

United States Department of the Interior  
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES  
REGISTRATION FORM



1. NAME OF PROPERTY

HISTORIC NAME: State Highway 16 Bridge at the Brazos River  
OTHER NAMES/SITE NUMBER: State Highway 6 Bridge at the Brazos River; KX0098-05-036

2. LOCATION

STREET & NUMBER: SH 6, 6 mi. south of junction with US 82  
CITY OR TOWN: Benjamin  
STATE: Texas CODE: TX COUNTY: Knox CODE: 275 ZIP CODE: 79505  
NOT FOR PUBLICATION: N/A  
VICINITY: X

3. STATE/FEDERAL AGENCY CERTIFICATION

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this x nomination request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property x meets does not meet the National Register criteria. I recommend that this property be considered significant nationally x statewide locally. ( See continuation sheet for additional comments.)

Curtis J. Funnell  
Signature of certifying official

9-6-96  
Date

State Historic Preservation Officer, Texas Historical Commission

State or Federal agency and bureau

In my opinion, the property x meets does not meet the National Register criteria.  
( See continuation sheet for additional comments.)

Signature of commenting or other official

Date

State or Federal agency and bureau

4. NATIONAL PARK SERVICE CERTIFICATION

I hereby certify that this property is:

Edson H. Beall  
Signature of the Keeper

Date of Action

10-10-96

entered in the National Register  
See continuation sheet.

determined eligible for the National Register  
See continuation sheet.

determined not eligible for the National Register

removed from the National Register

other (explain):

**5. CLASSIFICATION**

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**OWNERSHIP OF PROPERTY:** public-State

**CATEGORY OF PROPERTY:** structure

<b>NUMBER OF RESOURCES WITHIN PROPERTY:</b>	<b>CONTRIBUTING</b>	<b>NONCONTRIBUTING</b>
	0	0 BUILDINGS
	0	0 SITES
	1	0 STRUCTURES
	0	0 OBJECTS
	1	0 TOTAL

**NUMBER OF CONTRIBUTING RESOURCES PREVIOUSLY LISTED IN THE NATIONAL REGISTER:** 0

**NAME OF RELATED MULTIPLE PROPERTY LISTING:** Historic Bridges of Texas, 1866-1945

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**6. FUNCTION OR USE**

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**HISTORIC FUNCTIONS:** TRANSPORTATION/road-related (vehicular)

**CURRENT FUNCTIONS:** TRANSPORTATION/road-related (vehicular)

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**7. DESCRIPTION**

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**ARCHITECTURAL CLASSIFICATION:** Other: continuous through truss bridge

**MATERIALS:** FOUNDATION substructure: concrete piers, bents and abutments  
WALLS N/A  
ROOF N/A  
OTHER superstructure: steel truss

**NARRATIVE DESCRIPTION** (see continuation sheets 7-1 through 7-3)

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Description:

The State Highway 16 Bridge at the Brazos River is a through truss bridge consisting of a three-span continuous truss unit measuring 382½ feet flanked by two simply supported truss spans, each 96 feet long. The bridge has three steel I-beam approach spans on its south side and two on the north side (see Figure 2). It provides a crossing over the Brazos River on State Highway (SH) 6, former SH 16 (see Figure 1). Located just south of Benjamin, the Knox County seat, the bridge links this town with Knox City to the south and provides access to US 277, which leads to Abilene. Located in the rolling prairies of the North Central Plains, Knox County has an economy based primarily on agriculture and petroleum industries.

Texas Highway Department (THD) engineers developed a special design for the bridge's truss spans. These spans have a Warren truss configuration with parallel top and bottom chords (see Photograph 1). They rest on reinforced concrete piers consisting of square battered columns in a dumbbell configuration (see Photograph 2). The approach spans rest on a series of precast concrete pile bents. These spans feature Type P railing comprising concrete posts and steel channel rails. Truss railing is made up of 12-inch deep steel channels. The bridge provides a 24-foot roadway with 19-inch curbs serving as refuge walks for stranded pedestrians.

From 1938 through 1939, Oran Speer built the Brazos River bridge under contract to THD. In 1985 THD maintenance forces repaired damage to lateral struts by heating and straightening the members. No other repairs have been performed on this bridge. As such, it retains substantial integrity of design, materials and workmanship. The bridge and its surroundings appear relatively unchanged since 1939, maintaining integrity of location, setting, feeling and association. Although no projects are currently planned for the Brazos River bridge, its BRINSAP sufficiency rating as of April 1995 is 37.6, making it eligible for replacement under the federal Highway Bridge Replacement and Rehabilitation Program (HBRRP).

