STEAMBOAT SLOUGH BRIDGE
(Bridge No. 24-52)
Spanning Steamboat Slough at California State Highway 160
Courtland vicinity
Sacramento County
California

HAER CA-2291
HAER CA-2291

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street, Suite 700
Oakland, CA 94607

HISTORIC AMERICAN ENGINEERING RECORD
Steamboat Slough
(Bridge No. 24-52)

HAER No. CA-2291

Location:	Spanning Steamboat Slough at the Sacramento River at Post Mile 19.85 along California State Highway 160, two miles south of Courtland, Sacramento County, California UTM: 10-624657mE/4240566mN. UTM References were calculated using the North American Datum (NAD) 1983 series of the United States Geological Survey (U.S.G.S.), which is the California State Standard.
Present Owner:	California Department of Transportation 1120 N Street Sacramento, CA 95814
Present Use:	Highway Bridge
Significance:	Steamboat Slough is one of the oldest of the few bascule lift bridges in California. It was also a link in the Victory Transcontinental highway, and played an integral part in transportation and agricultural history in the Delta region.
Report Prepared By:	Margo Nayyar, Research Associate, Tory Swim, Research Associate, and Gloria Scott, Built Environment Preservation Services Branch Chief, Cultural Studies Office, Division of Environmental Analysis, California Department of Transportation
Project Information:	The control house on Steamboat Slough Bridge was removed and replaced in 2007 as part of a project to correct various safety deficiencies, install state-of-the-art electrical control equipment to operate the movable spans, and to bring the bridge up to current health and safety codes for decent, safe and sanitary structures. This documentation is intended to comply with the conditions to avoid Adverse Effect to the historic bridge, in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended. The bridge was determined eligible for the National Register of Historic Places through consensus determination between the Federal Highway Administration and the California State Historic Preservation Officer on April 3, 1996.
Date:	October 14, 2011

Part I. Historical Information

A. Physical History

1. **Date of Construction:** 1924
2. **Engineer:** Charles W. Deterding, Jr.
   Designer: Strauss Bascule Bridge Company
   Builder: Sacramento County
   Contractor: Nystedt & Isham

Charles W. Deterding, Joseph Strauss, Strauss Engineering Company of Chicago

Charles W. Deterding was Sacramento County's Engineer who participated in building the Steamboat Slough Bridge. Deterding first joined the county in 1908 as a surveyor. In 1921 Deterding became the County Engineer, just two years prior to the construction of the Paintersville, Isleton and Steamboat Slough bridges. The Strauss Bascule Bridge Company of Chicago built virtually all the bascule bridges in California prior to World War II. The proliferation of Strauss bascules can be attributed to two reasons: one, Strauss' bascule bridge design used multiple trunnions instead of a single hinge design, and two, the San Francisco office provided an opportunity for product marketing.[1] For a more detailed discussion of Mr. Deterding, Jr. and the Strauss Bascule Bridge Company, please refer to the Historic American Engineering Record Written Historical and Descriptive Data for the Isleton Bridge (Bridge No. 24-51), HAER No. CA-55.

Sacramento County, Nystedt & Isham

While Sacramento County is listed as the builder of this bridge, no information is known about its involvement in road and bridge construction. Likewise, very little information is known about the firm Nystedt & Isham. In approximately 1910 C. J. Nystedt worked in Stockton, California with the prominent contractor Joseph M. Chirhart. Their firm, Chirhart & Nystedt, was known for the construction of:

> the Aetna Apartments, the Embery flats, the watercure building at Clark's Sanitarium, the Bennett flats at Sutter and Poplar streets, the Catholic Church at Lodi, the Science building of the Stockton high school, completion of work on the Jefferson school building, remodeling the Lincoln school, erection of two buildings for the Standard Oil Company, and the concrete work on the City Bank building.[2]

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[1] Michael Chester, *Joseph Strauss; Builder of the Golden Gate Bridge*, 32,33,34,36, 40, 42; PBS, "Golden Gate Bridge," <http://www.pbs.org/wgbh/amex/goldengate/peopleevents/p_strauss.html> (accessed 13 October 2004); *Port of Los Angeles Virtual History Tour*, "Badger Avenue Bridge, People," Copyright 2001, <http://laporthistory.org/level4/Badger/badger_people.html> (accessed 13 October 2004).

[2] George H. Tinkham, *History of San Joaquin County California With A Biographical Review of the Leading Men and Women of the County Who Have Been Identified With its Growth and Development from the Early Days to the Present* (Historic Record Company: Los Angeles, California, 1923), 1395-96.

