Bridge NRHP Eligibility Report

Structure ID:	Disposition:	Year Built:	Year Rcnst:
071340014216031	In Service	1937	0000

District:	San Angelo	***Span Type:***	Continous
County:	Kimble	***Roadway Type:***	Through
Location:	0.21 MI E OF 6TH ST	***Member Type:***	Continuous Truss
Facility Carried:	LP 481	***Main Span Length:***	0189
Feature Crossed:	SOUTH LLANO RIVER	***Structure Length:***	001342
NRHP Det. Date:		***Evaluator:***	

Historical Significance: 1 NR Listed

NRHP Eligibility Determination Statement:

This bridge is currently listed on the National Register of Historic Places.
This bridge is listed in the On-System Historic Metal Truss Bridge Task Force Report. Please see the Task Force Report for recommended options regarding this bridge.
The State Highway 27 Bridge at the South Llano River is a through truss bridge consisting of two three-span continuous units each 382½ feet long, one three-span continuous unit 473 feet long, and one 96-foot simply supported truss span. U-type abutments at each end of the bridge measure 50 and 32 feet, bringing the bridge's overall length to 1,424 feet. The bridge provides a crossing over the South Llano River on Loop 481, just east of Junction, a livestock center that also serves as the Kimble County seat. Loop 481 serves as the business loop of Interstate 10 (I-10), former State Highway (SH) 27, which bypasses Junction to the north on its route between San Antonio and Houston. The bridge acts as a gateway to Junction, serving traffic between downtown and the intersection of I-10 about 2½ miles southeast of town. The bridge also links Shreiner Park, on the eastern bank of the South Llano River, with downtown. Kimble County is on the Edwards Plateau of southwest Texas at the western edge of the Texas Hill Country. The area's economy relies primarily on wool and mohair production, as well as the cedar, tile and pecan industries.
Texas Highway Department (THD) engineers custom-designed the bridge's truss spans. These spans have a Warren truss configuration with parallel top and bottom chords along most of the bridge length, except for the center span of the 473-foot continuous unit, where the top chord bows into a gentle curve. Truss railing consists of a single row of 12-inch deep steel channels. The truss spans rest on reinforced concrete dumbbell piers with square battered columns, some on reinforced concrete spread footings, others on steel caisson foundations. The bridge's U-type abutments are placed in a unique configuration, immediately adjacent to the exterior piers that support the bridge ends,- and share the same footings. These abutments do not support any portion of the bridge superstructure, but serve only as elaborate retaining walls. The bridge provides a 24-foot roadway and a 4-foot wide pedestrian walkway with decorative steel railing cantilevered from its northwest (upstream) side. At each end of the bridge, on top of custom-designed abutments, the roadway and sidewalk widen, providing what appears to be a an overlook or pedestrian rest area. A unique solid concrete entrance railing with grooved decorative treatment encloses this area. A bronze plaque imbedded in the railing at each entrance to the bridge names the contractor and identifies THD and the Bureau of Public Roads (BPR) as the government agencies responsible for the project. The plaque reads:

SOUTH LLANO RIVER BRIDGE

BUILT IN 1937 BY THE

TEXAS HIGHWAY DEPARTMENT

— * —

UNITED STATES

BUREAU OF PUBLIC ROADS

— * —

STATE HIGHWAY COMMISSION

ROBERT LEE BOBBITT CHAIRMAN

JOHN WOOD MEMBER

HARRY HINES MEMBER

GIBB GILCHRIST

HIGHWAY ENGINEER

CENTRAL BITULITHIC CO.

CONTRACTORS

From 1936 through 1937, the Central Bitulithic Company built the South Llano River bridge under contract to THD. No major repairs or alterations have been performed on this bridge. As such, it retains substantial integrity of design, materials and workmanship. Other than the impoundment of the South Llano River to form Lake Junction in 1974, the bridge and its surroundings appear relatively unchanged since 1937, maintaining integrity of location, setting, feeling and association. Although no projects are currently planned for the South Llano River bridge, its BRINSAP sufficiency rating as of October 1994 is 58.8, making it eligible for rehabilitation, but not replacement, under the federal Highway Bridge Replacement and Rehabilitation Program (HBRRP).

The State Highway 27 Bridge at the South Llano River was constructed from 1936 to 1937. This custom-designed continuous truss bridge with its combination of typifying features is significant for embodying the defining characteristics of a THD truss bridge. With its unique abutment configuration, the bridge is also significant for "employing technically complex, advanced or innovative designs and construction methods." As such, the bridge meets National Register Criterion C in the area of Engineering at a state level of significance.