GENERAL SPECS

TRUSS TYPE: continuous Warren through  
THD STD. DESIGN: n/a  
NO. TRUSS SPANS: 5 (1 3-span continuous unit)  
TRUSS SPAN LENGTH: 2 @ 96'0"; 382'6" (continuous unit)  
ROADWAY WIDTH: 24'  
DECK WIDTH: 27'  
APPROACH SPANS: 3 - 35'0" & 2 - 34'4½" steel I-beam  
OVERALL LENGTH: 754'9"

SPECIAL FEATURES

BRIDGE PLAQUE: no  
APPROACH RAILING: Type P concrete/steel railing  
OTHER: 19" refuge walks

SUPERSTRUCTURE

TRUSS DEPTH: 24'4"  
TRUSS PANELS: 4 - 24'; 18 - 21'3½"; 4 - 24'  
TOP CHORD & END POSTS: 2 channels w/ cover plate & lacing  
BOTTOM CHORD: 2 channels w/ batten plates  
VERTICAL POSTS: I-beam  
DIAGONAL MEMBERS: 2 channels w/ cover plates & lacing,  
or 2 double angles w/ lacing,  
or I-beam  
DECK TYPE: concrete

SUBSTRUCTURE

PIERS/INTERIOR BENTS: concrete piers and bents  
THD STD. DESIGN: n/a  
ABUTMENTS/END BENTS: concrete abutments  
THD STD. DESIGN: n/a

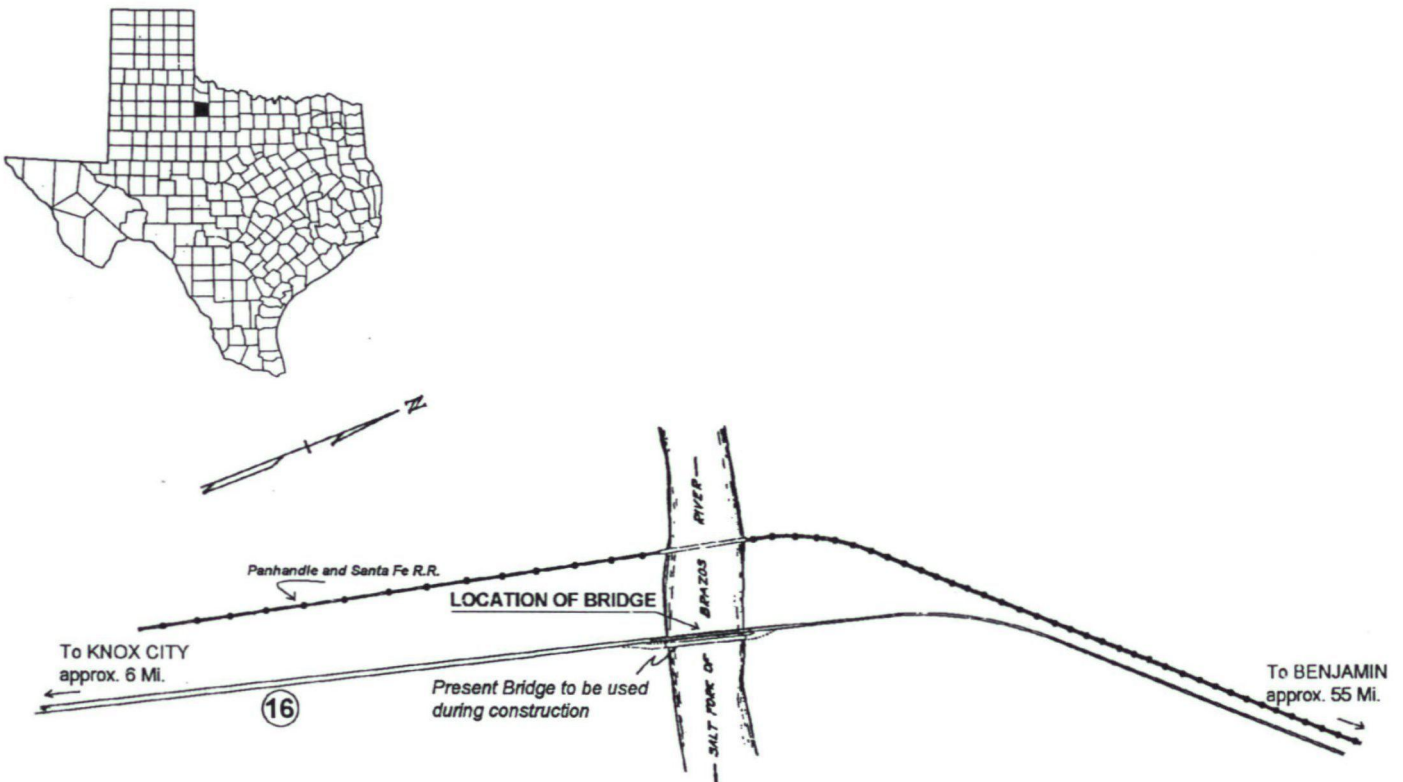
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Figure 1. Map of State Highway 16 in the vicinity of the Brazos River bridge as shown in the 1939 plans.