In 1916 the partnership was dissolved. The Steamboat Slough Bridge is the only known bridge to have been contracted to Nystedt & Isham. Nystedt was contractor for the Freeport Bridge (1929) and the Twin Cities Road Bridge (1931). Like Steamboat Slough, the Freeport Bridge is a Strauss Heel Trunnion Bascule Bridge, while the Twin Cities Road Bridge is a Warren through truss bridge.[3] Both bridges are in the Sacramento River Delta region.

Original Plans and Construction:

The original plans are on file in the California Department of Transportation (Caltrans) Bridge Inspection Records Information System (BIRIS), located in Sacramento, California.

3. Alterations and Additions:

> As part of the original construction there were two concrete and steel light standards flanking both entrances to the bridge. These have been removed but the concrete pedestals with bronze dedication plaques mounted on them are still at the original locations. The roadway at each abutment and approach to the movable span is paved with asphalt, and the roadway of the span is steel grate."[4]

Several changes and repairs occurred to Steamboat Slough Bridge over the years. In January 1936 fire fighting facilities were installed. Changes to these facilities occurred on September of that same year. Traffic signals were installed in March 1937. In April 1944 new fenders were added while in July of that same year the 1/8" brown linoleum was replaced with a substitute in the bridge operator control house. Also in July 1944,

> A safety platform ha[d] been constructed around the light at the end of the draw leaves. The new walkway leading to the operator's house along the downstream side of the north anchor spans was constructed. A new fender at the south end and dolphin at the north end is being constructed at the present time under contract.

In September 1950 "a new timber stairway was built near the northwest corner of the bridge." In 1953 Steamboat Slough was widened. In June 1990 six alterations were completed to upgrade the bridge under OSHA standards:

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[3] Bridgehunter.com: "Twin Cities Road Bridge,"< http://bridgehunter.com/ca/sacramento/24C0053/> (Accessed August 2011); Caltrans Bridge Inspection Records Information System (BIRIS) database electronic files for Bridge 24-0052.

[4] Federal Highway Administration, "Finding of No Adverse Effect for the Rehabilitation of Isleton Bridge (#24-51), Steamboat Slough Bridge (#24-52) and Paintersville Bridge (#24-53) Sacramento County California, 03-Sac-160 KP9.5, 31.9, 33.6 (PM 5.9, 19.8, 20.9) EA.03-437200," February 2000, 4.

1. New pipe railings replaced existing railings on stairways and landings leading from the deck to the navigation light access platforms on both leaves.
2. New timber walkways replaced existing timber walkways at the counterweight and navigation light access platforms on both leaves.
3. On the stairway between the counterweight and navigation light access platforms new steel tread was installed.
4. The ladders, timber railings and timber walkways were replaced in kind at the access to Pier 2 and 3 dolphins and lights.
5. At the center navigation lights a gate was installed in the deck railing and the platform and railings were replaced.
6. The existing timber railing was replaced with new pipe railing at the shear lock pin access platform.

In November of 2000 the bridge's bronze nameplates were removed to protect them from theft. In addition, five blocks were added to the south span counterweight.[5]

The control house on Steamboat Slough Bridge was replaced in 2007 as part of a project to correct various safety deficiencies, install state-of-the-art electrical control equipment to operate the movable spans, and to bring the bridge up to current health and safety codes for decent, safe and sanitary structures. The control house was removed and a new one lifted into place. Other design features to avoid an adverse effect to the bridge ensured that the new control house is compatible in color, scale, siding, roofline, and location to the original control house, and the work was completed in a manner consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, Rehabilitation Treatment Option. The control house is a contributing feature of the bridge.

B. Historical Context:

The Steamboat Slough Bridge is located in the Sacramento-San Joaquin River Delta region, an area that, since the late nineteenth century, has been concerned with improving transportation routes. Movable bridges answered the transportation needs of water and land traffic. They promoted the evolution of road travel without hindering water travel. Due to successful reclamation that began during the 1850s and the naturally rich soil, agriculture boomed in the Delta region. The success of agriculture, therefore, required successful transportation. Although water and railroad transport had long been the preferred transportation method, land transportation became important as surrounding roadways were completed, improved, and trucking became more efficient. Movable bridges in the Delta maintained a reliable flow of traffic for both water and land traffic; an important consideration as land transport became more important to the agriculture industry. The

[5] All information obtained from bridge reports and supplementary bridge reports are located in the Caltrans Bridge Inspection Records Information System (BIRIS) database. Specific dates of reports quoted from are January 1936, September 1936, March 1937, April 1944, July 1944, September 1950, 1953, June 1990, November 2000.

Steamboat Slough Bridge served as an important component to the Delta's intricate water land transportation systems.

For a more detailed history of Joseph Strauss, the Strauss Engineering Company of Chicago, the history of the Delta, moveable bridges and bascule bridges, please refer to Historic American Engineering Record Written Historical and Descriptive Data for the Isleton Bridge (Bridge No. 24-51), HAER No. CA-55.

