Bridge NRHP Eligibility Report

Structure ID:	Disposition:	Year Built:	Year Rcnst:
201240030603015	In Service	1939	1997

District:	Beaumont	***Span Type:***	Simple Span
County:	Jefferson	***Roadway Type:***	Through
Location:	RAINBOW BRIDGE	***Member Type:***	Other Truss, Parallel Chord
Facility Carried:	SH 73 WB	***Main Span Length:***	0680
Feature Crossed:	NECHES RIVER	***Structure Length:***	007741
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 a discussion of recommended options regarding this bridge.
The Port Arthur-Orange Bridge is a monumental cantilever truss bridge crossing the Neches River, which serves as a navigation channel for ports in Beaumont and Port Arthur. The bridge links Port Arthur in Jefferson County with Orange, the Orange County seat. The latter lies adjacent to the Sabine River, which forms the Louisiana state line. As a result, the bridge also serves traffic between Louisiana and points along the Texas Gulf Coast, including Galveston. The region is highly industrialized, with an economy based on the petrochemical industry, shipping and lumber processing.
The Port Arthur-Orange Bridge provides an unprecedented vertical clearance of 177 feet and a horizontal clearance of 600 feet. At 7,752 feet, the bridge is completely symmetrical on each side of the center of the river. It comprises 63 spans, including continuous deck girder and prestressed concrete beam approach spans, deck truss spans, continuous through truss spans and a three-span cantilever truss unit
Steel triangular towers serve as piers capable of transferring wind loads to the foundation. Steel bents with V-shaped bracing supported on concrete pedestals support the deck girder spans; the remaining approach spans rest on concrete bents.
The massive size and clearance requirements for the Port Arthur-Orange Bridge resulted in the innovative design evidenced in the original plans. George Wickline of the Texas Highway Department's Bridge Division produced the preliminary design and oversaw the bridge's construction while on leave from his regular duties as State Bridge Engineer. The Texas Highway Department (THD) contracted the consulting firm of Ash-Howard-Needles & Tammen to finalize construction plans for bidding.
From 1936 through 1938, the Union Bridge and Construction Company and the Taylor-Fitcher Steel Construction Company built the Port Arthur-Orange Bridge under contract to THD. In 1957, the bridge was renamed Rainbow Bridge. In 1991, the Veterans Memorial Bridge was constructed on the east side of the bridge to serve northbound traffic, lightening the burden on the Port Arthur-Orange Bridge. A major upgrade of the structure is underway, to be completed in 1996. The work includes replacing the 24 concrete girder approach spans with eight prestressed concrete beam spans and rebuilding the deck. Despite these modifications, this massive bridge will retain substantial integrity of design, materials and workmanship. With the exception of the construction of the Veterans Memorial Bridge in 1991, the bridge and its surroundings appear relatively unchanged since 1939, maintaining integrity of location, setting, feeling and association.
The Port Arthur-Orange Bridge was constructed from 1936 to 1938 as a U.S. Public Works Administration (PWA) project. Because of its association with a federal work relief program implemented during the Depression, the bridge meets Criterion A in the area of Transportation (subcategory Depression-era Public Works) at a state level of significance. (Refer to Section F, Associated Property Types, for a discussion on subcategories within an area of significance). The bridge reflects technological innovation in both its design and construction and is significant for "employing technically complex, advanced or innovative designs or construction methods." The bridge therefore meets Criterion C in the area of

Engineering at a state level of significance.
The Port Arthur-Orange Bridge was built on State Highway (SH) 87, which runs north to south through East Texas and serves as the easternmost north-south highway in the state. The route begins in Milam in Sabine County and extends south along the Sabine River to Orange, passing through Burkeville and Newton. It heads southwest out of Orange to Port Arthur and around Sabine Lake to the coast. From there it continues southwest along the Gulf Coast to High Island and Galveston, hence its historical name, "Hug-the-Coast Highway." The 60-mile stretch along the coast between Sabine Pass and High Island, serving traffic to McFaddin's Beach, was also commonly called the beach road. The construction of the Port Arthur-Orange Bridge necessitated the relocation of a 10-mile segment of the route in the vicinity of the bridge.
In the late 1920s, the citizens of Port Arthur began efforts to negotiate for a bridge across the Neches between Port Arthur and Orange. Early efforts toward a Neches River crossing resulted in the establishment of the Dryden Ferry in May 1926. This crossing provided a direct route between the two cities; the previous route required crossing the Neches at Beaumont, adding 27 miles to what would be an 18-mile trip. Many workers attracted to job opportunities in Port Arthur's thriving petrochemical industry moved there from Louisiana. Close family ties resulted in high volumes of weekend traffic across the ferry. The 12-car ferry proved inadequate under these conditions; even with two ferries employed, delays were routine. Three bond elections were subsequently held in Jefferson County, all of which failed. The contentious vote came from Beaumont interests protesting the effect a bridge might have on navigation, particularly on access to and from their port.
In August 1931, the Jefferson County Commissioners' Court solicited the involvement of State Bridge Engineer George Wickline in the design of a bridge across the Neches. A tunnel had also been considered, but its estimated cost of $3 to $6 million was considered prohibitive. The commissioners proposed a movable bridge, preferably a bascule, with 300 feet of horizontal clearance and a 40-foot vertical clearance when closed. This would allow 80 to 90 percent of river craft to pass under the bridge without requiring it to open. THD proceeded to solicit cost estimates from consulting engineers for movable bridges. By October, THD's Bridge Division had prepared preliminary plans for a double-leaf bascule structure with a 22-foot roadway and 40-foot vertical clearance when closed. The bridge was estimated to cost $678,000. An annual expenditure of $5,500, to be borne by Jefferson County, would cover maintenance and 24-hour-a-day operation costs. This output was substantially less than the $30,000 Jefferson County paid annually for the operation of the ferry.
Because it was a navigable waterway, bridges could not be built over the lower Neches River without a permit issued by the U.S. War Department. On November 3, 1935, THD submitted the preliminary plans with an application for such a permit. Disputes between citizens of Port Arthur and shipping interests in Beaumont continued. The Port Arthur Chamber of Commerce filed a protest accusing the Magnolia Petroleum Company, a subsidiary of the Standard Oil Company, of packing hearings in order to convince the War Department that a minimum 600-foot horizontal clearance was necessary. The protest document included a number of testimonials regarding the adequacy of movable bridges (lift and bascule) with horizontal clearances ranging from 150 to 180 feet. Such bridges were in use over the Lake Washington Canal in Seattle, the Chesapeake and Delaware Canal, and the Corritos Channel connecting the Long Beach and Los Angeles harbors. Despite the overwhelming evidence that smaller clearances than what navigation interests called for were adequate, the War Department disapproved the application on March 7, 1932, stating that approval would be granted for a bridge with a 500-foot horizontal clearance and a 140-foot vertical clearance. A horizontal clearance of 400 feet would be acceptable if the bridge site were moved away from the bend in the river where the Dryden Ferry was stationed.
THD engineers proceeded to establish a new site for the bridge at a straight section of the river. The savings gained by building a bridge with a smaller horizontal clearance would offset the loss incurred by not using the existing trestle approaches at the Dryden Ferry site. The site chosen was about ¾-mile upstream from the ferry. Wickline drew up a new set of preliminary plans resembling the final design for