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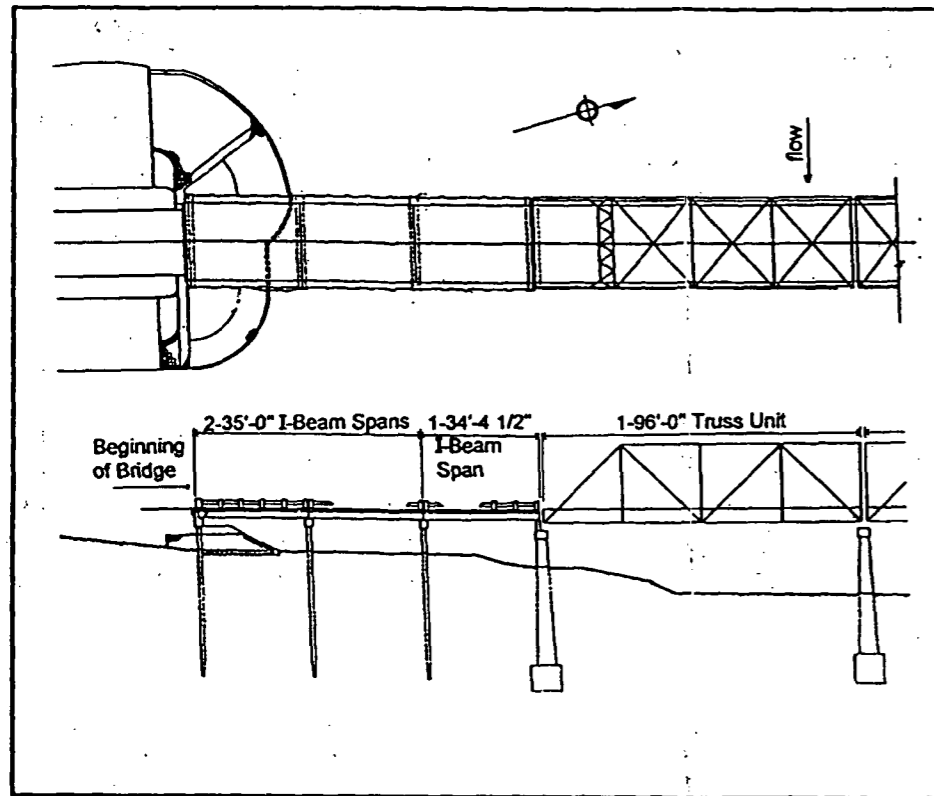
## National Register of Historic Places Continuation Sheet