History of Steamboat Slough

The Steamboat Slough structure is one of the few unmodified Strauss Heel Trunnion bascule lift bridges in California. The slough, which the bridge spans, was a six-mile shortcut with fewer snags for steamboats.[6] The Steamboat Slough Bridge was built in 1924 in an area that became very popular for boating:

> One of the most popular boating areas for yachts and more humble craft was the beautiful, tree-lined Steamboat Slough. In fact, so many power boats came to this waterway that a new dock and fueling station was built in 1929 at Courtland just up the Sacramento River from the mouth of the slough. This was, evidently, the first service station for power boats in the Delta.[7]

Hal Schell also wrote about Steamboat Slough:

> This slough came into its own during the early days of the Gold Rush. Vessels plying the lucrative run from San Francisco to Sacramento to disgorge Argonauts stricken with gold fever and supplies for the mining camps used it as a handy shortcut. After all, time was money. And Steamboat bypasses a long, wide bend in the Sacramento River, trimming a neat six miles off the run. Too, it did not have the profusion of snags and shoals that took such a heavy toll in the swift current of the Sacramento.[8]

Transportation

Since the time of the California Gold Rush, the Delta has provided water transportation for freights and passengers to and from major cities in the San Francisco Bay Area, and farms in the San Joaquin and Sacramento Valleys. With an increase in farming in the area toward the end of the nineteenth century, the need for overland transportation proved even more necessary. Early travelers passed through the area over the most obvious routes– the high

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[6]Charles A. Bohakel, *The Historic Delta Country; A Guidebook to State highway 160, the Bayou of the West* (Antioch, Calif.: by the author, 1979), 19.

[7] Frank Lortie, "Historic Architectural Survey Report for The Steamboat Slough and Threemile Slough Bridges, Bridge Numbers 24-52 and 24-121, Seismic Retrofit Projects; 3-Sac-160, PM 19.3 and 6.98, EA 3-428000," California Department of Transportation, Sacramento, January 1996, 5.

[8] Hal Schell, *Dawdling on the Delta; The Complete Cruising Guide for California's Fabulous 1,000-Mile Delta* (Stockton, Calif.: Schell Books, 1979), 47.

levee roads. However, good-quality roads in the Delta took forty years to transpire. The earliest roads followed old trails that followed natural levees, rivers and creeks. However, the Delta's numerous islands and tributaries limited the possibility for a direct overland route from San Francisco to Sacramento.[9]

The east bank of the Sacramento River developed as a transportation route because the west bank had recurring flooding problems. On the east bank of the Sacramento River, the Georgiana Road went from Freeport to Walnut Grove. In 1857, the Georgiana Road was designated a public road, and by 1870 it was extended southward to Sherman Island. In the early 1900s, to accommodate the new stream of automobile traffic, the County of Sacramento built three bridges between Walnut Grove and Sherman Island.[10]

Before Sacramento and Yolo counties built bridges to connect the islands and tributaries, ferries provided river crossing transportation. Since the 1850s, there have been over twenty privately-owned ferries providing service within the Delta. The ferries required a fee and posting of a bond. After 1900, ferries generally became toll free with county aid.[11] Steamboating, however, diminished in the 1930s. "River freighting," writes Dillon, "gave way to trucking, and passenger traffic yielded to privately owned Model A's. As transportation changed, bridges provided improved mobility."[12]

Roadway System and Highway System

Although the early farmers and settlers of the Delta had constructed roads on top of the levee system along the banks of the Sacramento River, these roads were not designed to sustain a large amount of vehicles or heavy trucks carrying loads of produce. As a result, the concern and need for better roadways increased during the first part of the twentieth century as the automobile population expanded. The numbers of automobiles in California increased after 1908 when Henry Ford's assembly line approach to manufacturing made the Model T more affordable for the average person. As with the popularity of the automobile, trucking also became a preferred and more standard way of transporting goods.[13]

In 1909, the First State Highway Bond Act established a State Highway System. The bond appropriated $18 million, but it was discovered that $18 million would not be enough money to construct a state highway system. The State and counties negotiated a deal concerning the highway system's construction. The counties donated the right of way to build bridges; the State developed the highway system in between. Sacramento County was slow to initiate an active role in the Delta area because the County spent its limited resources carefully and was

[9] John Thompson, "From Waterways to Roadways in the Sacramento Delta," *California History* 59, no.2 (1980): 146-7.
[10] Thompson, "From Waterways to Roadways," 147.
[11] Thompson, "From Waterways to Roadways," 151, 145.
[12] Dillion, *The Delta Country*, 111.
[13] Richard F. Weingroff, "Federal Aid Road Act of 1916: Building the Foundation," *U.S. Department of Transportation, Federal Highway, Infrastructure Website*, 6 February 2004, <http://www.fhwa.dot.gov/infrastructure/rw96a.htm> (accessed 20 August 2004).