The South Llano River bridge was built on the segment of SH 27 (now I-10) that passes through Junction. SH 27 originally linked El Paso and Fort Stockton, with a later extension to San Antonio through Sonora, Junction, Kerrville and Bandera. By 1932, the route was designated SH 27/US 290. By 1949, the original SH 27 designation had been dropped. Beginning about 1968, this route was upgraded and designated I-10. The segment running through town was bypassed and became Loop 481.

The bridge construction was undertaken as part of a larger THD effort to reconstruct the seven-mile portion of SH 27 between Junction and Segovia on a straighter alignment. The bridge replaced a functionally obsolete truss bridge with a 14-foot roadway. The old bridge was comprised of a single camelback through span, two Pratt pony spans, and several approach spans, which were probably timber trestles. State Bridge Engineer George Wickline relayed the condition of the bridge to Gibb Gilchrist, State Highway Engineer, in a February 7, 1935, memorandum: "This old bridge is in rather poor condition on

account of being narrow, weak, and on account of a very sharp curve at the south end of the structure." Flooding on June 14, 1935, further damaged the old bridge, washing out its deck. THD maintenance crews immediately repaired it, but Gilchrist and Wickline realized the urgency of replacing the bridge. The preliminary layout for the replacement bridge called for a 160-foot through truss span across the main channel along with a series of 90-foot pony truss spans for an overall structure length of 1,200 feet. In his February 5, 1935, memorandum to Gilchrist, the resident engineer stationed at Junction explained the rationale behind the emphasis on aesthetics in the design:

A rather handsome type of bridge is shown on the sketch, which we hope will receive your serious consideration, for the reason that we believe such a structure would be appropriate and in keeping with the location. In the first place, the city is acquiring . . . a wide strip along the river front, for park purposes and is terracing and beautifying the area thruout (sic). A River drive is under way. A large tract (some 160 acres) has been purchased for a park — to have a golf course, race track, etc. and considerable effort is being put forth to make the most of the natural beauty of the country. In addition, we believe that the setting for this bridge, especially as approached from the East is going to be simply magnificent. The proposed new Highway will come over the high hills for a splendid view of the canyons and the valley, and on down quite a large canyon to the bridge site, across a pretty stream and into town. This, coupled with the fact that the structure is to ultimately serve both highways 27 and 4, leads us to believe that a really handsome structure would be proper and justified, even tho (sic) the cost be somewhat greater than one not so good looking.

Despite a citizen petition for a 40-foot roadway with a pedestrian walkway flanking each side, THD engineers believed a 24-foot roadway with a single sidewalk was adequate for the traffic using the crossing. The citizen petition justified the need for wider roadway because of the "golf tournaments, rodeos, barbecues, and horse races, held at the Municipal Park [now Shreiner Park] during which time there will be a heavy traffic. . . ." With regard to the sidewalks, the petition stated:

The walks will afford a safe place for pedestrians crossing said bridge going to and returning from the Municipal Park and the town. The park is located across the River, and there is no other foot bridge of any nature built to cross said South Llano River. . . . There are some homes of tax-payers located across the South Llano River, and the walks will likewise give them a means of crossing the bridge without endangering their lives.

In his August 23, 1935, memorandum to Gilchrist, the division (now district) engineer in San Angelo gave the following opinion regarding the roadway width and sidewalks:

I believe a 24 Ft. roadway is ample. There is very little possibility of the traffic exceeding beyond the capacity of the [24-foot wide] bridge. They manage very well with the present 14 Ft. bridge when they have a rodeo or stock show across the river. A few of the Mexicans living a mile out on the old road walk across. One sidewalk will be ample to take care of the pedestrians.

We have been building structures around the towns lately [with] 40 Ft. roadway and two sidewalks but they are not very long, nothing compared to the proposed bridge, but citizens read about them and think they are being slighted. It is hard to make them realize the increase in width of roadway 10 Ft. over the width of the old 14 Ft. roadway bridge.

Although the roadway width was not revised, the overall bridge length was increased to 1,424 feet. The increased length allowed for its construction on higher ground, enabling the bridge to clear the new high water level established by the June 1935 flood. In November 1935, THD engineers made a major revision to the design, replacing the simple through and pony truss spans called for in the preliminary design with a continuous through truss configuration. According to a February 14, 1936, interoffice memorandum, the change was made "to secure a layout which would be more pleasing in appearance." The revised layout was estimated to cost $1 per linear foot more than the preliminary layout. As detailed in the memorandum, "A small economy could be made by selecting a less expensive type of railing. The railing design proposed has certain ornamental features which could be eliminated at a sacrifice in appearance of the structure and which would save probably less than one per cent (sic)." The revised

layout was included in the plans, specifications and estimate (PS&E) submitted to BPR, and its approval included an appropriation from the 1936 Regular Federal Aid Program to cover half the project cost. Rather than use a standard design, THD bridge engineers developed a special design for the South Llano River bridge, incorporating continuous truss spans for an improved appearance. 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. Convenience of erection was also a major advantage of continuous spans. 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.