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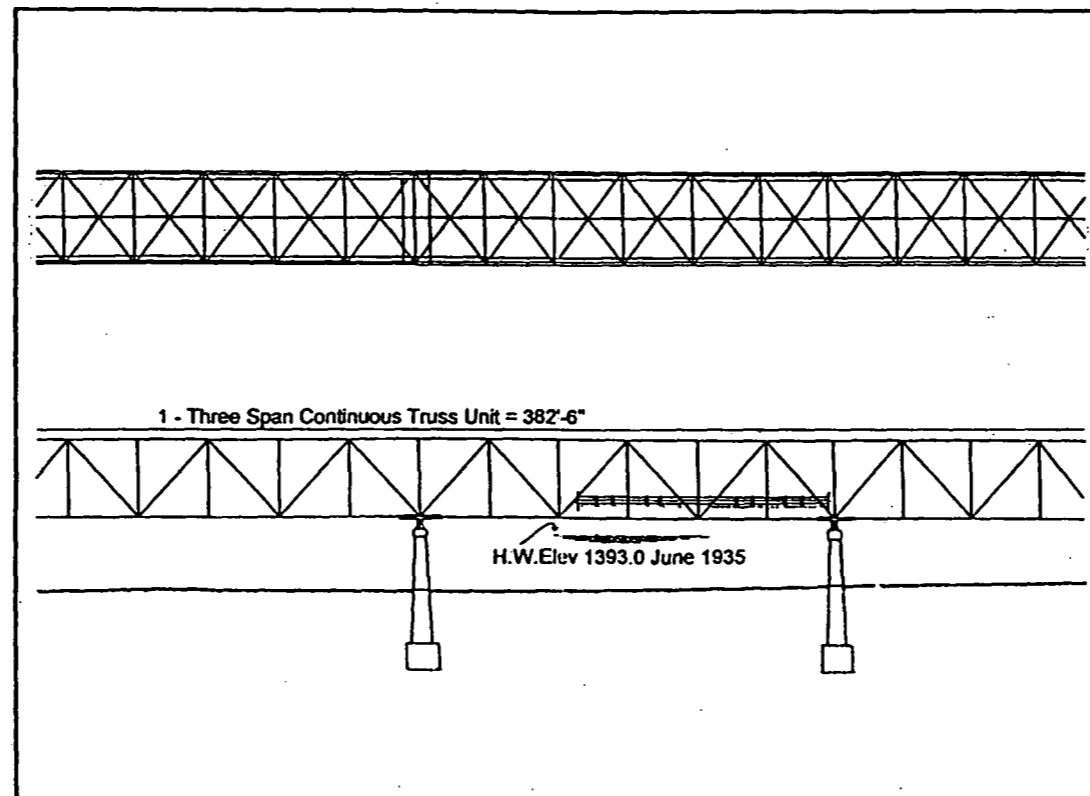
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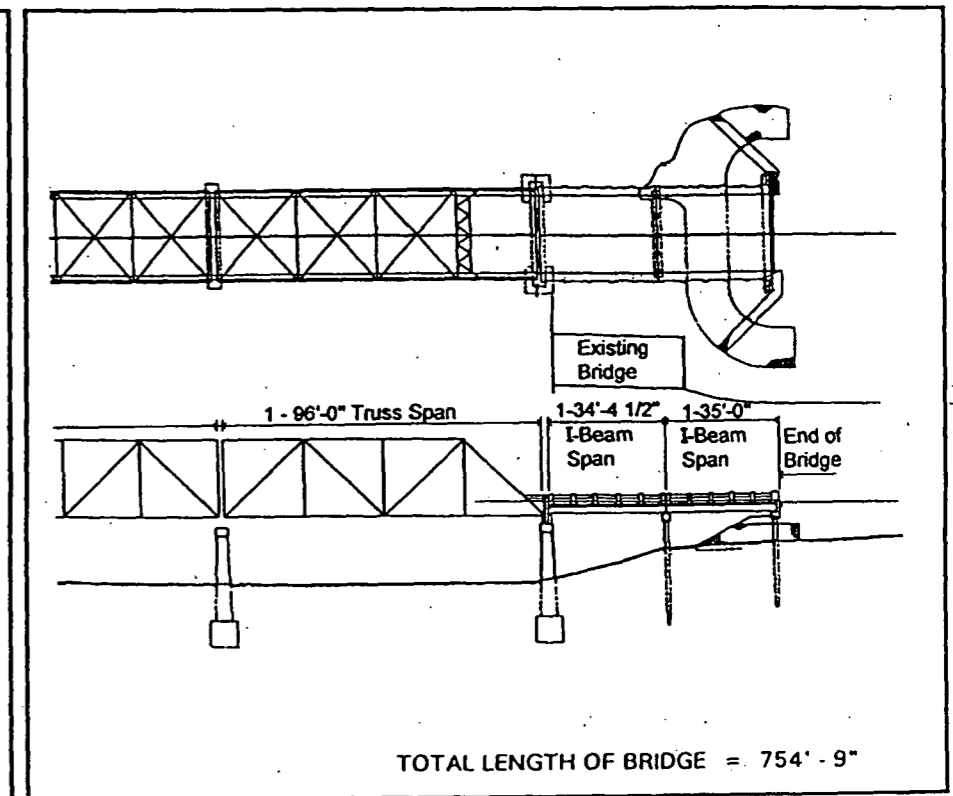
Figure 2. Elevation of the Brazos River bridge as shown in the 1939 plans.



PLAN SHEET 1 OF 3



PLAN SHEET 2 OF 3



PLAN SHEET 3 OF 3

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**8. STATEMENT OF SIGNIFICANCE**

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**APPLICABLE NATIONAL REGISTER CRITERIA**

- A** PROPERTY IS ASSOCIATED WITH EVENTS THAT HAVE MADE A SIGNIFICANT CONTRIBUTION TO THE BROAD PATTERNS OF OUR HISTORY.
- B** PROPERTY IS ASSOCIATED WITH THE LIVES OF PERSONS SIGNIFICANT IN OUR PAST.
- C** PROPERTY EMBODIES THE DISTINCTIVE CHARACTERISTICS OF A TYPE, PERIOD, OR METHOD OF CONSTRUCTION OR REPRESENTS THE WORK OF A MASTER, OR POSSESSES HIGH ARTISTIC VALUE, OR REPRESENTS A SIGNIFICANT AND DISTINGUISHABLE ENTITY WHOSE COMPONENTS LACK INDIVIDUAL DISTINCTION.
- D** PROPERTY HAS YIELDED, OR IS LIKELY TO YIELD, INFORMATION IMPORTANT IN PREHISTORY OR HISTORY.