the Port Arthur-Orange Bridge. The design called for a bridge 5,338 feet in length providing a 434-foot horizontal clearance and a 140-foot vertical clearance. A constant five percent grade change was designed into the approach spans to facilitate the extreme bridge height. Despite vigorous protest from shipping interests at the October hearings, the War Department approved the application in December 1933.
Without a source of funding, THD engineers believed the project would die. But in April 1934, the Texas Highway Commission ordered THD to apply to PWA for funds in the form of a grant or loan. A loan would be paid back from toll money collected after the bridge was put into service. On June 8, THD filed the application with PWA. In the meantime, THD engineers considered other bridge types, including a suspension bridge. Believing that the traffic volume did not justify the cost of such a high bridge, they also considered negotiating with the War Department for a low-type movable bridge.
Finally, navigation interests were assuaged with a compromise written into House Bill 9, which Governor Miriam Ferguson approved on November 30, 1934. The bill called for a free bridge over the Neches with a 600-foot clear span between fenders and a 176-foot vertical clearance for a horizontal distance of 400 feet. Vertical clearance at the piers could be as low as 140 feet. The estimated cost of such a bridge came to $2,250,000. The bill also set up a special construction account in which to deposit Jefferson County's contribution (proposed at $750,000) and THD's apportionment of about $645,000. THD was responsible for designing the bridge and supervising its construction or overseeing any such work contracted out. A final stipulation was the use of relief labor for the bridge construction.
In January 1935, Jefferson County voters approved a $750,000 bond for bridge construction. Wickline continued improving his preliminary design, consulting several engineering firms for advice on material costs. On April 22, 1935, Wickline visited the recently completed Huey P. Long Bridge over the Mississippi River in New Orleans. The bridge was designed by the preeminent engineering firm Modjeski, Masters and Case with whom Wickline continued to correspond after returning to Texas. In his May 25, 1935, letter about the proposed Neches River bridge, F.M. Masters stated:
It would certainly be a shame to have to provide a clearance of 176'0" for this structure as our brief study would indicate that it will be one of the important highways and to have to lift all of the tonnage which will be transported over this highway this excessive height to cross the narrow channel would be an unfair imposition upon highway traffic and would certainly not be advantageous to the communities being served by the structure. . . . I wonder what it is that requires the construction of a high level bridge at this particular point. I understand that the United States Navy some times (sic) sends boats up this channel for oil but certainly the amount of traffic in the channel cannot be so dense as to impose upon the highway traffic the hardship of using a high level bridge. There may be other considerations regarding which I am not informed that have an influence on this matter.
In his June 3, 1935, correspondence to Wickline, Masters continued, "it is hard to make the navigation interests realize the importance of highway traffic and the fact that free and unobstructed use of the highway contributes greatly to the business of any port, especially with the constantly increasing trucking business."
The project proceeded smoothly during the fall of 1935, with the approval by the Secretary of Interior and President Franklin D. Roosevelt of $1,142,000 in PWA funds to cover 45 percent of the construction cost. In addition, the Texas Highway Commission appointed Wickline as Engineer-in-Charge of the Neches River bridge project. This was facilitated by granting Wickline an extended leave-of-absence from his regular duties as State Bridge Engineer; from October 1, 1935 to October 31, 1938, Herbert Eldridge took over as Acting Bridge Engineer. On September 23, PWA informed Wickline, "the President has stated that all contracts for projects to be constructed under the New Works Program must be awarded by December 15. Therefore it is imperative that you submit plans and specifications immediately." On Wickline's recommendation, the Texas Highway Commission contracted with the consulting firm of Ash-Howard-Needles & Tammen to develop detailed plans for the bridge. Wickline described the situation in the August 21, 1938, issue of the Port Arthur News ("Engineer Tells How Problems Were Met in Erecting Bridge"):

The structure was estimated to cost $2,500,000 and was of such a nature that it was evident that it would require an unusual type of design. In order to properly advertise for bids for building the structure within such a short space of time it meant that the plans and specifications would have to be prepared in the short space of about five weeks. . . . Also at that time each state highway department, as well as other governmental agencies, was exceedingly busy in getting plans and specifications under way for a large group of federal highway bridges and railroad grade crossing elimination structures. . . . This meant that practically all of the available engineers with designing ability were already employed. [Therefore] the writer . . . recommended the employment of a firm of consulting engineers with an organization sufficient to make a general design and prepare the plans for bidding purposes of a major portion of the project. . . . The firm of Ash-Howard-Needles & Tammen, consulting bridge engineers of Kansas City and New York were employed and began work on the plans and specifications on October 17, 1935.

By December 6, plans submitted to the PWA's office in Fort Worth had been approved.

The plans as finalized comprised 77 spans, including concrete girder and steel girder approach spans, 16 deck truss spans, two continuous through truss spans and a three-span cantilever truss unit. The design provided a 22-foot roadway with two 18-inch curbs serving as refuge walks for stranded pedestrians. Triangular steel tower piers were designed to withstand 75 pounds per square foot of wind load, roughly the pressure that a 140-mile per hour wind would produce. These wind loads influenced the design of the substructure and foundations, since the load would be transferred down from the superstructure. As Wickline explained in the same article:

A special attempt was made to design large reinforced concrete piers with bases of sufficient size to resist the overturning effect during wind storm. It was found that the base would have to be so large that the cost of same would be prohibitive. In order to keep the cost within reasonable limits it was found necessary to resort to the use of low independent pier units to be constructed at the caissons upon which rested heavy triangular shaped steel towers of special design terminating in a point at the top of piers. . . . The towers are battered outward in order to provide the necessary overturning resistance to resist, to a considerable extent, the force of wind storms.

In addition to the potential for hurricane winds, the region offered a marshy topography with muck extending down 30 to 45 feet. As a result, the bridge design called for two types of foundations. Piers supporting the bridge's seven central spans rest on reinforced concrete caissons 18 to 32 feet in diameter sunk 90 to 105 feet below mean Gulf level. Bents are supported on untreated timber piling driven on a batter of about 5 inches per foot to resist wind pressure during hurricanes. The specifications called for the use of copper bearing steel, more resistant to corrosion, to combat the atmospheric conditions resulting from the seaside location and the proximity to petrochemical plants.

The Port Arthur-Orange Bridge was constructed under two contracts. Bids for the substructure were opened on December 11, 1935. After reviewing the six bids submitted, the Texas Highway Commission awarded the contract to the Union Bridge & Construction Company of Kansas City, Missouri, which submitted the low bid of $828,740. Work on the bridge began on March 3, 1936. Wickline oversaw construction of the bridge and filed monthly reports with THD's Bridge Division. Engineers from the Bureau of Public Roads also performed periodic inspections. Percy Pennybacker, who would later become one of THD's most important bridge engineers, assisted Wickline as construction engineer for the project.

In April, the Jefferson County Commissioners' Court and the Port Arthur Building & Trades Council pressured the contractor to use only union labor, and on April 24, 1936, a contract to this effect was signed. Wickline advised against the contract for two reasons: the project was meant to provide relief labor and such a contract would prevent some workers from realizing this opportunity for work. In addition, future bidding for the superstructure would produce few bidders if the use of union labor was a precedent. Gibb Gilchrist, State Highway Engineer, declared that federal provisions covered labor for PWA projects and that any such contract would therefore be null and void. At a July 2, 1936, meeting of the Building & Trades Council, union members voted to drop the issue, conceding that the contractor was

in fact hiring many union workers.
In the meantime, the Union Bridge & Construction Company had requested permission to dig a canal along the west side of the bridge to facilitate pile driving and the construction of the pedestal piers. On the advice of the consulting engineers, Wickline granted permission with the provision that the canal be backfilled upon completion of the piers and before erection of the steel superstructure. As construction of the superstructure proceeded, increasing loads would be transferred to the substructure and the supporting foundation materials. Without backfilling, the canals could compromise the stability of these subsurface materials. The contractor agreed to the terms and proceeded with the construction of a canal alongside the bridge measuring 60-feet wide by 5-feet deep. Side cuts were dredged for access to each individual pier. Once piles were driven for that pier, these cuts were closed off from the main channel so pier construction could be undertaken on dry land. The Austin Bridge Company of Dallas, subcontractor on the approach spans, rigged a floating plant to facilitate pile driving. The September 9, 1937, issue of Engineering News-Record gives a detailed description of the apparatus:
Because so many of the piles were driven on a batter in all directions, the approach subcontractor developed a clever pile driving rig that is quickly adjustable to any driving angle or position. The power plant consists of a large steam whirler crane mounted on a 40x56 ft. barge. Outrigger pontoons were added at the sides to give the barge greater stability. Projecting over one end of the barge are two steel A-frames that support an 18-in. horizontal pipe beam. . . . A pair of steel leads, 85 ft. long, is supported about mid-point on the back by a spool roller riding on the pipe cross-bar. Near the top of the leads on their back side are welded in vertical position two 10-in. pipes 10 ft. long, open at the top. Telescoping inside these two pipes is an inverted U-shaped frame of two 9-in. pipes and a welded cross-bar at the top. The tip of the crane boom is fastened to the cross-bar of the U-assembly. . . . By swinging the crane and booming up or down the leads can be tilted to any driving angle.
Sand islands were created to facilitate sinking caissons under the main spans. The July 5, 1940, issue of Engineering reported that this method was used in the construction of the Huey P. Long Bridge in New Orleans. The islands were built up by driving a cylinder of steel sheeting at each caisson site. The cylinder diameter was to exceed that of the caisson by at least 10 feet. With the aid of clamshell buckets, workers excavated the soft material to a level of 30 to 45 feet below mean Gulf level. The cylinder was then filled with sand. The caisson's lower section containing a cutting edge along the bottom edge was placed on the sand layer. Sand was removed within the caisson interior to facilitate its sinking. Concrete was poured and additional caisson sections were added in nine-foot increments.
This open dredging process was followed by the construction of a cap with air locks on top of the caisson. Caisson workers, known as sandhogs, were called in to work under the pneumatic caisson method, whereby compressed air would facilitate sinking the caissons the last few feet. This method often gave rise to the bends or caisson disease, painful nitrogen poisoning that resulted when a worker returned from the high pressure atmosphere at too great a speed. The August 21, 1938, issue of the Port Arthur News reported:
Port Arthur began to hear about sandhogs in earnest when they, released from work, began collapsing on downtown streets from attacks of caisson disease or the more familiar bends. Newspaper clippings show that several such cases were hospitalized. . . . The caisson workers were equipped with identification buttons which carried information vital to the wearer. "If found ill, do not send to hospital, but send immediately to the medical air lock at the Neches River bridge site," the buttons read, and carried the name of the contractor.
In early 1937, the 150 caisson workers, most from St. Louis and Chicago, formed a strike to demand a 10 percent wage increase. The proposed wage was still lower than the going rate for similar work in New York City. One worker is quoted in the same issue of Port Arthur News: "Men doing this kind of work don't know when they come to the surface whether they will take their boots off or whether someone else will have to take them off." The men returned to work after the contractor granted the pay increase. The Port Arthur News reported that six men had died working on the bridge, but did not specify the causes.