One unique feature of the South Llano River bridge is the bowed top chord incorporated into the 473-foot continuous unit. Such a localized increase in truss height is sometimes provided to resist large stresses, but in a continuous bridge, maximum stress usually occurs over the pier supports. On the South Llano River bridge, the increase occurs in the middle of the center span. Stress calculations shown in the bridge plans reveal that the height increase in this vicinity was probably not required for strength. Because of the emphasis on the appearance of this bridge, it is likely that the increased height was provided for improved aesthetics.

The bridge incorporates other unusual features. The lack of short trestle-type approach spans, common in THD bridges, may also be attributable to a concern for aesthetics, but is more likely a response to the damage caused by drift in the June 1935 flood. By employing longer spans, such damage could be avoided. The bridge's abutments are also unique. They do not support the bridge ends, for which reinforced concrete piers are provided, but rather act as elaborate retaining walls with concrete slabs supporting the approach roadway, solid concrete railing and flared sidewalk. The South Llano River bridge is the only documented THD bridge surviving with such a configuration. It is also the only surviving continuous truss bridge in the state with a parallel top chord incorporating a bowed section. Six other continuous through truss bridges survive in Texas; only four of these were built before World War II.

The Texas Highway Commission opened bids for the project on April 8, 1936. In addition to the construction of the South Llano River bridge, the project included 0.323 mile of approach roadway grading. After reviewing the 10 bids submitted, the commission awarded the contract to the Central Bitulithic Company of Dallas, which submitted the low bid of $266,547. H.J. Vann was subcontracted to erect the steel spans, which the Bethlehem Steel Company of Pottstown, Pennsylvania, fabricated. Construction work on the project began on May 19, 1936. The THD resident engineer in Junction supervised the construction, which engineers from both THD and BPR inspected. The contractor encountered some difficulty in sinking the steel caissons, which deformed during installation. In addition, several of the truss members sustained damage during transportation. These were replaced or repaired by heat treatment, as appropriate. The new bridge was opened to traffic on August 10, 1936, allowing the dismantling of the old bridge, which had been serving traffic during construction. The project was completed the same month at a total cost (including approach roadway) of more than $283,000.

State Highway 27 Bridge at the South Llano River

Report Error

S H 27 Bridge South Llano River

Reference Number:	96001124
Resource Name:	State Highway 27 Bridge at the South Llano River
Other Name:	Loop 481 Br. at the S. Llano R.;KM0142-16-031
Address:	Loop 481, .2 mi. E of 6th St.
Restricted:	
City:	Junction
State:	
County:	Kimble
Ownership:	STATE
Resource Type:	STRUCTURE
Number of Contributing Buildings:	0
Number of Contributing Sites:	0
Number of Contributing Structures:	1
Number of Contributing Objects:	0
Number of Non-contributing Buildings:	0
Number of Non-contributing Sites:	0
Number of Non-contributing Structures:	0
Number of Non-contributing Objects:	0

Federal Agency:	
Park Name:	
Related Multiple Property Listing:	Historic Bridges of Texas MPS
Nominated Name:	STATE GOVERNMENT
Certification:	LISTED IN THE NATIONAL REGISTER
Certification Date:	1996-10-10 00:00:00.000
Significance Level:	STATE
Significant Person:	
Circa:	
Significant Dates:	1937
Cultural Affiliation:	
Architect:	Central Bitulithic Company; Bethlehem Steel, et al
Other Description:	continuous through truss
Applicable Criteria:	ARCHITECTURE/ENGINEERING
Criteria Considerations:	
Areas of Significance:	ENGINEERING
Architectural Style:	OTHER
Current Function:	TRANSPORTATION
Subfunction:	ROAD-RELATED
Historic Function:	TRANSPORTATION
Historic Subfunction:	ROAD-RELATED
Foundation Material:	STEEL
Wall Material:	NONE LISTED
Roof Material:	NONE LISTED
Other Materials:	CONCRETE
Other Certifications:	DATE RECEIVED/PENDING NOMINATION
Other Documentation:	
Period of Significance:	1925-1949
UTM Zone:	
UTM Easting:	
UTM Northing:	
Acreage:	10
Narrative:	