**CRITERIA CONSIDERATIONS:** N/A

**AREAS OF SIGNIFICANCE:** Engineering

**PERIOD OF SIGNIFICANCE:** 1938-1939

**SIGNIFICANT DATES:** 1938-1939

**SIGNIFICANT PERSON:** N/A

**CULTURAL AFFILIATION:** N/A

**ARCHITECT/BUILDER:** Bridge Designer: Texas Highway Department  
Truss Fabricator: Virginia Bridge Company of Roanoke, Virginia  
Bridge Builder: Oran Speer of Alvord, Texas

**NARRATIVE STATEMENT OF SIGNIFICANCE** (see continuation sheets 8-4 through 8-6)

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**9. MAJOR BIBLIOGRAPHIC REFERENCES**

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**BIBLIOGRAPHY** (see continuation sheet 9-7)

**PREVIOUS DOCUMENTATION ON FILE (NPS):** N/A

- preliminary determination of individual listing (36 CFR 67) has been requested.
- previously listed in the National Register
- previously determined eligible by the National Register
- designated a National Historic Landmark
- recorded by Historic American Buildings Survey #
- recorded by Historic American Engineering Record #

**PRIMARY LOCATION OF ADDITIONAL DATA:**

- State historic preservation office (*Texas Historical Commission*)
- Other state agency (*Texas Department of Transportation*)
- Federal agency
- Local government
- University
- Other -- Specify Repository:

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### Statement of Significance:

The State Highway 16 Bridge at the Brazos River was constructed from 1938 to 1939. This custom-designed continuous truss bridge with its combination of typifying features is significant for embodying the defining characteristics of a THD truss bridge. As such, it meets National Register Criterion C in the area of Engineering at a state level of significance.

The Brazos River bridge was built on State Highway (SH) 16, now SH 6. SH 16 was a fairly short route beginning at the Oklahoma State line and running south through Hardeman, Foard and Knox counties, terminating at the intersection with SH 18 in southwestern Haskell County. The route was designated SH 283 from the 1940s through the 1960s, and became SH 6 in the mid-1970s. Today, SH 6 continues along the same route, linking the towns of Quanah, Crowell, Benjamin, Knox City and Rule.

The Brazos River bridge was built to replace an unsafe truss bridge built by the county in 1901. The 1901 structure included four 119-foot Pratt through truss spans and two pony truss spans, measuring 40 and 80 feet in length. Two timber approach spans completed the structure. A 1934 inspection of the bridge revealed its serious condition. In his May 22, 1935, memorandum to State Highway Engineer Gibb Gilchrist, the THD division (now district) engineer in Childress summarized the bridge's poor condition:

The floor and stringers are so rotten that the bridge is now unsafe for loads over five tons. On recent examination I found one of the concrete piers to be about five to six inches out of plumb. I am inclined to believe that the pier has cracked just below the bed of the stream. The floor of the bridge is 25 feet above the stream bed. If a truck or tractor should fall thru (sic) the bridge it would probably result in a fatal accident. The 119 Ft. steel trusses are very old and of the unusual design that was built in this state years ago. It only has a 15 foot clear roadway. We will be fortunate if the old bridge lasts until a new bridge can be built.

The memorandum went on to request immediate approval of a preliminary site investigation for the replacement bridge. George Wickline, State Bridge Engineer, agreed to the assessment, writing in a June 5 memorandum:

We regard this as being a very necessary project and recommend that same be approved at an early date. It is likely that the old bridge will become unserviceable and possibly wrecked before a new bridge can be built even if we should start immediately.

Despite the apparent urgency of the replacement project, the bridge was not programmed for construction that year, and planning on the project did not resume until November 1937 when it was programmed as a state project. On December 4, 1937, THD conducted a preliminary site inspection. The resulting report stated that:

The river at this point is straight and is normal to the proposed bridge. The north bank is



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formed by low clay hills and is apparently somewhat resistant to erosion. The south bank is low and composed principally of sand. . . . Borings indicate that hard red shale will be encountered for foundations at an average depth of about 15 ft. below the bed of the stream. This material is very hard and is capable of sustaining a large superimposed load. . . . This material is subject to scouring by the abrasive action of the overlying sand during periods of extreme high water. This seems to be especially true adjacent to piers or pile bents where eddy currents are induced by the obstruction. . . . It was generally agreed that the foundation for the main piers should penetrate the red shale to a minimum depth of 8'-0."

The site for the new bridge was immediately adjacent to the 1901 bridge on its north (upstream) side. The old bridge continued to serve traffic during construction. THD engineers came up with a preliminary bridge layout consisting of five 35-foot I-beam approach spans, two 96-foot through truss spans and a 382½ continuous truss unit. The bridge would provide a 24-foot roadway for two lanes of traffic, as well as 19-inch curbs. Because of the stable red shale stratum underlying the bridge site, spread footing, rather than pile or caisson foundations, could be used to support the square columns of the dumbbell piers.