weary of the monetary responsibility of building and repairing levees, and building and repairing roads. Farmers also added to the delay of road improvement and maintenance because they took pride in the land reclamation and the roads they had built on top of their levees. To farmers, the roads were exemplary of the achievements of land reclamation.[14] In 1909, the Freeport Road became the first road in the Delta to be macadamized or surfaced.[15] In 1912 the Southern Pacific Railroad opened the Walnut Grove Short Line. This line extended from Sacramento, to Isleton, to Walnut Grove, and held both passengers and freight. Produce, then, was shipped back East directly from the Delta by railroad.[16]

History of Road and Bridge Progress

Prior to 1880, counties constructed few bridges in California. Those who traveled by automobile "negotiated" numerous ferry crossings on Highway 160 until "the first Antioch Bridge was completed to open the Victory Highway on New Year's Day of 1926."[17] Previous to the 1880s, "highway bridge building in California was predominantly a private endeavor. While a few counties built public bridges as early as 1855, it was not until after 1874 that the state legislature adopted a comprehensive program through which counties could establish road districts, road commissioners, and property taxes reserved for road construction."[18] In 1893, a new law mandated that counties "seek the advice of its county surveyor on bridge design. This law helped professionalize the office of county surveyor and attracted trained bridge engineers."[19] By 1903 agriculture and crop processing expanded, thereby increasing traffic; and in 1906, to accommodate traffic, Sacramento County instituted the first phase of bridge construction. The County constructed three bridges in 1906 which provided a continuous road from the Brannan, Andrus and Grand Islands to Sacramento, and an easterly road from Walnut Grove to Thornton.

The second stage of bridge construction began in the Delta in 1911 with the goal to improve roads. During this period, routes to and from Sacramento were flooded most of the year. Poor road quality made trucking goods to regions west of Sacramento difficult. Companies and farmers wishing to ship products to San Francisco from Sacramento and the Delta region

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[14] State of California, "Fact Sheet; Important Events in Caltrans History," *Department of Transportation*, copyrighted 2003, <http://www.dot.ca.gov/hq/paffairs/about/chist.htm> (accessed 23 August 2004); Norman Root, *A History of Bridge Building in California on the Lincoln Highway*, produced by California Department of Transportation, Division of Engineering Services, Education Committee, 75 min., 2000, CD-Rom. Located in the Transportation Library at Caltrans Headquarters in Sacramento. The Norman Root presented the recorded lecture in Sacramento, CA; Thompson, "From Waterways to Roadways," 157.

[15] Parsons Harland Bartholomew & Associates, Inc, "Historic Resources Evaluation Report Freeport Shores Pedestrian/Bicycle Trail Project Sacramento County, State 160/Freeport Boulevard," March 2004, 9.

[16] Graham, *Discovering the Sacramento River Delta*, 30.

[17] Hal Schell, *Cruising California's Delta* (Stockton, Calif: Schell Books, 1995), 13.

[18] Christopher McMorris, "Caltrans Historic Bridge Inventory Update: Metal Truss, Movable and Steel Arch Bridges, Volume 1: Report and Figures," JRP Historical Consulting, prepared for California Department of Transportation, Environmental Program, Sacramento, as part of 2004 Bridge Survey Report, March 2004, 15.

[19] McMorris, "Caltrans Historic Bridge Inventory Update," JRP Historical Consulting, prepared for California Department of Transportation, Environmental Program, Sacramento, as part of 2004 Bridge Survey Report, March 2004, 15.

remained heavily dependent on steamboats and water carriers. In response to the monopoly on freight service, steamboat captains, having realized the control they held on transportation, held annual strikes to force a rise in prices. In May 1916, however, on the same day as an annual steamboat strike, the Yolo bypass opened between Sacramento and Yolo Counties providing an alternate transportation route from Sacramento to the San Francisco ports by road. With the opening of the Yolo bypass, trucking became the preferred alternative to transport goods.[20]

In 1916, the Goodyear Tire and Rubber Company introduced the pneumatic cord truck tire. The pneumatic tire was designed as a tire within a tire; therefore, the pneumatic tire was more resistant to puncturing and could carry substantially more weight.[21] With trucks equipped to transport heavy loads, the strongest inhibitor to the progression of roadway traffic and trucking was the poor road conditions. The Delta region also needed better bridges. The first part of the twentieth century would become an era of mass bridge construction within the Delta region.