Description:

The State Highway 27 Bridge at the South Llano River is a through truss bridge consisting of two three-span continuous units each 382½ feet long, one three-span continuous unit 473 feet long, and one 96-foot simply supported truss span. U-type abutments at each end of the bridge measure 50 and 32 feet, bringing the bridge's overall length to 1,424 feet (see Figure 2). The bridge provides a crossing over the South Llano River on Loop 481, just east of Junction, a livestock center that also serves as the Kimble County seat. Loop 481 serves as the business loop of Interstate 10 (I-10), former State Highway (SH) 27, which bypasses Junction to the north on its route between San Antonio and Houston. The bridge acts as a gateway to Junction, serving traffic between downtown and the intersection of I-10 about 2½ miles southeast of town (see Figure 1). The bridge also links Shreiner Park, on the eastern bank of the South Llano River, with downtown. Kimble County is on the Edwards Plateau of southwest Texas at the western edge of the Texas Hill Country. The area's economy relies primarily on wool and mohair production, as well as the cedar, tile and pecan industries.

Texas Highway Department (THD) engineers custom-designed the bridge's truss spans. These spans have a Warren truss configuration with parallel top and bottom chords along most of the bridge length, except for the center span of the 473-foot continuous unit, where the top chord bows into a gentle curve (see Photograph 3). Truss railing consists of a single row of 12-inch deep steel channels. The truss spans rest on reinforced concrete dumbbell piers with square battered columns, some on reinforced concrete spread footings, others on steel caisson foundations (see Photograph 2). The bridge's U-type abutments are placed in a unique configuration, immediately adjacent to the exterior piers that support the bridge ends,- and share the same footings. These abutments do not support any portion of the bridge superstructure, but serve only as elaborate retaining walls. The bridge provides a 24-foot roadway and a 4-foot wide pedestrian walkway with decorative steel railing cantilevered from its northwest (upstream) side. At each end of the bridge, on top of custom-designed abutments, the roadway and sidewalk widen, providing what appears to be a an overlook or pedestrian rest area. A unique solid concrete entrance railing with grooved decorative treatment encloses this area (see Photograph 1). A bronze plaque imbedded in the railing at each entrance to the bridge names the contractor and identifies THD and the Bureau of Public Roads (BPR) as the government agencies responsible for the project. The plaque reads:

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general specs

truss type	continuous Warren through
thd std. design	n/a
no. truss spans	10 (3 continuous units)
truss span length	1 - 96'0" simple span; 1 - 473'4" 3-span continuous unit; 2 - 382'6" 3-span continuous units
roadway width	24'
deck width	27'
approach spans	none
overall length	1423'11" (including two abutments)

special features

bridge plaque	yes
approach railing	n/a
other	pedestrian walkway with decorative steel railing; concrete entrance railing with grooved decorative treatment

superstructure

truss depth	33'
truss panels	4 - 24'; 20 - 23'8"; 18 - 21'3"
top chord & end posts	2 channels w/ cover plates & lacing
bottom chord	2 channels w/ lacing
vertical posts	I-beam or 2 channels w/ lacing
diagonal members	2 channels w/ lacing
deck type	concrete

substructure

piers/interior bents	concrete piers
thd std. design	n/a
abutments/end bents	concrete abutments
thd std. design	n/a

Statement of Significance:

The State Highway 27 Bridge at the South Llano River was constructed from 1936 to 1937. This custom-designed continuous truss bridge with its combination of typifying features is significant for embodying the defining characteristics of a THD truss bridge. With its unique abutment configuration, the bridge is also significant for "employing technically complex, advanced or innovative designs and construction methods." As such, the bridge meets National Register Criterion C in the area of Engineering at a state level of significance.

The South Llano River bridge was built on the segment of SH 27 (now I-10) that passes through Junction. SH 27 originally linked El Paso and Fort Stockton, with a later extension to San Antonio through Sonora, Junction, Kerrville and Bandera. By 1932, the route was designated SH 27/US 290. By 1949, the original SH 27 designation had been dropped. Beginning about 1968, this route was upgraded and designated I-10. The segment running

through town was bypassed and became Loop 481.

