UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Description Revised 10-9-61
by L.L.L. & E.G.K.
Reviewed by W.H.G. 2-15-62

Station No. 08-1140.00

Description of Gaging Station on BRAZOS RIVER AT RICHMOND, TEX.

Location.--Lat 29°34'56", long 95°45'27" (determined from USGS topographic map, Richmond Quadrangle, scale 1:62,500), on downstream end of right main pier, opposite sounding station 880 at bridge on U. S. Highway 59, 2 blocks east of courthouse in Richmond, Fort Bend County, 925 ft downstream from bridge of Texas and New Orleans Railroad (formerly Galveston, Harrisburg and San Antonio Railway and generally known as one of the Southern Pacific Lines), and at mile 93.

Datum of gage is 40.94 ft above mean sea level, datum of 1929, through the medium of Houston supplementary adjustment of 1943.

Drainage area.--44,020 sq mi, approximately, of which 9,240 sq mi is probably noncontributing.

Establishment and History.--January 1903 to June 1906: On Jan. 1, 1903, the USGS established a reference point on railroad bridge 925 ft upstream from present (1961) recording gage. During 1903, gage heights were obtained by measuring down from reference point to water surface with a weighted plumber's chain graduated in feet. During the period 1904-06, gage heights were obtained from a standard chain gage attached to railroad bridge. (For a description of gages and bench marks, see Water-Supply Papers 99, 132 and 174). This gage was discontinued June 30, 1906. Datum of gage was 41.84 ft above mean sea level, datum of 1929.

Oct. 1, 1922 to Sept. 30, 1931: On Oct. 1, 1922, U. S. Weather Bureau established a chain gage at bridge on FM Road at Rosenberg, 7.6 miles upstream from present (1961) recording gage. Records (published as "Brazos River at Rosenberg") are equivalent to those obtained at Richmond, except for the diversions by the Richmond Irrigation Co.'s Canal. Gage-heights were furnished by U. S. Weather Bureau. Datum of gage was 44.9 ft above mean sea level, unadjusted. Gage was discontinued Sept. 30, 1931.

June 1931 to May 1957: In June 1931 a cableway was installed about 270 ft downstream from gage. Caving banks threatened cableway and it was removed during flood in May 1957.

June 7, 1931 to : On June 7, 1931, USGS installed a water-stage recorder housed in timber shelter over corrugated pipe well attached to downstream end of left main pier to highway bridge on U. S. Highway 59 and 90A. This installation failed to obtain a satisfactory gage-height record at low stages because of the building up of a sand bar around the pier to which the gage was attached.

On Jan. 31, 1935, USGS installed a wire-weight gage on the upstream handrail of the bridge, 90 ft to left of present (1961) recording gage. This gage was installed for use by the U. S. Weather Bureau.

On Oct. 23, 1943, USGS moved recording gage structure from downstream end of the left pier and re-installed recorder in a circular metal shelter cover over a corrugated metal pipe well attached to downstream end of right main pier

on highway bridge. Much of the low-water record from Jan. 31, 1935 to Oct. 23, 1943, was based on the once-daily readings of the Weather Bureau wire-weight gage.

All gages at Richmond in use after June 7, 1931, were set to same datum, 40.94 ft above mean sea level, datum of 1929, Houston supplementary adjustment of 1943.

On June 15, 1961, USGS removed corrugated metal pipe well from downstream end of right main pier. The metal gage shelter only was left in place and a bubble gage installed inside shelter on June 20, 1961.

Gage.--Bubble gage geared to water-stage recorder housed in 42" circular metal house, attached to downstream side of right main bridge pier near right edge of low water. Bubble tube is 1/8 inch I.D. polyethylene tubing about 60 ft long and is encased in 2" diameter galvanized pipe.

Recorder will function through a 50 ft range.

Elevations of various features of bubble gage:

Feature of gage	Elev. above datum of gage in feet
Orifice	
Top of shelter floor	49.7
Top of instrument shelf	52.6

Wire-weight Gage:

A type A wire-weight gage is attached to upstream handrail of bridge to which recorder is attached, 90 ft to left of recorder. Gage is set to recorder datum.

