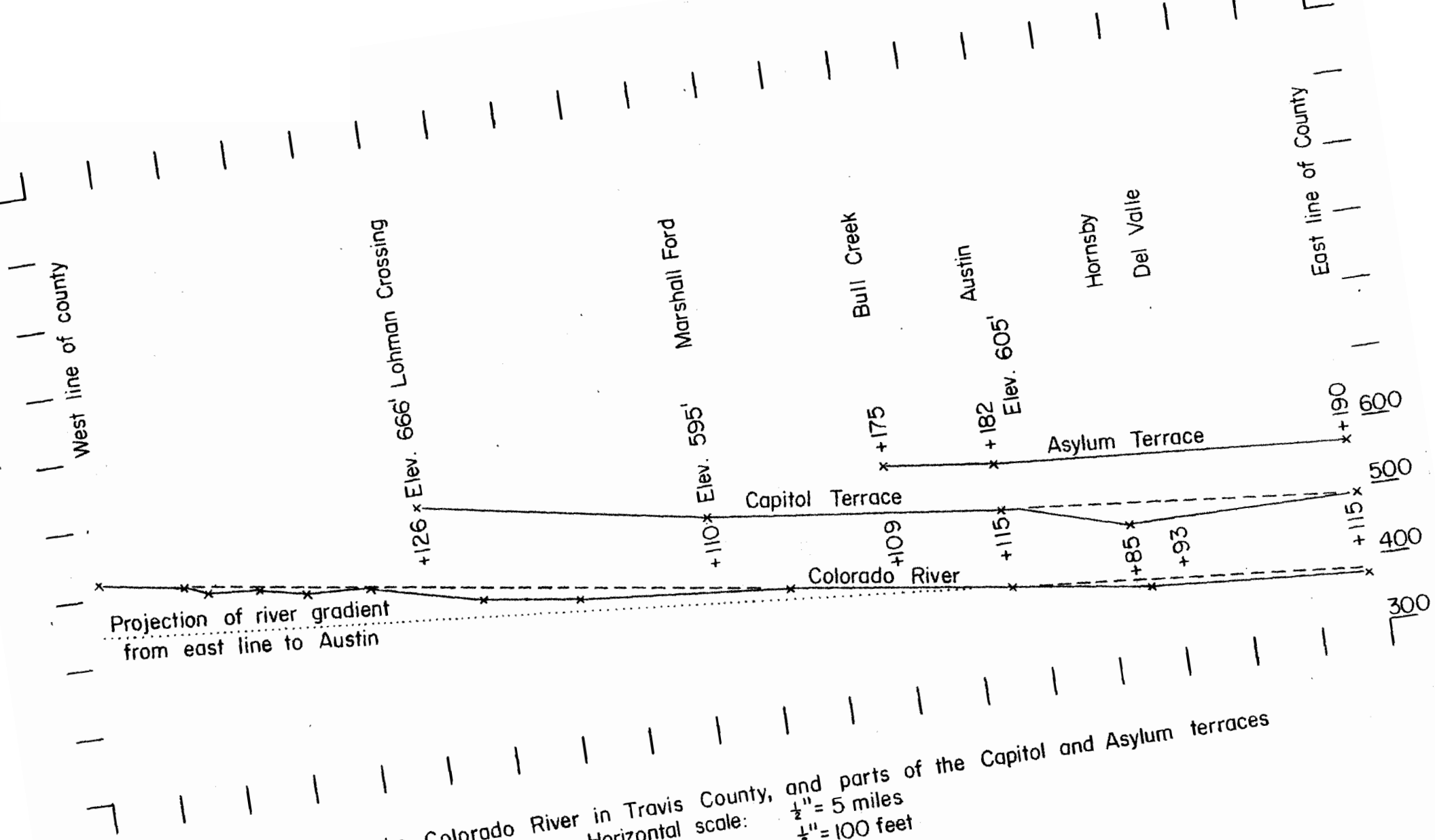
Oak Hill, 0.75 mile west of, intersection of Bee Cave and Cedar Valley roads, in corner of fence; iron post stamped "839" 831.207
Cedar Valley, forks of Dripping Springs and Johnson City roads; iron post stamped "1085" 1077.610
Cedar Valley, 8.64 miles southeast of, at crossing of Cedar Valley — Manchaca and Mountain City — Oak Hill roads; iron post stamped "781" 775.434