The Campaign for Good Roads

The general concern for road conditions extended beyond local concern and became of national interest. Locally, "until about 1914," describes author Kathleen Graham, "the vehicular roads in the region were rudimentary. In the early days the levees were low, between 4 and 8 feet and narrow ('shoestring levees') and a footpath either followed the top or was on the riverside of the levee. Any road for vehicles was usually next to the levee on the land side. As the levees grew in size and the tops gradually broadened, they were increasingly used for vehicular traffic. After 1914, the levees were raised about 5 feet to approximately their height in the mid 1980s. The roadbeds were unpaved and sandy."[22]

At a national level, the desire for good roads was strong. Carl Fisher, founder of Indianapolis Motor Speedway, began to promote the idea of a transcontinental highway in 1912. Wanting to implement a paved roadway from Times Square in New York City to Lincoln Park in San Francisco, Fisher planned to incorporate and involve towns along his highway by having them provide the necessary equipment while he, in return, would provide "free materials and a place along America's first transcontinental highway." Fisher also asked for cash donations. The Lincoln Highway began in 1912 and lasted until it began to be "chopped up" in 1925 as the federal government began a "system of *numbered* highways.[23]

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[20] Norman Root, *A History of Bridge Building in California on the Lincoln Highway*, CD-rom; Thompson, "From Waterways to Roadways," 151.

[21] Jack Thiessen, contributing editor, "1908-1917; Trucking Enters its Teens," in *Heavy Duty Trucking: 100 Years of Trucking 1898-1998*, special issue of monthly publication *Heavy Duty Trucking* (Santa Ana, Calif.: Newport Publications Division, HIC CORP, March 1998), 40; Paul Dickson and William D. Hickman *Firestone: A Legend, A Century, A Celebration*. Edited by Nelson Eddy (New York: Bridgestone/Firestone Inc., 200): 75.

[22] Graham, *Discovering the Sacramento River Delta*, 31.

[23] James Lin, "A Brief History: Parts 1-4," *Lincoln Highway Homepage*, 7 October 1998, <http://www.ugcs.caltech.edu/~jlin/lincoln/history/part1.html> (18 August 2004). Parts 2-4 may be accessed from this link.

As Fisher and other visionaries began to think of a paved road that extended across the country and put the plan into action, residents and enthusiasts of the Delta worked toward improving the roadways in the Delta area. Although a plan had been proposed by Delta supporters for the construction of six bridges and the upgrading of sixty percent of all road mileage as early as 1911, the California Highway Commission did not adapt this plan until 1916. By 1912, the California Highway Commission began to change bridge and road construction and maintenance within California:

> Beginning in 1912 the California Highway Commission began to require that all structures built as part of the state highway project be designed by competent engineers and the plans, specifications, and workmanship be subject to the inspection and approval of the Highway Engineer. The commission also established the minimum width and live load guidelines for their designs and went on record in favor of the use of reinforced concrete designs when possible. . . . Reliance on the counties to furnish bridges had led to the bridge work lagging behind road construction on state highways. In response, the highway commission began requiring that all bridge design and construction on the state highway system be done under the direction of the Bridge Department beginning in 1923.[24]

These requirements increased the workload for the commission and created a need for the formation of a Bridge Department, which began supervising bridge construction in 1923.[25]

The federal government also began to assist in improving roads. Proposed by the American Association of State Highway Officials (AASHO), federal government passage of the 1916 Federal Aid Road Act aided the state and counties with road improvements. Also in 1916, the state issued a second highway bond for $15 million. The California Highway Commission implemented the adapted 1911 road improvement plan in the Delta region, covering thirty-nine miles of asphalt from Freeport to beyond Isleton and constructing several bridges: Walnut Grove (1916), Rio Vista (1919), Paintersville (1923), Isleton (1923) and Steamboat Slough (1924).[26] The American Toll Bridge Company had finished a bridge spanning the San Joaquin River in the Antioch vicinity in 1926, and in 1928 the Freeport Bridge became part of the Sacramento and Yolo Counties road system.[27] "By 1929," argues Kathleen Graham, "all the major bridges were built and by 1930, there was an extensive network of primary and secondary paved roads."[28]

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[24] Thompson, "From Waterways to Roadways," 152-53; McMorris, "Caltrans Historic Bridge Inventory Update," 16-17.
[25] McMorris, "Caltrans Historic Bridge Inventory Update," 17.
[26] Weingroff, "Federal Aid Road Act of 1916," *Infrastructure Website*; State of California, "Fact Sheet," *Department of Transportation*; Thompson, "From Waterways to Roadways," 153-54. Thompson's report dates the construction of the Paintersville bridge as 1920, however, all other documents, such as BIRIS reports, state the bridge's construction being in the year 1923.
[27] Thompson, "From Waterways to Roadways," 154.
[28] Kathleen Graham, *Discovering the Sacramento River Delta*, 32.