Elevation of check bar by levels	58.64
Elevation of check bar by dial	58.68

Counter Gage:

Bubble gage is equipped with a counter which reads to hundredths and is set to read with the outside gage (wire-weight gage). This counter will not be changed unless there is a malfunction of manometer or change in elevation of the orifice. At medium and high stages a discrepancy may appear between the outside gage and the counter gage, in which case a study should be made to calibrate the manometer (see "Installation and Service Manual", page 46).

Control.--Low water control is gravel bar 2 miles downstream from gage. The control for all other stages except extremely high stages, is sand, gravel and silt streambed and banks. After banks are overflowed, contours of the flood plain and it's vegetation will have some controlling effect. Control will shift for all stages. In addition, loop curves of varying dimensions will be experienced during most floods.

Discharge Measurements.--Wading: Wading measurements can be made in vicinity of control, about 2 miles below recording gage, up to a gage height of about 2½ ft. This is a very good wading section with sand and gravel bottom, and flow normal to section.

Bridge: Medium and high stage (above about 1,000 cfs) measurements are made from upstream walkway with battery powered four-wheel Columbus Crane. (Crane is kept in 24-hour Humble Service Station, one block west of gage). Caution: 0.2 method should be used and depths determined from cross section when measuring between stations 870 and 900 (right pier)! Initial point for sounding is streamward face of left abutment. Sounding stations are marked by dots painted on the top of the upstream handrail of walkway, one dot every twenty feet from station 0, every ten feet (except between station 0-500, where there are dots every twenty feet), two dots every fifty feet, and three dots with appropriate numeral at each 100-foot station. The bed of the stream is of sand and silt, free from vegetation and subject to shift. Flow will vary with stage, with horizontal angles at all stages. Velocities will range from less than one foot per second to over six feet per second at high stages. Flow is smooth. Considerable drag can be expected at high stages. During extreme floods (above 35 ft) water will begin to flow through openings to left of main channel. There are twenty-three openings (to and including Oyster Creek at Sugarland). These openings should be inspected whenever stage gets above 35 ft. Water will probably flow through these openings for several days after river at gage falls below overflow stage. Water surface should be determined at all bridge openings. Initial point of sounding for all bridges is streamward face of left abutment. Station numbers are marked on upstream guardrail of overflow bridges. All channels have been cross-sectioned of measuring section. With the exception of main channel bridge, datum is assumed to be 50.0 ft at center of road at center of each span.

0.2 depth method may be used above a stage of 13 ft (discharge, about 20,000 sec-ft) in accordance with circular letter, "Measurements - current meter, 0.2 depth method for flood use", dated Sept. 26, 1944. The method will be used at bridge, from right edge of pier at station 610 to REW.

Floods.--Historical flood information begins in 1852. Since that date, the highest stage occurred on Dec. 10, 1913, reaching a stage of 48.2 ft, present (1961) datum, at a point on right bank about 1,000 ft above gage. This elevation determined by levels of Feb. 1, 1945, to peak marks in a blacksmith shop at elevation 48.3 ft, and to peak mark in a lumber yard at elevation of 48.1 ft; both considered reliable as identified to Mr. S. J. Butler, USWB river observer and City of Richmond Water Supt. by A. Kochan and J. A. Wessendorff. Records of the Southern Pacific Railroad Co. show that this flood reached a stage of 47.5 ft, present (1961) datum, at it's bridge, 925 ft upstream from gage (see levels of Jan. 9, 1945). The figure of 48.2 ft, which is the mean elevation of the two highwater marks, tied in by the levels of Feb. 1, 1945, will be used rather than the figure furnished by the Southern Pacific Railroad Co. The figure of 45.4 ft, for the crest of the 1913 flood which was published from 1931 to 1943, was obtained by running levels to a board nailed to a tree on left bank near (old) gage, purported to mark the crest of the flood, but it was undoubtedly in error.

The present (1961) gage is located at the downstream end of the right main bridge pier. Therefore, the crest stage obtained by it for a flood of like

magnitude to the 1913 flood will be less than the figure of 48.2 ft obtained upstream. No figure for the 1913 flood at the gage will be given until comparative water-surface elevations at both sites during a large flood can be obtained.

A stage of 40.6 ft, present (1961) datum, was reached June 6, 1929, determined by levels to floodmarks at right end of highway bridge at gage.

Highwater data was obtained from the Southern Pacific Railroad Co. at their bridge 925 ft upstream for floods in 1884, 1899, 1915 and 1922.