On May 15, 1937, the Union Bridge & Construction Company completed the substructure.
THD had held bidding for the superstructure nearly a year earlier, on June 10, 1936. Only two bids were received. The Taylor-Fitcher Steel Construction Company of New York City submitted the lower bid of $1,613,500. The Texas Highway Commission granted the company the contract on August 10, 1936, although, due to delays in the substructure construction, they could not begin work until the beginning of the next year. The contractor subcontracted the Fort Pitt Bridge Works of Cannonsburg, Pennsylvania, to fabricate the main truss spans; Jones and Laughlin of Pittsburgh fabricated the shorter spans and steel bents at its New Orleans plant.
Since the superstructure and substructure bids plus 10 percent for engineering and contingencies totalled more than the funds allotted for the project, THD was compelled to apply for a supplemental grant from PWA. The application was made on August 11, 1936; by May 1937, THD learned the application was not approved. As a result, THD's contribution rose from $645,000 to $843,000. PWA's total contribution came to $1,141,742, or 45 percent of the eligible costs of construction. The total project cost came to $2,686,464.
In January 1938, workers joined the two halves of the center cantilever span. The bridge was put into service on September 8, 1938, with just painting remaining to be completed (see Photographs 3 and 4). The dedication was held on the second day of a two-day celebration of the bridge's opening. The first day's events featured a dinner, horse show and music. An estimated 20,000 people attended the actual dedication, which included a boat regatta. Texas Governor James V. Allred spoke at the dedication; Mayor Lea of Orange served as master of ceremonies. At the time of completion, the Port Arthur Chamber of Commerce claimed the bridge to be the tallest in the south. The Port Arthur-Orange Bridge received that official name on March 2, 1938, by order of the Jefferson County Commissioners' Court. In 1957, however, the North Port Arthur Lion's Club held a contest to rename the structure. The winning name of Rainbow Bridge was first submitted by six-year-old Christy Jean McClintock of Port Arthur.
In response to increasing traffic volumes on the Rainbow Bridge, the Texas Department of Transportation, formerly THD, constructed the Veterans Memorial Bridge on the east side of the Rainbow Bridge. The bridge was put into service in 1990, though construction was not completed until early 1991. It was built to serve three lanes of northbound traffic, leaving the Rainbow Bridge to serve two lanes of southbound traffic.
In 1992, a major upgrade of the structure was implemented, with a projected completion date of 1996. The work includes the replacement of 24 concrete girder approach spans with eight prestressed concrete beam spans. The existing truss railing will be replaced and a few truss members will be strengthened. The deck will be replaced and reconfigured throughout, providing a wider roadway without necessitating widening the structure. The 18-inch refuge walks, however, will be lost as a result of the upgrade.
Bibliography:
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"Bridge Construction Was Held Up by Few Serious Labor Rows." Port Arthur News, 21 August 1938, 3.
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Condit, Carl. American Building. Chicago: University of Chicago Press, 1968.
"Engineer Tells How Problems Were Met in Erecting Bridge." Port Arthur News, 21 August 1938, 6.
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Texas Highway Department. Plans of Proposed State Highway Improvement. Control-Section-Job No.

0306-03-091, located at TxDOT headquarters in Austin.
Texas Highway Department. Project Correspondence Files. Control-Section-Job No. 0306-03-004 and -005, located at TxDOT headquarters in Austin.
"Texas' Largest Bridge." Texas Parade, December 1937, 5.
"Unusual Foundation Plant for Long Bridge." Engineering News-Record, 9 September 1937, 421-424.
"Wooden Ferry Acts as Prod in Movement: Inadequate for Port Arthur and Orange Traffic from Start." Port Arthur News, 21 August 1938, 10

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

1. NAME OF PROPERTY

HISTORIC NAME: Port Arthur-Orange Bridge
OTHER NAMES/SITE NUMBER: Rainbow Bridge; SH 87 Bridge at the Neches River (southbound lanes); JF0306-03-015

2. LOCATION

STREET & NUMBER: SH 87 at the Jefferson and Orange county line **NOT FOR PUBLICATION:** N/A
CITY OR TOWN: Groves **VICINITY:** X
STATE: Texas **CODE:** TX **COUNTY:** Jefferson **CODE:** 245 **ZIP CODE:** 77619

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.)

Signature of certifying official — 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

Director of Environmental Affairs, Texas Department of Transportation

State or Federal agency and bureau

4. NATIONAL PARK SERVICE CERTIFICATION

I hereby certify that this property is:	Signature of the Keeper	Date of Action
___ 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

OWNERSHIP OF PROPERTY: public-State

CATEGORY OF PROPERTY: structure

NUMBER OF RESOURCES WITHIN PROPERTY:	CONTRIBUTING	NONCONTRIBUTING
	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

6. FUNCTION OR USE

HISTORIC FUNCTIONS: TRANSPORTATION/road-related (vehicular)

CURRENT FUNCTIONS: TRANSPORTATION/road-related (vehicular)

7. DESCRIPTION

ARCHITECTURAL CLASSIFICATION: Other: cantilever through truss bridge

MATERIALS:

FOUNDATION	substructure: steel tower piers, steel bents on concrete pedestals, concrete bents
WALLS	N/A
ROOF	N/A
OTHER	superstructure: steel truss

NARRATIVE DESCRIPTION (see continuation sheets 7-1 through 7-4)

8. STATEMENT OF SIGNIFICANCE

APPLICABLE NATIONAL REGISTER CRITERIA

_x_ **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.

_x_ **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: Transportation (Depression-era Public Works); Engineering

PERIOD OF SIGNIFICANCE: 1936-1938

SIGNIFICANT DATES: 1936-1938

SIGNIFICANT PERSON: N/A

CULTURAL AFFILIATION: N/A

ARCHITECT/BUILDER:

Bridge Designer: Texas Highway Department;
Ash-Howard-Needles & Tammen of NYC and Kansas City, MO (consulting engineers)

Truss Fabricator: Fort Pitt Bridge Works of Cannonsburgh, PA;
Jones & Laughlin Steel Corp. of Pittsburgh, PA

Bridge Builder: Union Bridge & Construction Co. of Kansas City, MO (substructure);
Taylor-Fitcher Steel Construction Co. of NYC (superstructure);

NARRATIVE STATEMENT OF SIGNIFICANCE (see continuation sheets 8-5 through 8-11)

9. MAJOR BIBLIOGRAPHIC REFERENCES

BIBLIOGRAPHY (see continuation sheet 9-12)

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:

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

10. GEOGRAPHICAL DATA

ACREAGE OF PROPERTY: 4.8 acres

UTM REFERENCES	Zone	Easting	Northing		Zone	Easting	Northing
1	15	416140	3317890	3	_	_____	_____
2	15	415730	3315570	4	_	_____	_____

(___see continuation sheet)

VERBAL BOUNDARY DESCRIPTION (see continuation sheet 10-13)

BOUNDARY JUSTIFICATION (see continuation sheet 10-13)

11. FORM PREPARED BY

NAME/TITLE: text by Regina A. Lauderdale
graphics by Pat St.George

ORGANIZATION: Texas Historical Commission/
Texas Department of Transportation **DATE:** April 1995

STREET & NUMBER: Texas Historical Commission **TELEPHONE:** 512/463-6094
P.O. Box 12276

CITY OR TOWN: Austin **STATE:** TX **ZIP CODE:** 78711

ADDITIONAL DOCUMENTATION

CONTINUATION SHEETS

MAPS

PHOTOGRAPHS

ADDITIONAL ITEMS

PROPERTY OWNER

NAME Texas Department of Transportation

STREET & NUMBER 125 East 11th Street **TELEPHONE** 512/416-2606

CITY OR TOWN Austin **STATE** TX **ZIP CODE** 78701

Description:

The Port Arthur-Orange Bridge is a monumental cantilever truss bridge crossing the Neches River, which serves as a navigation channel for ports in Beaumont and Port Arthur. The bridge links Port Arthur in Jefferson County with Orange, the Orange County seat. The latter lies adjacent to the Sabine River, which forms the Louisiana state line (see Figure 1). As such, the bridge also serves traffic between Louisiana and points along the Texas Gulf Coast, including Galveston. The region is highly industrialized, with an economy based on the petrochemical industry, shipping and lumber processing.