Data on Gravel Samples

	Asylum Terrace							Capitol Terrace					
	Burney	Poor Farm	Clayton	Asylum	Giles	Air-port	Spill-man	Lohman	Marshall	Allen	Harvey (surf.)	Harvey 15 ft. below surf.	Delana gravel (Uvalde?)
Flint (%)	70.67	51.29	68.6	66.25	66.94	55.66	73.59	82.53	79.27	69.74	65.63	22.10	77.99
Quartz	28.25	25.23	23.1	26.31	25.25	24.01	16.37	15.49	19.92	19.79	19.81	7.39	21.58
Igneous	7*	23.26	8.1	7.34	7.21	20.31	9.75	1.36		9.33	12.90	8.11	
Limestone									9*		8*	58.35	1*
Sandstone	4*				6*			4*	2*	6*	6*	3.04	2*
Black chert	2*			3*				4*		6*	4*		1*
Total (%)	98.92	99.78	99.8	99.4	99.4	99.98	99.71	99.38	99.19	98.86	98.34	98.99	99.57
Number of pebbles	1221	963	1822	3283#	1192	1151	1405	1394	1375	1061	1100	987	11.77
Thickness (ft.)	5	15	15	10+	15	15	15	10	5	35	45		5
Elev. (ft.)		611	626	617	605	600	575	666	595	550	550		654
Elev. above the river (ft.)	175	177	203	194	182	177	175	126	110	130	130		228

*/ Indicates the number of pebbles of one type included in the sample in cases where the number was too small to express in percent. Thus, the Burney sample contained 7 pebbles of igneous origin.

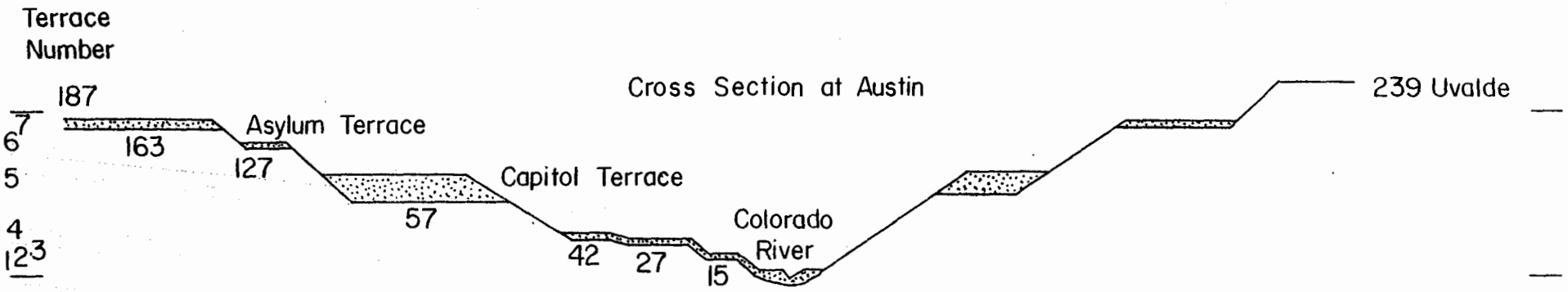
#/ Two samples combined.

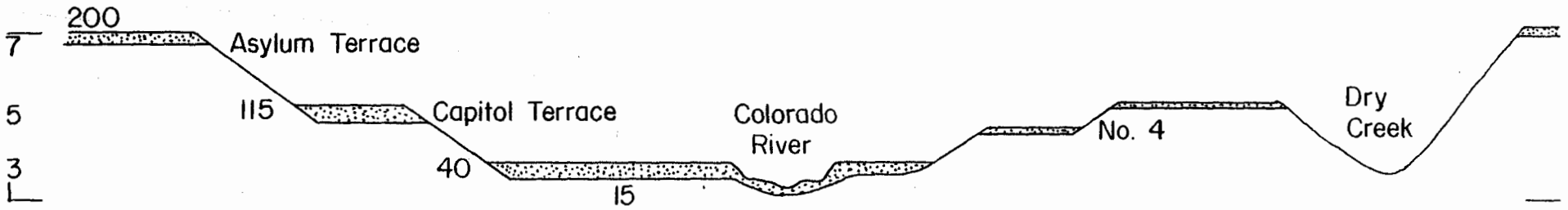


Profile of the Colorado River in Travis County, and parts of the Capitol and Asylum terraces

Horizontal scale: ½" = 5 miles
Vertical scale: ½" = 100 feet
Datum sea level

(Min. Res. Sur. Circ. 39)





Terraces of the Colorado River in Travis County (Min. Res. Sur. Circ. 39)

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