State Highway 160—the Victory Highway

Paintersville, Isleton and Steamboat Slough bridges are all located on the present-day State Highway 160, which at one time was known as the Victory Highway, a transcontinental route.[29] State Highway 160, also known as State Route 160, is one of the three main highways that run through the Delta.

The Victory Highway Association, organized in 1921, aimed to promote road improvements and follow U.S. Route 40. The Victory Highway was established after World War I as a memorial to those who served in the war. In 1923, the Secretary of Agriculture Henry C. Wallace chose the routing of the Victory Highway via Wendover, Utah, the same route that the Utah state government wished for the Lincoln Highway.[30] The Victory Highway gained additional funding in 1921 after the Utah government chose the Victory Highway as a federal road and, therefore, received money from the new federal highway act.[31]

The Victory Highway detours from Route 40 between Sacramento and San Francisco.[32] The Delta region, for economic reasons, wanted the Victory Highway, "In an effort to obtain additional funds for transportation improvements the Victory Highway Association made several 'reroutings' of the Highway through Sacramento."[33] Businessmen and different business sectors in Oakland and San Francisco and of the California State Automobile Association desired a steadier flow of traffic from Salt Lake City and Ely, Nevada, and the newly formed Victory Highway Association worked to find a solution to steering more traffic towards San Francisco.[34] By 1924, the Victory Highway was well established as noticed from this 1924 commentary by Edward Tree, the editor of *Good Roads* magazine:

> Approaching the Pacific end of the Victory Highway line the tourist is supplied with an entry way into San Francisco from Sacramento that follows a concrete highway down the Sacramento River levee, crosses the San Joaquin River at Antioch and follows the wonderful concrete county highway system of Contra Costa County. . .[35]

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[29] Root, *A History of Bridge Building* lecture, CD-Rom. Some rumors suggest that after the construction of the Antioch Bridge in 1926, Highway 160 became part of the Lincoln Highway.

[30] Thompson, "From Waterways to Roadways," 154; Parsons Harland Bartholomew & Associates, Inc., "Revised Historical Resources Compliance Report for the Relinquishment of State 160 to the City of Sacramento, California by the California Department of Transportation, Sacramento County, Sac-160 PM 35.04/44.46; EA 03-2A4700," April 2001, 11; Frank X. Brusca, "Victory Highway," *U.S. Route 40; America's Golden Highway*, copyrighted 2002, <http:www.route40.net/history/victory.shtml> (accessed 18 August 2004).

[31] James Lin, "A Brief History: Parts 1-4," *Lincoln Highway Homepage*. The act provided $75 million worth of matching funds to state highway construction in addition to requiring, unlike in 1916, that states identify "7 percent of its total mileage as 'primary'; only these roads would be eligible for federal funds."

[32] Brusca, "Victory Highway," *U.S. Route 40; America's Golden Highway Website.*<http:www.route40net/history/victory.shtml>

[33] Parsons Harland Bartholomew & Associates, Inc, "Revised Historical Resources Compliance Report," April 2001, 11.

[34] Thompson, "From Waterways to Roadways," 154.

[35] Parsons Harland Bartholomew & Associates, Inc, "Revised Historical Resources Compliance Report," 9.

When the Antioch Bridge was completed in 1926, in celebration of the diversion of the Victory Highway through the Delta region, the bridge was named "The Victory Bridge." [36]

Bridges, inevitably, made the River Road eligible for incorporation into a major highway. According to historian Frank Lortie, "Without modern, movable bridges the River Road would have never been the up-to-date motor transportation route that the Delta needed. Between Antioch and Freeport there were ultimately eight movable bridges along State Route 160. . .The bascule design seems to have been the best type of bridge for most of the Delta crossings."[37] The county constructed the three movable bridges studied in this report during the early 1920s.

Part II. Structural/ Design Information

A. General Statement:

1. **Character:** The Steamboat Slough Bridge is a steel double-leaf Strauss Through Bascule bridge. Joseph Strauss's Bascule design used concrete, a cheaper alternative to iron, for the above-deck counterweights. Furthermore, the bridge's moveable spans pivot on a trunnion upward instead of swinging out. Bascules, then, are more time efficient because they adjust to the height of approaching vessels. The bascule design was only used for spanning navigable water.

2. **Condition of Fabric:** The Steamboat Slough Bridge has been in service since its construction in 1924. Its historic fabric appears to be in fair condition, with few alterations, other than repair and replacement of worn material and parts. The structural integrity of the bridge's individual components is fair, and the bridge operator's controls are worn.

B. Description:

1. **Substructure:** The Steamboat Slough Bridge substructure is comprised of two reinforced concrete seat abutments, and two concrete piers with curved wing walls. The piers consist of unreinforced concrete columns set on timber piles. They are located 57 feet from each abutment. Each pier has a concrete fender.