The Port Arthur-Orange Bridge provides unprecedented vertical clearance of 177 feet and a horizontal clearance of 600 feet. At 7,752 feet, the bridge is completely symmetrical on each side of the center of the river. It comprises 63 spans, including continuous deck girder and prestressed concrete beam approach spans, deck truss spans, continuous through truss spans and a three-span cantilever truss unit (see Figure 2). Steel triangular towers serve as piers capable of transferring wind loads to the foundation. Steel bents with V-shaped bracing supported on concrete pedestals support the deck girder spans; the remaining approach spans rest on concrete bents (see Photographs 1 and 5).

The massive size and clearance requirements for the Port Arthur-Orange Bridge resulted in the innovative design evidenced in the original plans (see Figure 2). George Wickline of the Texas Highway Department's Bridge Division produced the preliminary design and oversaw the bridge's construction while on leave from his regular duties as State Bridge Engineer. The Texas Highway Department (THD) contracted the consulting firm of Ash-Howard-Needles & Tammen to finalize construction plans for bidding.

From 1936 through 1938, the Union Bridge and Construction Company and the Taylor-Fitcher Steel Construction Company built the Port Arthur-Orange Bridge under contract to THD. In 1957, the bridge was renamed Rainbow Bridge. In 1991, the Veterans Memorial Bridge was constructed on the east side of the bridge to serve northbound traffic, lightening the burden on the Port Arthur-Orange Bridge (see Photograph 2). A major upgrade of the structure is underway, to be completed in 1996. The work includes replacing the 24 concrete girder approach spans with eight prestressed concrete beam spans and rebuilding the deck. Despite these modifications, this massive bridge will retain substantial integrity of design, materials and workmanship. With the exception of the construction of the Veterans Memorial Bridge in 1991, the bridge and its surroundings appear relatively unchanged since 1939, maintaining integrity of location, setting, feeling and association.

GENERAL SPECS

OVERALL LENGTH:	7752'
LENGTH STEEL PORTION:	6990'
LONGEST SPAN:	680'
TOTAL NO. SPANS:	77
MAX VERT CLEARANCE:	177'
MAX HORIZ CLEARANCE:	600'

ORIGINAL CONSTRUCTION SPECS

REINFORCING STEEL:	2,820,000 lb.
STRUCTURAL STEEL:	19,565,000 lb.
CONCRETE:	38,820 cubic yards
TIMBER PILING:	102,800 lin. ft.

SPECIAL FEATURES

BUILDER/DATE PLATE:	none
APPROACH RAILING:	n/a
OTHER:	monumental bridge

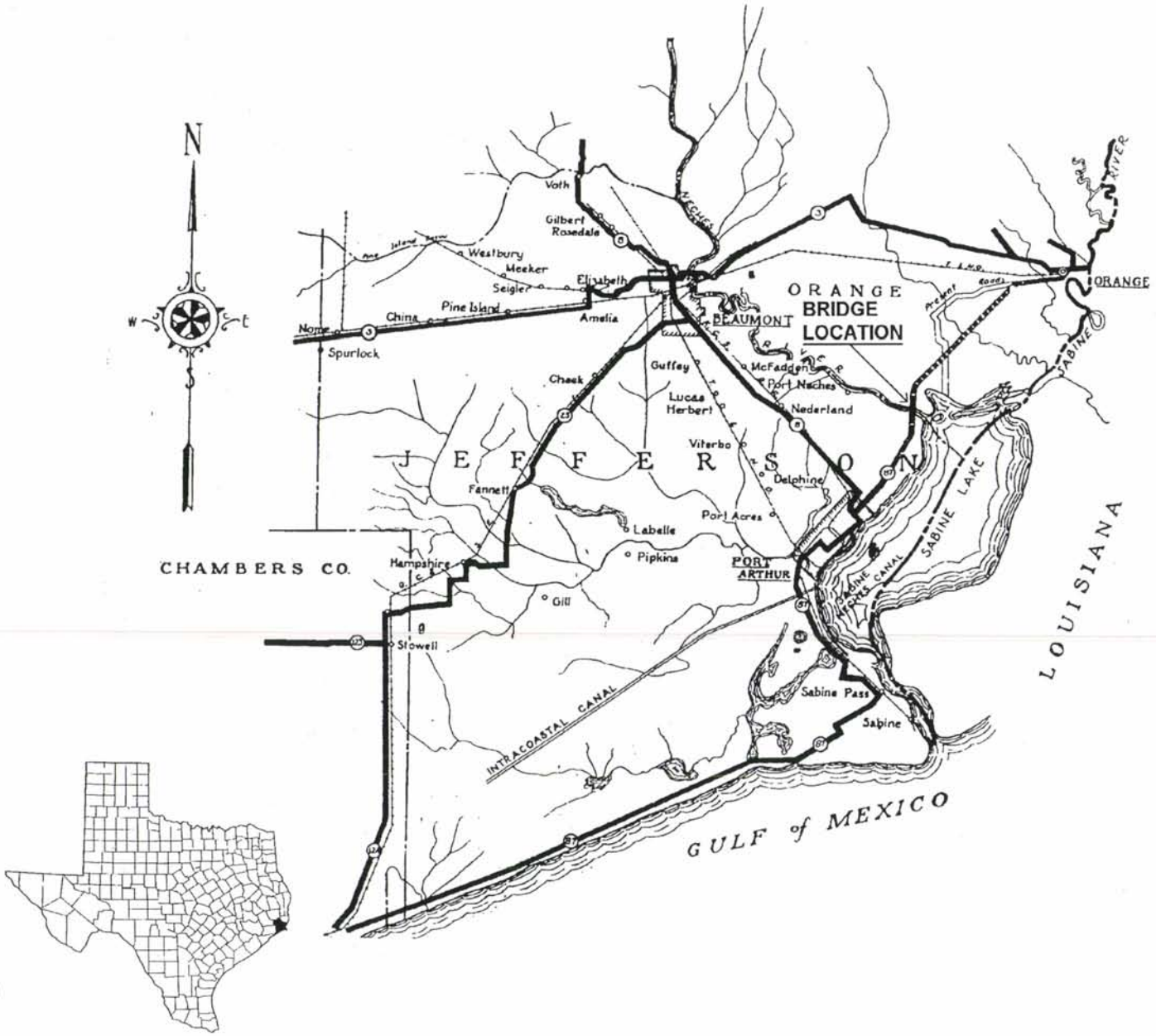
SUPERSTRUCTURE

TRUSS TYPE:	cantilever truss bridge
THD STD. DESIGN:	n/a
NO. TRUSS SPANS:	23
TRUSS SPAN LENGTH:	3-span cantilever unit 1428' (center span 680') 2 - two-span 600' cont. truss units 16 deck truss spans
ROADWAY WIDTH:	28' (originally 22'6")
DECK WIDTH:	30' (originally 27')
APPROACH SPANS:	10 - 92' prestressed concrete beam (originally 24 - 31'9" concrete girder spans) 2 - 15-span 901' continuous deck girder units each w/ 3 suspended spans
DECK TYPE:	concrete

SUBSTRUCTURE

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

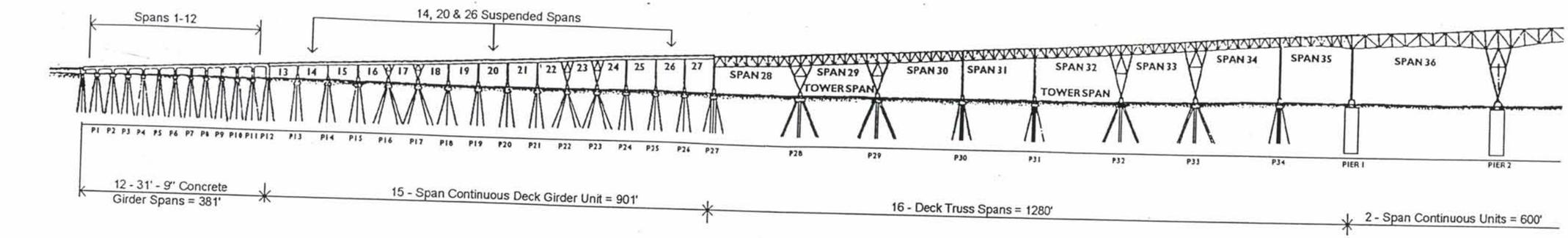
Figure 1. Map of Jefferson and Orange counties with the location of the Port Arthur-Orange Bridge as shown in the 1938 plans.