The flood in December 1913 was the greatest since at least 1852, this date determined from the following: The Galveston News, May 29, 1884, by-line Wallis (just upstream from Richmond) May 28, 1884: The Brazos River is higher here than it has been in 32 years. The water is 2 ft deep in N. P. Wards' gin house, 1½ miles up the river. The Galveston News, June 6, 1884, by-line Richmond, June 5, 1884: The Brazos River commenced rising Tuesday morning and is now slowly receding. It has been about 7 ft higher than at any time since 1852. The oldest inhabitant has never witnessed anything like it. A statement appears in the Texas State Gazette, dated March 27, 1852, that there was a great flood on the Brazos during this year.

Summary of peak stages

- 1852	Large flood, stage unknown.	
May 1884	43.7 ft	at Railroad bridge 925 ft upstream from gage
June 13, 1885	44.7 ft	Do
July 1899	45.6 ft	Do
Dec. 10, 1913	48.2 ft	on right bank 1,000 ft upstream from gage.
May 2, 1915	43.3 ft	at Railroad bridge 925 ft upstream from gage.
May 9, 1922	40.9 ft	Do

Point of zero flow.--0.5 foot (8-13-57).

Winter flow.--No ice effect.

Regulation.--Low flow partly regulated by storage in Possum Kingdom Reservoir, Lake Whitney, Belton Reservoir, Lake Waco and many smaller lakes and reservoirs.

Diversions and Return Water.--Considerable water is diverted above station for irrigation and municipal supply. See records of American Canal Co.'s Canal near Fulshear and Richmond Irrigation Co.'s Canal near Richmond, Tex. Very little water, if any, is returned to the river.

Accuracy.--Records for all stages will be good.

Cooperation.--Construction of gage well was financed 50% by USGS funds and 50% by funds paid by the Board of Water Engineers.

In June, 1961, installation of bubble gage was financed by Corps of Engineers, Galveston District.

Operation of station (1961) is financed by Corps of Engineers, Galveston District.

Classification.--(A-33, A-22) "Water management, long term operational hydrologic network, secondary mainstream".

Justification.--This gage is the basis for the operation of flood control dams upstream and is used to evaluate their effect. It is also the basis for water resources investigations.

Reference Marks.--R.M. No. 1: Abandoned 6-29-38.

R.M. 2: Abandoned 11-16-54

R.M. 3: Top of right bolt in row of four anchor bolts in top of downstream end of pier about 0.3 foot above top of pier cap and 265 ft to left of recorder. Elev. above datum of gage, 49.315 ft.

R.M. 4: Top of 1/2" round reinforcing bar set in right cable anchorage near eyebar and about 3/4" above top of anchor. Elev. above datum of gage, 49.88 ft.

R.M. 5: Standard USGS WR bronze tablet set in the top of a 5" reinforced concrete post, set 32 ft below and 0.5 foot above ground, 16 ft upstream from 36" pecan tree, 65 ft upstream from bridge, 180 ft directly upstream from left cable anchorage and 545 ft to left of recorder. This monument is broken below ground. However, levels of Oct. 24, 1956 indicate no change in elevation. Elevation above datum of gage, 40.86 ft.

R.M. 6: Standard USGS WR bronze tablet set in top of downstream end of right concrete abutment of bridge, to which gage is attached, located 4 ft below roadway and 220 ft to right of recorder. Elev. above datum of gage, 51.275 ft.

R.M. 7: Top of a 5/8" galvanized bolt set horizontally in right side of downstream end of pier to which gage is attached. Elev. above datum of gage, 5.830 ft.

37M - 1925: (Levels by Topo Branch USGS, cooperating with State Reclamation Department) State Reclamation Department bronze tablet set in concrete post, stamped "Prim. Sta. No. 37M-1925", along south edge of sidewalk, 3 ft west of inside sidewalk intersection at northeast corner of courthouse yard, 2 blocks west of gage. (State Reclamation Department Bulletin #20, p. 120). Elev. above mean sea level, 93.907 ft, datum of 1929 through the medium of Houston Supplementary adjustment of 1943. Elev. above datum of gage, 52.96 ft.

For sea level datum of gage see "Location" paragraph.