In his memorandum dated December 21, 1937, Herbert Eldridge, who had taken over as Acting Bridge Engineer, wrote D.C. Greer, Chief Engineer of Designs and Construction, that the bridge's cost estimate came to \$150,000. "The above estimate embraces the minimum amount of work if programmed as a State Project. It is noted, however, that approximately 3000 lin. ft. of the proposed highway embankment is below high water. If this work is to be programmed as a Federal Aid Project, it is believed that raising of this embankment above high water would be a Bureau [of Public Roads] requirement. . . ." In such a case, the estimate would increase to \$172,000. In January, the Texas Highway Commission ordered that "plans be prepared and contract let" for a state project to construct a "high-water bridge with low-water approaches." Because of the large number of projects scheduled for letting, the THD's Bridge Department prepared the bridge plans only and delegated the preparation of plans for the approach roadway to the division office in Childress.

Rather than use a standard design, THD bridge engineers custom-designed the Brazos River bridge, employing a continuous truss unit. The continuous truss bridge was considered aesthetically superior to a series of simply supported spans. Typically, however, continuous spans were employed for increased strength and rigidity, particularly for long spans where improved economy could sometimes be achieved. Although the Brazos River bridge is not particularly long, convenience of erection may have been a factor. With the continuous bridge, the span under construction could be cantilevered from previously built spans acting as anchors. This minimized the amount of falsework needed and was especially advantageous for the construction of long spans over deep water. One major disadvantage of the continuous truss is that it is statically indeterminate. As such, the equations of statics, the branch of physics used in structural engineering, cannot be employed in its design, and more complex design methods must be used. In addition, the continuous bridge is subject to the amplified effects of secondary stresses due to pier settlement and the cumulative effects of temperature expansion. With increased experience and improved structural analysis methods, however, these issues provided less of an impediment to the design of continuous truss bridges.

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The Brazos River bridge is one of only seven continuous through truss bridges surviving in Texas. It is one of only five such bridges built before World War II. It is the only surviving continuous truss bridge in the state with parallel top and bottom chords. It is also one of only three metal truss highway bridges surviving in Texas exhibiting Type P concrete and steel approach railing.

The Texas Highway Commission opened bids for the bridge project on March 22, 1938. After reviewing the six bids submitted, the commission awarded the contract to Oran Speer of Alvord, Texas. His low bid of just over \$126,000 was more than 15 percent below THD's estimate. The Virginia Bridge Company of Roanoke, Virginia, was subcontracted to fabricate the steel truss spans. Construction began on May 2, 1938. The THD resident engineer in Benjamin supervised the construction, which he and other THD engineers periodically inspected.

Almost immediately, THD implemented a field change to shift the bridge location 10 feet south in order to move it further from the old bridge's south abutment. Despite this precaution, the old abutment proved hazardous during construction. On August 6, as work proceeded on the new bridge's southernmost pier (labeled no. 4 on the plans), the old bridge's abutment began to subside, necessitating the contractor to install temporary bracing. The August 8, 1938, Construction Inspection Report explained:

All work has been stopped on account of the fact that the south bent [abutment] on the old Brazos River Bridge was settling and it was necessary for the maintenance department to secure the services of the contractor to drive two piles on each side of the light bent under the south end of the old bridge. As soon as these piling were in place it was proposed to cut them off, run a steel needle beam thru (sic) the bent and rest it on the piles on each side. We then propose to pour concrete around the holes where the needle beam went through the web of the old bent. . . . Apparently the old pier was settling on top of a water bearing sand and only a few feet below the surface of the ground.

The resident engineer's September 3, 1938, letter to the division engineer describes what happened next:

. . . . A sudden blow-in occurred, shearing off the supporting piles under the old abutment where they entered the shale, and further dropping the old pier necessitating immediate stoppage of traffic. The sheet piling [of the cofferdam used to construct pier no. 4 on the new bridge] gave way. . . . All operations on Pier No. 4 ceased and the old structure was removed.

Later investigation revealed that the foundation of the old bridge's abutment had been laid on sand and not sunk into the shale stratum. As a result of the old bridge closing down, THD was required to build a detour road. By January 11, 1939, the new Brazos River bridge was open to traffic, with just painting remaining to be completed. The project was finished on March 16, 1939 at a cost of about \$138,000.