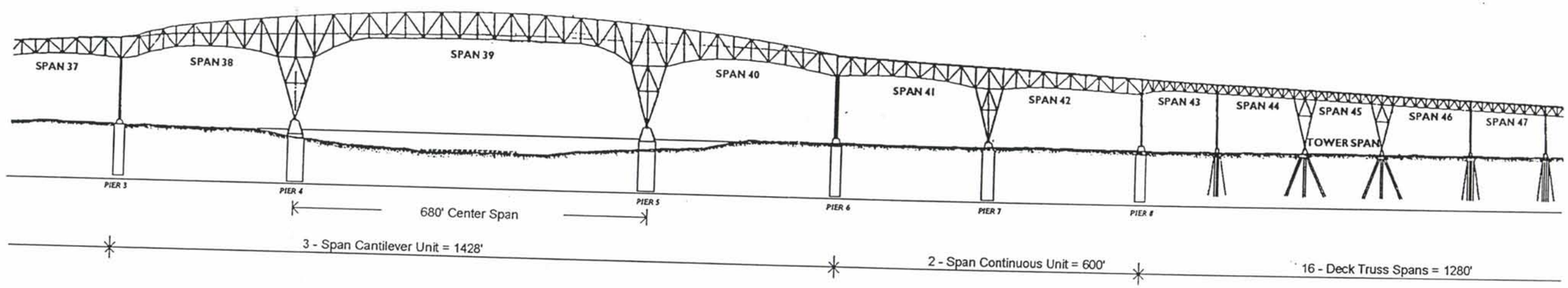


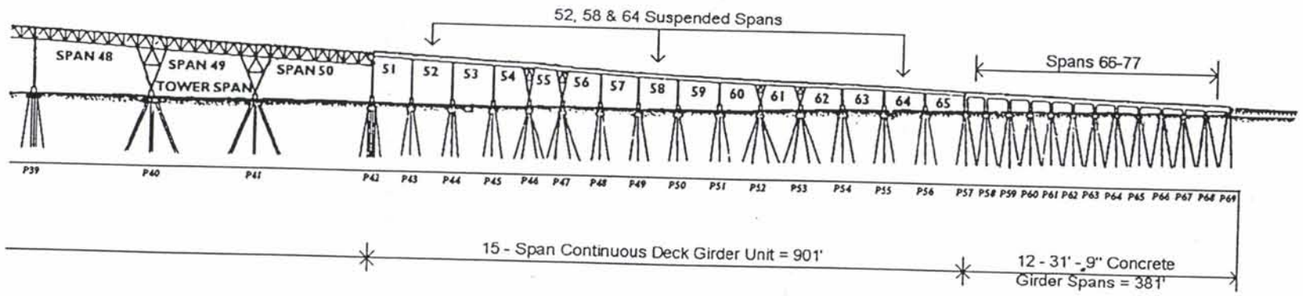
Source: Texas Highway Department, CSJ 0306-03-004 & -005, 1938.

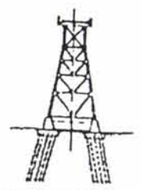
Figure 2. Elevation of the Port Arthur-Orange Bridge as shown in the 1938 plans.

Source: Texas Highway Department, CSJ 0306-03-004 & -005, 1938.

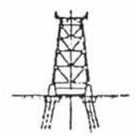




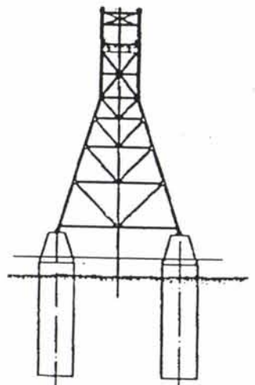




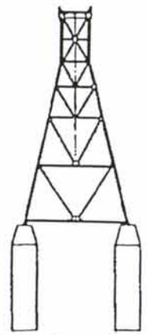
TOWER SUPPORTING DECK TRUSS SPANS



TOWER SUPPORTING DECK GIRDER SPANS



TOWERS SUPPORTING CANTILEVER UNIT



TOWER SUPPORTING CONTINUOUS UNIT

Statement of Significance:

The Port Arthur-Orange Bridge was constructed from 1936 to 1938 as a U.S. Public Works Administration (PWA) project. Because of its association with a federal work relief program implemented during the Depression, the bridge meets Criterion A in the area of Transportation (subcategory Depression-era Public Works) at a state level of significance. (Refer to Section F, Associated Property Types, for a discussion on subcategories within an area of significance). The bridge reflects technological innovation in both its design and construction and is significant for "employing technically complex, advanced or innovative designs or construction methods." The bridge therefore meets Criterion C in the area of Engineering at a state level of significance.

The Port Arthur-Orange Bridge was built on State Highway (SH) 87, which runs north to south through East Texas and serves as the easternmost north-south highway in the state. The route begins in Milam in Sabine County and extends south along the Sabine River to Orange, passing through Burkeville and Newton. It heads southwest out of Orange to Port Arthur and around Sabine Lake to the coast. From there it continues southwest along the Gulf Coast to High Island and Galveston, hence its historical name, "Hug-the-Coast Highway." The 60-mile stretch along the coast between Sabine Pass and High Island, serving traffic to McFaddin's Beach, was also commonly called the beach road. The construction of the Port Arthur-Orange Bridge necessitated the relocation of a 10-mile segment of the route in the vicinity of the bridge.

In the late 1920s, the citizens of Port Arthur began efforts to negotiate for a bridge across the Neches between Port Arthur and Orange. Early efforts toward a Neches River crossing resulted in the establishment of the Dryden Ferry in May 1926. This crossing provided a direct route between the two cities; the previous route required crossing the Neches at Beaumont, adding 27 miles to what would be an 18-mile trip. Many workers attracted to job opportunities in Port Arthur's thriving petrochemical industry moved there from Louisiana. Close family ties resulted in high volumes of weekend travelers across the ferry. The 12-car ferry proved inadequate for the volume of weekend traffic; even with two ferries employed, delays were routine. Three bond elections were subsequently held in Jefferson County, all of which failed. The contentious vote came from Beaumont interests protesting against the effect a bridge might have on navigation, particularly on access to and from their port.

In August 1931, the Jefferson County Commissioners' Court solicited the involvement of State Bridge Engineer George Wickline in the design of a bridge across the Neches. A tunnel had also been considered, but its estimated cost of $3 to $6 million was considered prohibitive. The commissioners proposed a movable bridge, preferably a bascule, with 300 feet of horizontal clearance and a 40-foot vertical clearance when closed. This would allow 80 to 90 percent of river craft to pass under the bridge without requiring it to open. THD proceeded to solicit cost estimates from consulting engineers for movable bridges. By October, THD's Bridge Division had prepared preliminary plans for a double-leaf bascule structure with a 22-foot roadway and 40-foot vertical clearance when closed. The bridge was estimated to cost $678,000. An annual expenditure of $5,500, to be borne by Jefferson County, would cover maintenance and 24-hour-a-day operation costs. This annual output was substantially less than the

$30,000 Jefferson County paid monthly for the operation of the ferry.

Because it was a navigable waterway, bridges could not be built over the lower Neches River without a permit issued by the U.S. War Department. On November 3, 1935, THD submitted the preliminary plans with an application for such a permit. Disputes between citizens of Port Arthur and shipping interests in Beaumont continued. The Port Arthur Chamber of Commerce filed a protest accusing the Magnolia Petroleum Company, a subsidiary of the Standard Oil Company, of packing hearings in order to convince the War Department that a minimum 600-foot horizontal clearance was necessary. The protest document included a number of testimonials regarding the adequacy of movable bridges (lift and bascule) with horizontal clearances ranging from 150 to 180 feet. These bridges were in use over the Lake Washington Canal in Seattle, the Chesapeake and Delaware Canal, and the Corritos Channel connecting the Long Beach and Los Angeles harbors. Despite the overwhelming evidence that smaller clearances than what the navigation interests called for were adequate, the War Department disapproved the application on March 7, 1932, stating that approval would be granted for a bridge with a 500-foot horizontal clearance and a 140-foot vertical clearance. A horizontal clearance of 400 feet would be acceptable if the bridge site were moved away from the bend in the river where the Dryden Ferry was stationed.