Aerial Photo.--Aerial photo No. CLC-2K-116 was taken 3-6-52. This photo was obtained from the U. S. Department of Agriculture.

9-213-C (March 1949) Sketch Form

UNITED STATES DEPARTMENT OF THE INTERIOR
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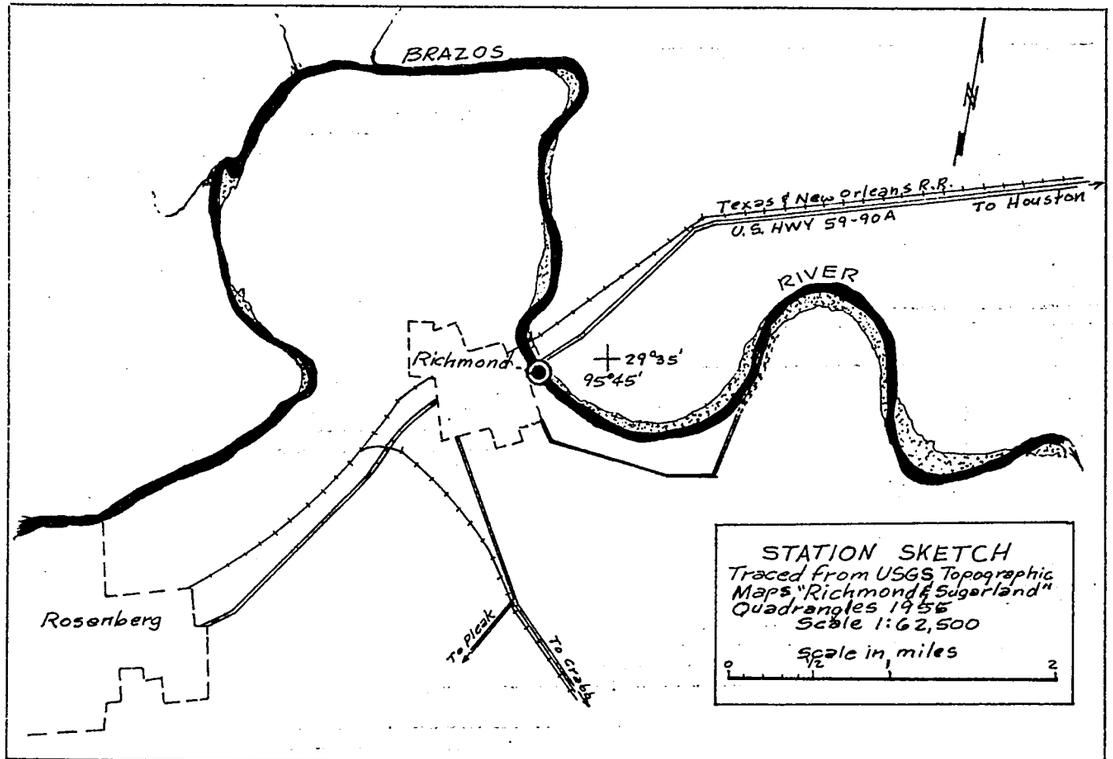
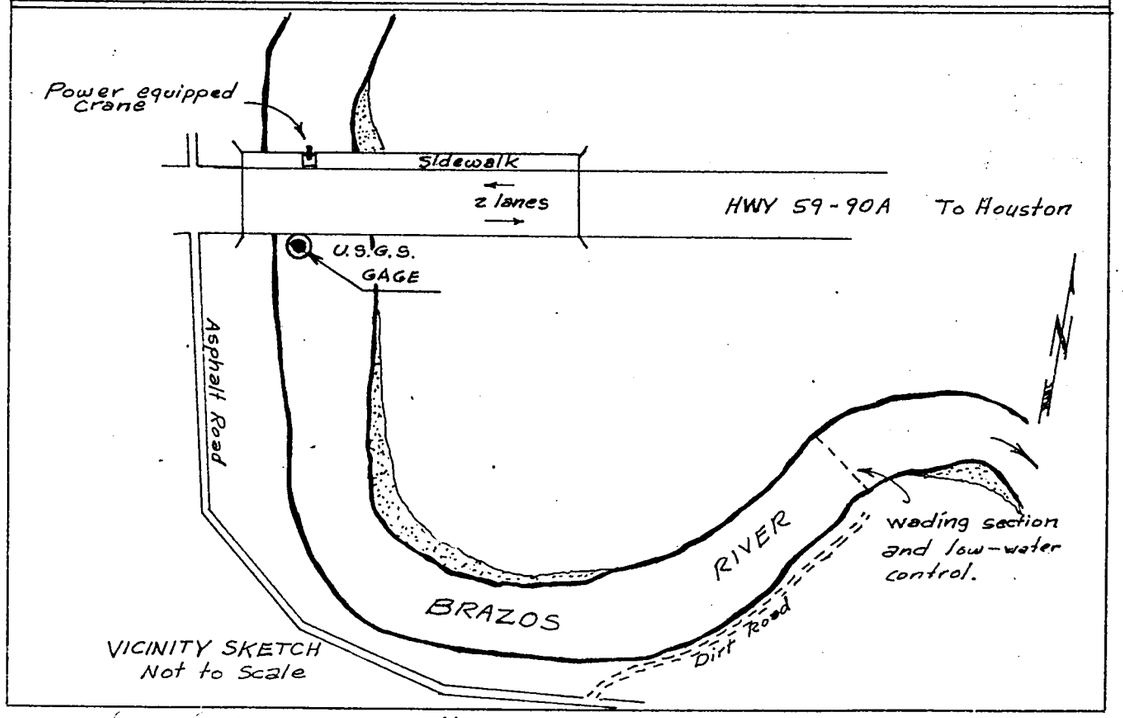
WATER RESOURCES DIVISION