   There are a total of three spans. Two spans measure 57 feet, and the main span measures 226 feet. The spans are made of riveted steel, rigid-connected Bascule through truss. The total length of the bridge is 343 feet.

[36] Thompson, "From Waterways to Roadways," 154.
[37] Frank Lortie, "Historic Architectural Survey Report for The Steamboat Slough and Threemile Slough Bridges, Bridge Numbers 24-52 and 24-121, Seismic Retrofit Projects; 3-Sac-160, PM 19.3 and 6.98, EA 3-428000," California Department of Transportation, Sacramento, January 1996, 4.

There are seven, seven-pile dolphins made of treated Douglas fir wood. Five are located on the south end of the bridge, two on the north. A single navigation light is located at the top of each dolphin.[38]

2. **Superstructure:** The bridge carries a two-way road measuring 18.10 feet wide. The total width of the bridge is 19.10 feet. There is a height clearance of 14.80 feet. The deck elevation is at 29.5 feet from the piers. The deck is concrete poured over floor beams and stringers on the approach spans and steel grating deck on the bascule leaves. The rail is composed of steel lattice, and there are wood plank curbs.

   The approach spans consists of a tower truss supporting the counterweight, the counterweight truss, and the mechanical equipment. The steel truss members are mostly latticed sections with riveted connections. There are two large concrete counter-weights mounted in the steel frame approximately fifteen feet over the roadway at each abutment. The counterweights are approximately ten feet tall, 8.5 feet wide, and fifteen feet deep.[39]

3. **Gear houses:** There is one gear house (two total) located at each counterweight tower next to the counterweight trunnion, approximately fifteen feet above the roadway. The gear houses are triangular in design and identical. The floor of the gear houses is sloped forty-five degrees and is supported by steel framing attached to the bridge trusses. The gear houses are wood framed. The exteriors are clad in corrugated steel sheets; there are no windows. There are two wood doors, one on the east and one on the west façades. The roof is sheathed with corrugated sheets of steel, and is half-gabled with open eaves and exposed rafters.

   Steel staircases with steel pipe guardrails lead to the gear houses from the main deck to the gear house platform. The southern gear house staircase is located on the west side of the bridge; it leads from the roadway to the west door. A second staircase leads from the east door to the counterweight platform.

   The northern gear house staircase is located on the east side of the bridge; it leads from the roadway to the east door. A second staircase leads from the west door to the counterweight platform.

4. **Gates, navigation lights, etc:** On each end of the bridge there are two-color traffic lights, bells, signs, and crossing gates as protective measures for crossing road traffic.

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[38] All information obtained from bridge reports and supplementary bridge reports are located in the Caltrans Bridge Inspection Records Information System (BIRIS) database. Specific dates of reports quoted from are January 1924, August 1933, January 1944 and December 1996; Ravi Mathur and Greg Orsolini "Seismic Retrofit of a Bascule Bridge," in "Seismic Design, Evaluation and Retrofit of Steel Bridges; Proceedings of the Second US Seminar held at Hyatt Regency San Francisco, November 20-21, 1996," organized and edited by Abolhassan Astaneh-Asl and James Roberts, (November 1996), 517.

[39] FHWA, "FNAE," 5; Matur and Orsolini, "Seismic Retrofit of a Bascule Bridge," 517.

On the north end of the bridge there is a traffic light located on the west side of the roadway. The traffic light is on a metal pole with a concrete foundation. Behind the traffic light, attached to the pole, is a bell which dings when the crossing gate lowers and the center spans rise. The single crossing-gate arm is located on the same metal pole; the gate has three yellow caution lights which blink when the gate lowers. Located above the traffic light is a sign which reads, "STOP HERE ON RED," and has an arrow pointing to a line on the roadway. The same metal pole with the same sign, stop light, bell, and crossing gate is located on the south end of the bridge, east of the roadway.

There is a metal fog bell located on a steel truss on the west side of the bridge, on the south side of the bridge operator's control house. The bell is rigged so that the bridge control operator can warn oncoming water traffic. There is also one fog horn located on the same steel truss above the control house, outside the west door of the gear house.

There are two blinking navigation lights at the center opening of each side of the bridge. A single navigation light is located at the top of each of the seven dolphins.

5. **Approaches**: On the north end of the bridge, west of the roadway, there is a painted concrete block with a dedication plaque.