THD engineers proceeded to establish a new site for the bridge at a straight section of the river. The savings gained by building a bridge with a smaller horizontal clearance would offset the loss incurred by not using the existing trestle approaches at the Dryden Ferry site. The new site was about ¾-mile upstream from the ferry. Wickline drew up a new set of preliminary plans resembling the final design for the Port Arthur-Orange Bridge. The design called for a bridge 5,338 feet in length providing a 434-foot horizontal clearance and a 140-foot vertical clearance. A constant five percent grade change was designed into the approach spans to facilitate the extreme bridge height. Despite vigorous protest from shipping interests at the October hearings, the War Department approved the application in December 1933.

Without a source of funding, THD engineers believed the project would die. But in April 1934, the Texas Highway Commission ordered THD to apply to PWA for funds in the form of a grant or loan. A loan would be paid back from toll money collected after the bridge was put into service. On June 8, THD filed the application with PWA. In the meantime, THD engineers considered other bridge types, including a suspension bridge. Believing that the traffic volume did not justify the cost of a high bridge, they also considered negotiating with the War Department for a low-type movable bridge.

Finally, navigation interests were assuaged with a compromise written into House Bill 9, which Governor Miriam Ferguson approved on November 30, 1934. The bill called for a free bridge over the Neches with a 600-foot clear span between fenders and a 176-foot vertical clearance for a horizontal distance of 400 feet. Vertical clearance at the piers could be as low as 140 feet. The estimated cost of such a bridge came to $2,250,000. The bill also set up a special construction account in which to deposit Jefferson County's $750,000 contribution and THD's apportionment of about $645,000. THD was responsible for designing the bridge and supervising its construction or overseeing any such work contracted out. A final stipulation was the use of relief labor for the bridge construction.

In January 1935, Jefferson County voters approved a $750,000 bond for bridge construction. Wickline continued improving his preliminary design, consulting several engineering firms for advice on material costs. On April 22, 1935, Wickline visited the recently completed Huey P. Long Bridge over the Mississippi River at New Orleans. The bridge was designed by the preeminent engineering firm Modjeski, Masters and Case with whom Wickline continued to correspond after returning to Texas. In his May 25, 1935, letter about the proposed Neches River Bridge, F.M. Masters stated:

> It would certainly be a shame to have to provide a clearance of 176'0" for this structure as our brief study would indicate that it will be one of the important highways and to have to lift all of the tonnage which will be transported over this highway this excessive height to cross the narrow channel would be an unfair imposition upon highway traffic and would certainly not be advantageous to the communities being served by the structure. . . . I wonder what it is that requires the construction of a high level bridge at this particular point. I understand that the United States Navy some times (sic) sends boats up this channel for oil but certainly the amount of traffic in the channel cannot be so dense as to impose upon the highway traffic the hardship of using a high level bridge. There may be other considerations regarding which I am not informed that have an influence on this matter.

In his June 3, 1935, correspondence to Wickline, Masters continued, "it is hard to make the navigation interests realize the importance of highway traffic and the fact that free and unobstructed use of the highway contributes greatly to the business of any port, especially with the constantly increasing trucking business."

The project proceeded smoothly during the fall of 1935, with the approval by the Secretary of Interior and President Franklin D. Roosevelt of $1,142,000 in PWA funds to cover 45 percent of the construction cost. In addition, the Texas Highway Commission appointed Wickline as Engineer-in-Charge of the Neches River Bridge project. This was facilitated by granting Wickline an extended leave-of-absence from his regular duties as State Bridge Engineer; from October 1, 1935 to October 31, 1938, Herbert Eldridge took over as Acting Bridge Engineer. On September 23, PWA informed Wickline, "the President has stated that all contracts for projects to be constructed under the New Works Program must be awarded by December 15. Therefore it is imperative that you submit plans and specifications immediately." On Wickline's recommendation, the Texas Highway Commission contracted with the consulting firm of Ash-Howard-Needles & Tammen to develop detailed plans for the bridge. Wickline described the situation in the August 21, 1938, issue of the *Port Arthur News* ("Engineer Tells How Problems Were Met in Erecting Bridge"):

> The structure was estimated to cost $2,500,000 and was of such a nature that it was evident that it would require an unusual type of design. In order to properly advertise for bids for building the structure within such a short space of time it meant that the plans and specifications would have to be prepared in the short space of about five weeks. . . . Also at that time each state highway department, as well as other governmental agencies, was exceedingly busy in getting plans and specifications under way for a large group of federal

> highway bridges and railroad grade crossing elimination structures. . . . This meant that practically all of the available engineers with designing ability were already employed. [Therefore] the writer . . . recommended the employment of a firm of consulting engineers with an organization sufficient to make a general design and prepare the plans for bidding purposes of a major portion of the project. . . . The firm of Ash-Howard-Needles & Tammen, consulting bridge engineers of Kansas City and New York were employed and began work on the plans and specifications on October 17, 1935.

By December 6, plans submitted to the PWA's office in Fort Worth had been approved.

The plans as finalized comprised 77 spans, including concrete girder and steel girder approach spans, 16 deck truss spans, two continuous through truss spans and a three-span cantilever truss unit. The design provided a 22-foot roadway with two 18-inch curbs serving as refuge walks for stranded pedestrians. Triangular steel tower piers were designed to withstand 75 pounds per square foot of wind load, roughly the pressure that a 140-mile per hour wind would produce. These wind loads influenced the design of the substructure and foundations, since the load would be transferred down from the superstructure. As Wickline explained in the same article:

> A special attempt was made to design large reinforced concrete piers with bases of sufficient size to resist the overturning effect during wind storm. It was found that the base would have to be so large that the cost of same would be prohibitive. In order to keep the cost within reasonable limits it was found necessary to resort to the use of low independent pier units to be constructed at the caissons upon which rested heavy triangular shaped steel towers of special design terminating in a point at the top of piers. . . . The towers are battered outward in order to provide the necessary overturning resistance to resist, to a considerable extent, the force of wind storms.

In addition to the potential for hurricane winds, the region offered a marshy topography with muck extending down 30 to 45 feet. As a result, the bridge design called for two types of foundations. Piers supporting the bridge's seven central spans rest on reinforced concrete caissons 18 to 32 feet in diameter sunk 90 to 105 feet below mean Gulf level. Bents are supported on untreated timber piling driven on a batter of about 5 inches per foot to resist wind pressure during hurricanes. The specifications called for the use of copper bearing steel, more resistant to corrosion, to combat the atmospheric conditions resulting from the seaside location and the proximity to petrochemical plants.

The Port Arthur-Orange Bridge was constructed under two contracts. The bids for the substructure were opened on December 11, 1935. After reviewing the six bids submitted, the Texas Highway Commission awarded the contract to the Union Bridge & Construction Company of Kansas City, Missouri, which submitted the low bid of $828,740. Work on the bridge began on March 3, 1936. Wickline oversaw construction of the bridge and filed monthly reports with THD's Bridge Division. Engineers from the Bureau of Public Roads also performed periodic inspections. Percy Pennybacker, who would later become one of THD's most important bridge engineers, assisted Wickline as construction engineer for the

project.

In April, the Jefferson County Commissioners' Court and the Port Arthur Building & Trades Council pressured the contractor to use only union labor, and on April 24, 1936, a contract to this effect was signed. Wickline advised against the contract for two reasons: the project was meant to provide relief labor and such a contract would prevent some workers from the opportunity of relief labor. In addition, future bidding for the superstructure would produce few bidders if the use of union labor was a precedent. Gibb Gilchrist, State Highway Engineer, declared that federal provisions covered labor for PWA projects and that any such contract would therefore be null and void. At a July 2, 1936, meeting of the Building & Trades Council, union members voted to drop the issue, conceding that the contractor was in fact hiring many union workers.