File

8-1140 Brazos River at Richmond, Tex. SKETCH





Sheet No. 6 of 6 Sheets. Prepared by LLL Date 2-13-62 Checked by EGK Date 2-13-62

U. S. GOVERNMENT PRINTING OFFICE 16—25596-3

STATION FILE

Supplement to Station Description dated Oct. 9, 1961; prepared by C. T. Welborn, 1/28/66

8-1140. Brazos River at Richmond, Tex.

MAINTENANCE AND OPERATION PROCEDURES OF THE SEDIMENT STATION

Duties of the local observer:

1. To collect daily, or more frequently, sediment samples from the fixed sampling point on the bridge. During periods of low flow one sample a day will be sufficient. During periods of flood runoff, sediment samples should be collected at approximately 3-hour intervals on a rising stage and every 3 to 4 hours on a falling stage. The local observer must understand that several samples should be collected during periods of flood runoff. In the collection of sediment samples from the fixed sampling point, 2 milk bottles should be used for each sample.

2. The observer should include the following information on each bottle.
   a. Name of station (stream and town)
   b. Date
   c. Time
   d. Gage height
   e. Temperature of water
   f. His initials

3. The observer will continue sending gage-height cards to the Austin office. He should, however, report any malfunction of the equipment to the Houston office.

Duties of the Houston subdistrict office:

1. To make a suspended-sediment discharge measurement from the walkway of the old bridge on every visit to the station. Sediment samples will be collected at the following bridge stations: 950, 925, 900, 830, and 800. As the river overflows the left bank additional stations should be added. Until other equipment is added, the sediment samples will be collected with the DH-59 hand line sediment sampler at all stations except station 925. Station 925 is the fixed sampling point and the D-49 sediment sampler will be used. One sample bottle will be used in each vertical except for station 925, where two sample bottles will be used.

If the field man is at the station for 2 or 3 hours during periods of runoff, additional sediment samples should be collected from the fixed sampling point.

2. To check and maintain the sediment sampling equipment.

3. To see if the local observer is carrying out his duties.

4. To pick up sediment samples from the observer and ship them to the Austin office. The Austin office will ship empty milk bottles and cases to the Dixie Truck Lines in Richmond. The bottles will be held there until called for by the field man. The original Government Bill of Lading must be presented at the truck line office when picking up the bottles.

The observer, Irineo L. Reyes, lives at house No. 6 in the Edgewood Trailer Park. He has a barber shop at the Edgewood Trailer Park.

5. On regular visits to the station no charges for auto expense, per diem, or travel time will be made against the sediment station. Make charges for time spent while collecting samples, making sediment discharge measurements, maintaining equipment and picking up and shipping sediment samples. On special trips or visits prorate all charges. All charges made to the Brazos River at Richmond sediment station will be charged to Operation ~~18~~, account number ~~404900~~.

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