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The preliminary layout for the replacement bridge called for a 160-foot through truss span across the main channel along with a series of 90-foot pony truss spans for an overall structure length of 1,200 feet. In his February 5, 1935, memorandum to Gilchrist, the resident engineer stationed at Junction explained the rationale behind the emphasis on aesthetics in the design:

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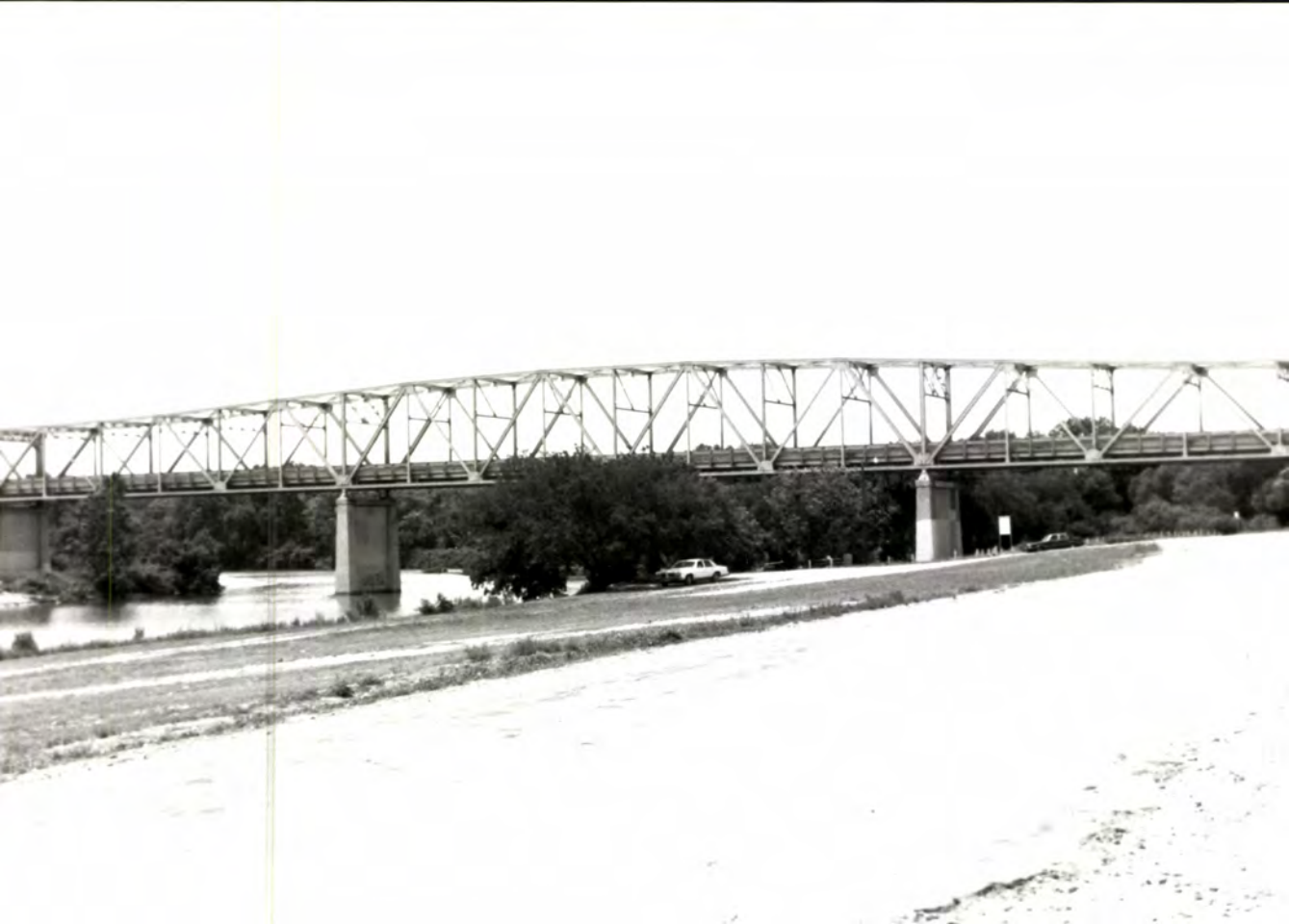
Bibliography:

Condit, Carl. *American Building*. Chicago: University of Chicago Press, 1968.

Hool, George A., and W.S. Kinne, eds. *Movable and Long-span Steel Bridges*. 2d ed. New York: McGraw Hill, 1943.

Texas Highway Department. Plans of Proposed State Highway Improvement. Control-Section-Job No. 0142-01-004, located at TxDOT headquarters in Austin.

Texas Highway Department. Project Correspondence Files. Control-Section-Job No. 0142-01-004, located at TxDOT headquarters in Austin.




16 FT. 0 IN.