In the meantime, the Union Bridge & Construction Company had requested permission to dig a canal along the west side of the bridge to facilitate pile driving and the construction of the pedestal piers. On the advice of the consulting engineers, Wickline granted permission with the provision that the canal be backfilled upon completion of the pier and before erection of the steel superstructure. As construction of the superstructure proceeded, increasing loads would be transferred to the substructure and the supporting foundation materials. Without backfilling, the canals could compromise the stability of these subsurface materials. The contractor agreed to the terms and proceeded with the construction of a canal alongside the bridge measuring 60-feet wide by 5-feet deep. Side cuts were dredged for access to each individual pier. Once piles were driven for that pier, these cuts were closed off from the main channel so pier construction could be undertaken on dry land. The Austin Bridge Company of Dallas, subcontractor on the approach spans, rigged a floating plant to facilitate pile driving. The September 9, 1937, issue of *Engineering News-Record* gives a detailed description of the apparatus:

> Because so many of the piles were driven on a batter in all directions, the approach subcontractor developed a clever pile driving rig that is quickly adjustable to any driving angle or position. The power plant consists of a large steam whirler crane mounted on a 40x56 ft. barge. Outrigger pontoons were added at the sides to give the barge greater stability. Projecting over one end of the barge are two steel A-frames that support an 18-in. horizontal pipe beam. . . . A pair of steel leads, 85 ft. long, is supported about mid-point on the back by a spool roller riding on the pipe cross-bar. Near the top of the leads on their back side are welded in vertical position two 10-in. pipes 10 ft. long, open at the top. Telescoping inside these two pipes is an inverted U-shaped frame of two 9-in. pipes and a welded cross-bar at the top. The tip of the crane boom is fastened to the cross-bar of the U-assembly. . . . By swinging the crane and booming up or down the leads can be tilted to any driving angle.

Sand islands were created to facilitate sinking caissons under the main spans. The July 5, 1940, issue of *Engineering* reported that this method was used in the construction of the Huey P. Long Bridge in New Orleans. The islands were built up by driving a cylinder of steel sheeting at each caisson site. The cylinder diameter was to exceed that of the caisson by at least 10 feet. With the aid of clamshell buckets,

workers excavated the soft material to a level of 30 to 45 feet below mean Gulf level. The cylinder was then filled with sand. The caisson's lower section containing a cutting edge along the bottom edge was placed on the sand layer. Sand was removed within the caisson interior to facilitate its sinking. Concrete was poured and additional caisson sections were added in nine-foot increments.

This open dredging process was followed by the construction of a cap with air locks on top of the caisson. Caisson workers, known as sandhogs, were called in to work under the pneumatic caisson method, whereby compressed air would facilitate sinking the caissons the last few feet. This method often gave rise to the bends or caisson disease, painful nitrogen poisoning that resulted when a worker returned from the high pressure atmosphere at too great a speed. The August 21, 1938, issue of the *Port Arthur News* reported:

> Port Arthur began to hear about sandhogs in earnest when they, released from work, began collapsing on downtown streets from attacks of caisson disease or the more familiar bends. Newspaper clippings show that several such cases were hospitalized. . . . The caisson workers were equipped with identification buttons which carried information vital to the wearer. "If found ill, do not send to hospital, but send immediately to the medical air lock at the Neches River bridge site," the buttons read, and carried the name of the contractor.

In early 1937, the 150 caisson workers, most from St. Louis and Chicago, formed a strike to demand a 10 percent wage increase. The proposed wage was still lower than the going rate for similar work in New York City. One worker is quoted in the same issue of *Port Arthur News*: "Men doing this kind of work don't know when they come to the surface whether they will take their boots off or whether someone else will have to take them off." The men returned to work after the contractor granted the pay increase. The *Port Arthur News* reported that six men had died working on the bridge, but did not specify the causes. On May 15, 1937, the Union Bridge & Construction Company completed the substructure.

THD had held bidding for the superstructure nearly a year earlier, on June 10, 1936. Only two bids were received. The Taylor-Fitcher Steel Construction Company of New York City submitted the lower bid of $1,613,500. The Texas Highway Commission granted the company the contract on August 10, 1936, although, due to delays in the substructure construction, they could not begin work until the beginning of the next year. The contractor hired the Fort Pitt Bridge Works of Cannonsburg, Pennsylvania, to fabricate the main truss spans; Jones and Laughlin of Pittsburgh fabricated the shorter spans and steel bents at its New Orleans plant.

Since the superstructure and substructure bids plus 10 percent for engineering and contingencies totalled more than the funds allotted for the project, THD was compelled to apply for a supplemental grant from PWA. The application was made on August 11, 1936; by May 1937, THD learned the application was not approved. As a result, THD's contribution rose from $645,000 to $843,000. PWA's total contribution came to $1,141,742, or 45 percent of the eligible costs of construction. The total project cost came to $2,686,464.

In January 1938, workers joined the two halves of the center cantilever span. The bridge was put into service on September 8, 1938, with just painting remaining to be completed (see Photographs 3 and 4). The dedication was held on the second day of a two-day celebration of the bridge's opening. The first day's events featured a dinner, horse show and music. An estimated 20,000 people attended the actual dedication, which included a boat regatta. Texas Governor James V. Allred spoke at the dedication; Mayor Lea of Orange served as master of ceremonies. At the time of completion, the Port Arthur Chamber of Commerce claimed the bridge the tallest in the south. The Port Arthur-Orange Bridge received that official name on March 2, 1938, by order of the Jefferson County Commissioners' Court. In 1957, however, the North Port Arthur Lion's Club held a contest to rename the structure. The winning name of Rainbow Bridge was first submitted by six-year-old Christy Jean McClintock of Port Arthur.

In response to increasing traffic volumes on the Rainbow Bridge, the Texas Department of Transportation, formerly THD, constructed the Veterans Memorial Bridge on the east side of the Rainbow Bridge. The bridge was put into service in 1990, though construction was not completed until early 1991. It was built to serve three lanes of northbound traffic, leaving the Rainbow Bridge to serve two lanes of southbound traffic.

In 1992, a major upgrade of the structure was implemented, with a projected completion date of 1996. The work includes the replacement of 24 concrete girder approach spans with eight prestressed concrete beam spans. The existing truss railing will be replaced and a few truss members will be strengthened. The deck will be replaced and reconfigured throughout, providing a wider roadway without necessitating widening the structure. The 18-inch refuge walks, however, will be lost as a result of the upgrade.

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Verbal Boundary Description:

The nomination encompasses the complete structure, Port Arthur-Orange Bridge, from the extreme limits of the north abutment to the extreme limits of the south abutment.

Boundary Justification:

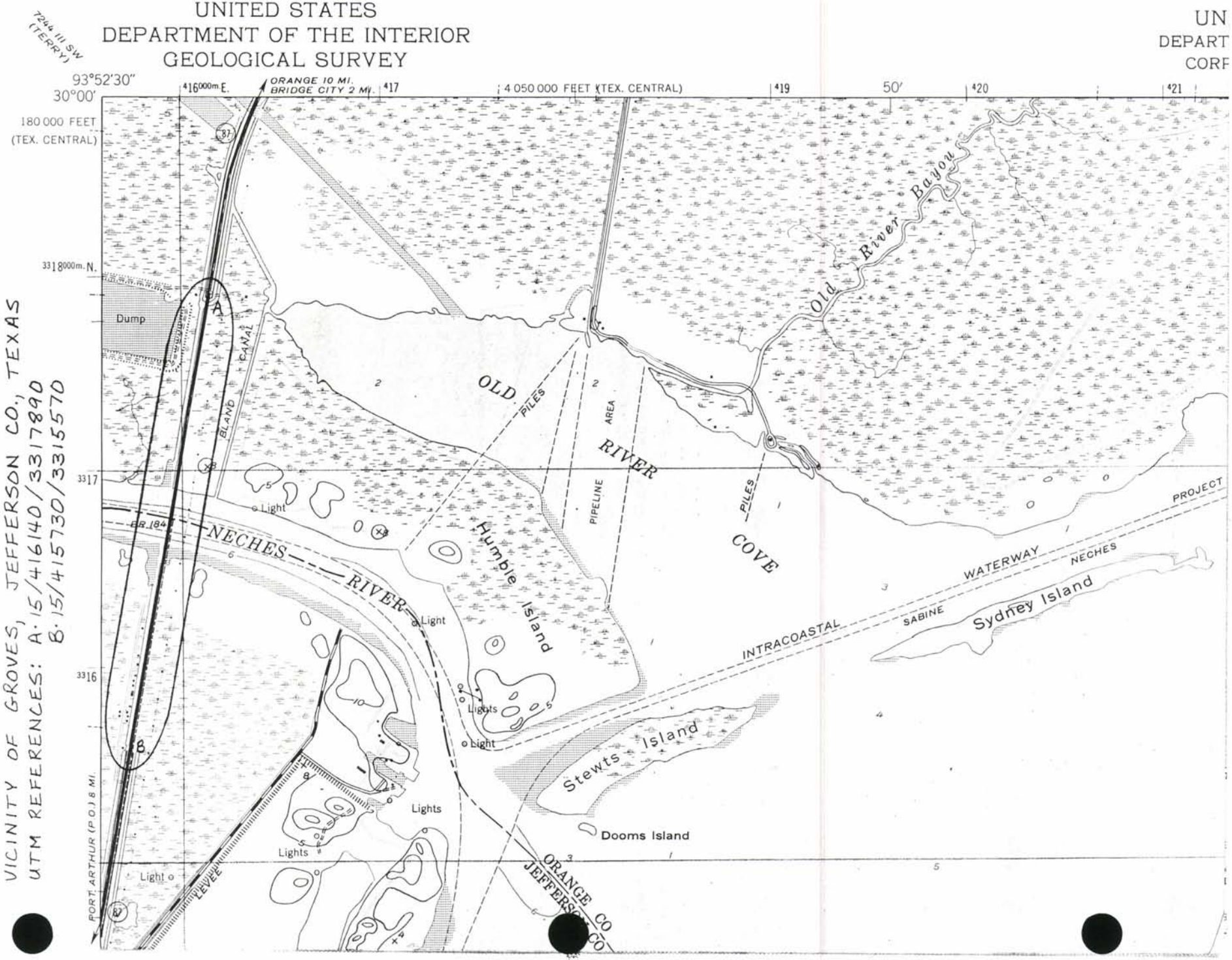
The boundary includes all components of the bridge substructure and superstructure historically associated with the property.