**10. GEOGRAPHICAL DATA**

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**ACREAGE OF PROPERTY:** less than one acre

UTM REFERENCES	Zone	Easting	Northing	Zone	Easting	Northing
1	14	425550	3706820	3	—	—
2	—	—	—	4	—	—

(— see continuation sheet)

**VERBAL BOUNDARY DESCRIPTION** (see continuation sheet 10-7)

**BOUNDARY JUSTIFICATION** (see continuation sheet 10-7)

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**11. FORM PREPARED BY**

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<b>NAME/TITLE:</b>	text by Regina A. Lauderdale graphics by Pat St. George	<b>DATE:</b> September 1996
<b>ORGANIZATION:</b>	Texas Historical Commission/ Texas Department of Transportation	<b>TELEPHONE:</b> 512/463-6094
<b>STREET &amp; NUMBER:</b>	Texas Historical Commission P.O. Box 12276	<b>ZIP CODE:</b> 78711
<b>CITY OR TOWN:</b>	Austin <b>STATE:</b> TX	

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**ADDITIONAL DOCUMENTATION**

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**CONTINUATION SHEETS**

**MAPS**

**PHOTOGRAPHS**

**ADDITIONAL ITEMS**

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**PROPERTY OWNER**

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<b>NAME</b> Texas Department of Transportation	
<b>STREET &amp; NUMBER</b> 125 East 11th Street	<b>TELEPHONE</b> 512/416-2606
<b>CITY OR TOWN</b> Austin <b>STATE</b> TX	<b>ZIP CODE</b> 78701

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### Bibliography:

Texas Highway Department. Plans of Proposed State Highway Improvement. Control-Section-Job No. 0098-05-006, located at TxDOT headquarters in Austin.

Texas Highway Department. Project Correspondence Files. Control-Section-Job No. 0098-05-006, located at TxDOT headquarters in Austin.

### Verbal Boundary Description:

The nomination boundaries encompass the complete structure, State Highway 16 Bridge at the Brazos River, including the approach spans and steel approach railing, as well as the ground upon which the structure stands.

### Boundary Justification:

The boundary includes all components historically associated with the property.

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES  
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY State Highway 16 Bridge at the Brazos River  
NAME:

MULTIPLE Historic Bridges of Texas MPS  
NAME:

STATE & COUNTY: TEXAS, Knox

DATE RECEIVED: 9/09/96 DATE OF PENDING LIST: 9/24/96  
DATE OF 16TH DAY: 10/10/96 DATE OF 45TH DAY: 10/24/96  
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 96001123

NOMINATOR: STATE

REASONS FOR REVIEW:

APPEAL: N DATA PROBLEM: N LANDSCAPE: N LESS THAN 50 YEARS: N  
OTHER: N PDIL: N PERIOD: N PROGRAM UNAPPROVED: N  
REQUEST: N SAMPLE: N SLR DRAFT: N NATIONAL: N

COMMENT WAIVER: N

ACCEPT  RETURN  REJECT 10-10-96 DATE

ABSTRACT/SUMMARY COMMENTS:

RECOM./CRITERIA \_\_\_\_\_

REVIEWER \_\_\_\_\_ DISCIPLINE \_\_\_\_\_

TELEPHONE \_\_\_\_\_ DATE \_\_\_\_\_

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

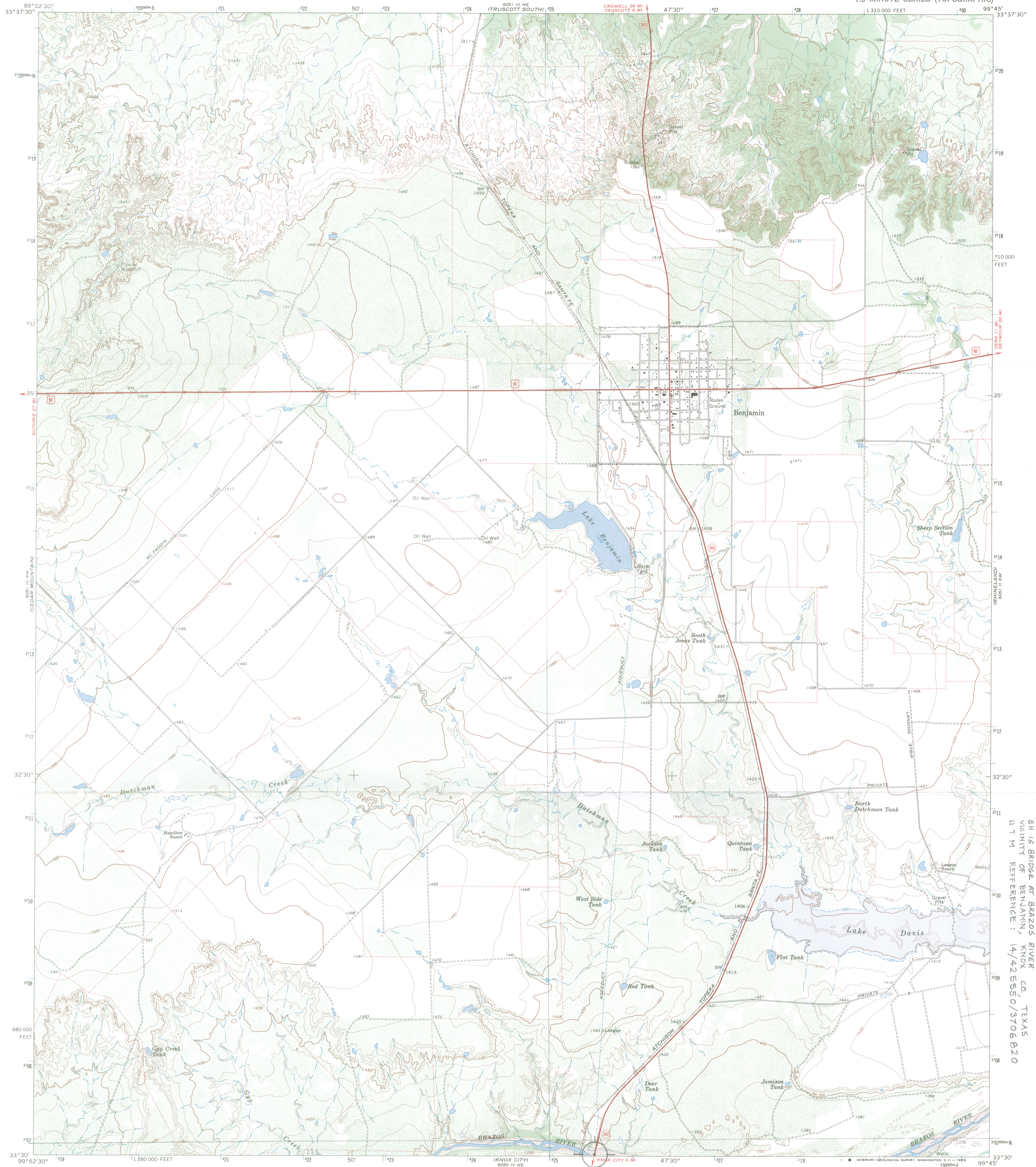


SITE NO. KX0098-05-036  
SH 16 BRIDGE AT BRAZOS RIVER  
HISTORIC BRIDGES OF TEXAS  
KNOX CO., TEXAS  
PHOTOGRAPH 1 OF 2

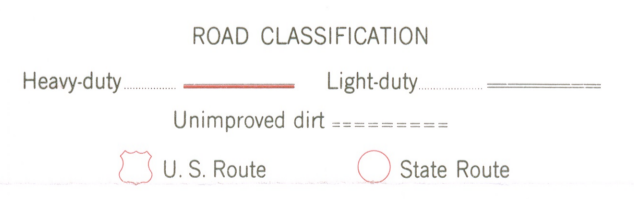
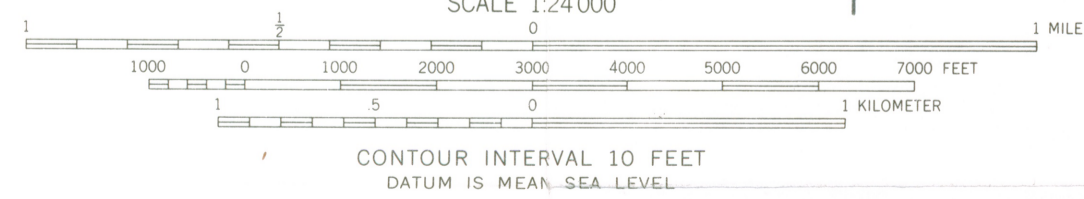
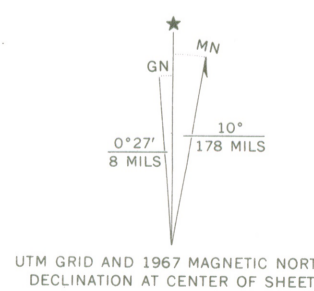




SITE NO. KX0098-05-036  
SH 16 BRIDGE AT BRAZOS RIVER  
HISTORIC BRIDGES OF TEXAS  
KNOX CO., TEXAS  
PHOTOGRAPH 2 OF 2



Mapped, edited, and published by the Geological Survey  
Control by USGS and USC&GS  
Topography by photogrammetric methods from aerial  
photographs taken 1966. Field checked 1967  
Polyconic projection. 1927 North American datum  
10,000-foot grid based on Texas coordinate system,  
north central zone  
1000-meter Universal Transverse Mercator grid ticks,  
zone 14, shown in blue  
Fine red dashed lines indicate selected fence lines



THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS  
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242  
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

3399-321

BENJAMIN, TEX.  
N3330—W945/7.5

1967

AMS 6051 III SE—SERIES V882

HISTORIC BRIDGES OF TEXAS  
SH 16 BRIDGE AT BRAZOS RIVER  
VICINITY OF BENJAMIN, KNOX CO., TEXAS  
UTM REFERENCE: 14/425650/3706820

SITE No: KX0098-05-036