Location:

The Port Arthur-Orange Bridge is located in both Jefferson (245) and Orange (361) counties.

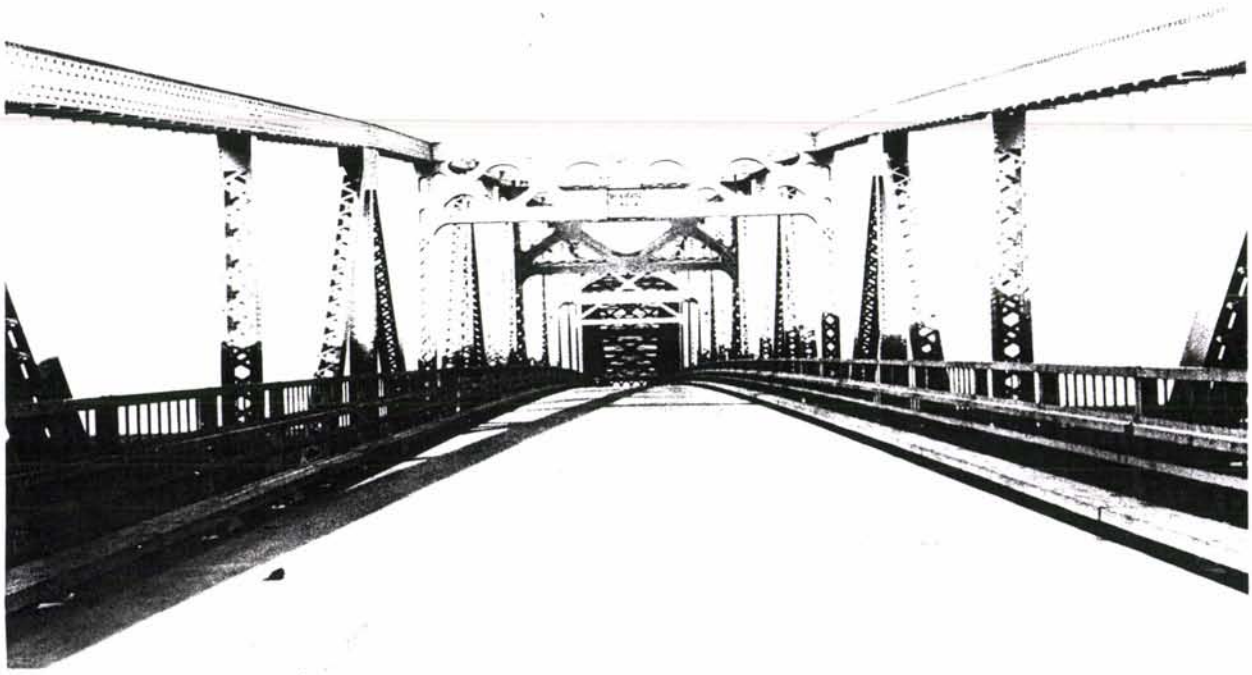
SITE NO: TF0306-03-015

HISTORIC BRIDGES OF TEXAS
PORT AKINS-ORANGE BRIDGE
VICINITY OF GROVES, JEFFERSON CO., TEXAS
UTM REFERENCES: A. 15/416140/3317890
B. 15/415730/3315570



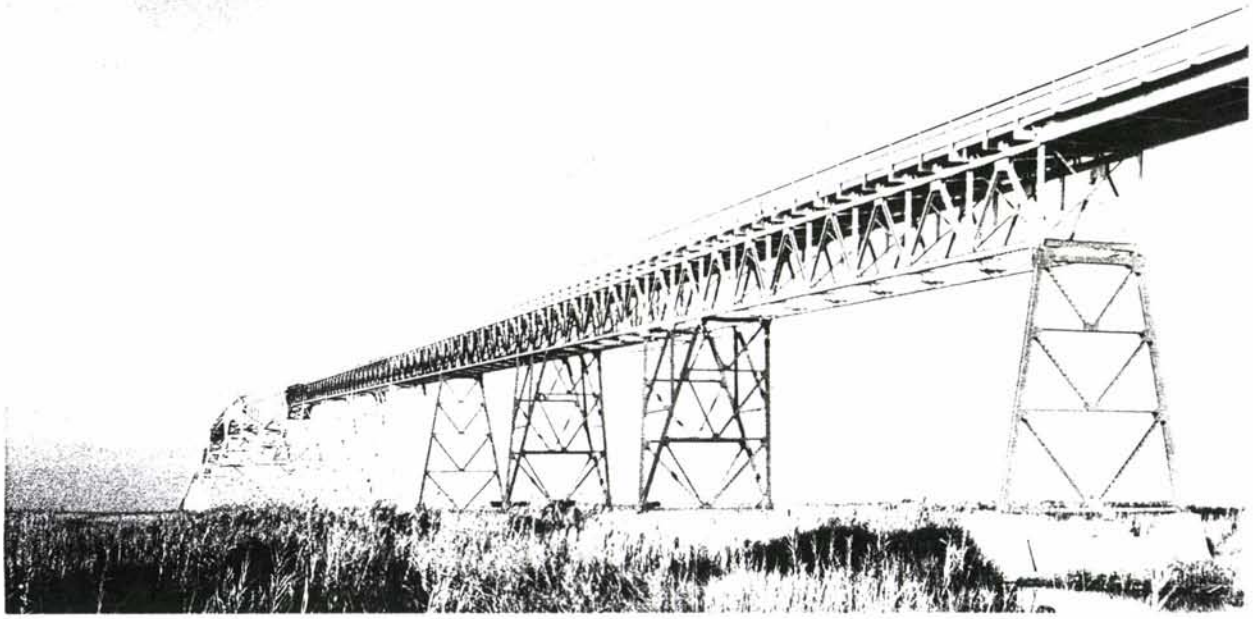
SITE NO. JF0306-03-015
PORT ARTHUR - ORANGE BRIDGE
HISTORIC BRIDGES OF TEXAS
JEFFERSON CO., TEXAS
PHOTOGRAPH 1 OF 5

SITE NO. JF0306-03-015
PORT ARTHUR - ORANGE BRIDGE
HISTORIC BRIDGES OF TEXAS
JEFFERSON CO., TEXAS
PHOTOGRAPH 2 OF 5



SITE NO. JF0306-03-015
PORT ARTHUR-ORANGE BRIDGE
HISTORIC BRIDGES OF TEXAS
JEFFERSON CO., TEXAS
PHOTOGRAPH 3 OF 5 (HISTORIC)

SITE NO. JF0306-03-015
PORT ARTHUR-ORANGE BRIDGE
HISTORIC BRIDGES OF TEXAS
JEFFERSON CO., TEXAS
PHOTOGRAPH 4 OF 5 (HISTORIC)



SITE NO.
PORT ARTHUR - ORANGE BRIDGE
HISTORIC BRIDGES OF TEXAS
JEFFERSON CO., TEXAS
PHOTOGRAPH 5 OF 5 (HISTORIC)

DEC. 9, 1938

VIEW LOOKING NORTHEAST SHOWING ALUMINUM PAINT ON SPANS 27 & 28 AND ON PARTS OF SPANS 29, 30, & 31., AND CLEANING UNDERWAY ON BENT AT PIER 1., AND GRAY PAINT IN PROGRESS IN SPAN 35.