6. **Original Control House Exterior**[40]

   a. **Overall dimensions:** The bridge operator's control house is a one-story rectangular structure with irregular projections. The north side of the control house has an "L" shaped projection off of the main rectangular structure. Exact measurements are unknown.

   b. **Foundation:** The control house is cantilevered over the Sacramento River on the west side of the bridge. It is supported by two steel brackets across its width, and three galvanized iron soffits across its length bracing the house to the brackets. Above the soffits is a galvanized iron water table. The house is level with the bridge's main deck.

   c. **Walls:** The control house is clad with corrugated steel siding with metal corner finishing boards. There is a louvered vent on the east façade below the roof line.

   d. **Structural system, framing:** The control house is wood framed. The roof has a common hipped rafter system.

   e. **Walkways:** On the north side of the control house is a wood plank walkway and steps that lead to the main entrance on the north façade. A metal pipe railing runs

[40] The original control house was replaced in 2007, and its description here is the major reason in the FHWA FNAE that this documentation was written.

along the walkway. Along the east side of the control house, along the roadway, is another wood plank walkway leading to the east entrance.

f. Doors: There are two wood doors on the control house. On the east façade of the control house there is one wood door with a fixed-sash, single-paned window on the upper third of the door. The window is protected by metal security bars. There is a metal-framed and metal mesh security screen door in front of the wood door.

On the north façade there is a plain wood door and a metal-framed with metal mesh security screen door.

g. Windows: On the east façade of the control house there is one multi-paned, double-hung window. The window has wide wood board casing and a decorative wood sill. The top half of the window is boarded shut.

On the south façade are two single-paned, double-hung windows with wide wood board casing and decorative wood sills.

The west façade has four windows. The southernmost window is a small, square, single-paned, fixed-sash window, with thin wood casing and no decorative sill. The northernmost window is a small, rectangular, single-paned, double-hung window with thin wood board casing and a decorative wood sill. The other two windows are regular size, single-paned, double-hung windows with wide wood board casing and decorative wood sills. There are no windows on the north façade.

h. Roof: The control house has a simple hipped roof composed of corrugated steel. The roof has moderate eave overhang and boxed eaves with metal fascia and metal sheet soffits.

There is a second roof plane above the north entrance L-shaped irregular projection. The roof is flat with wide eave overhang over the entrance, and little eave overhang over the L-shaped projection. The roof has a wood rafter system. The rafters are exposed only over the north entrance, and there is a simple wood bracket on the east corner. The roof is composed of corrugated steel.

The gutter system is made of galvanized iron; it runs along the roof line and has galvanized iron drainage pipes.

1. Original Control House Interior

a. Flooring: There are wood floors covered by linoleum throughout the control house. In areas the wood floors are exposed. The bathroom has linoleum flooring.

b. Wall and ceiling finish: The walls and the ceiling have simple decorative coffered wood paneling. The window casings are made of simple wood boards

with decorative sills. There are plain wood base boards throughout the interior. The interior is painted.

c. Decorative features: There is a wood shelving unit with a cabinet along the west wall.

d. Heating and air: A window mounted air conditioner is located in a window on the west façade.

e. Plumbing: There is a ceramic toilet and sink.

C. Mechanicals/Operation: The Heel Trunnion Bascule operates "with concrete counterweights to distribute loads throughout the opening process and to reduce the motor power necessary to lift the bridge and with four trunnions to ensure that the counterweight and lift spans are balanced at all points while the bridges are being lifted."[41]

In the May 1923, blueprints the bridge's motor was noted to be a three-phase, alternating-current (AC) motor with 15 horse power. The motor has 850 rotations per minute (RPM) and has normal running torque of 90 inches and normal starting torque at 180 inches. There are four counterweight trunnions and heel trunnions, and there are solenoid brakes.[42]

The bridge gearing is triple pinion-and-spur reduction before final rack-and-pinion.

The bridge operator's control house contains electric control panels and other equipment necessary to operate the movable span. Along the eastern wall is the engine generator. Along the southern wall is an engine generator; along the eastern wall are the bridge controls and electrical panels, and along the west wall is a wood desk.

D. Site Information: The Steamboat Slough Bridge is located at Postmile 19.85 on State Highway 160 in Sacramento County; the road is on top of the levees on either side of the river. The bridge spans the Sacramento River carrying two lanes of traffic in opposing directions as a component of California State Highway 160. The bridge is surrounded by flat farm fields and sparsely scattered single family houses and farm structures.

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[41] Chester, *Joseph Strauss*, 32,33,34,36, 40,42; PBS, "Golden Gate Bridge," <http://www.pbs.org/wgbh/amex/goldengate/peopleevents/p_strauss.html>;and *Port of Los Angeles Virtual History Tour*, "Badger Avenue Bridge, People," <http://laporthistory.org/level4/Badger/badger_people.html>

[42] All information obtained from bridge reports and supplementary bridge reports are located in the Caltrans Bridge Inspection Records Information System (BIRIS) database. Specific dates of reports quoted from are May 1923.

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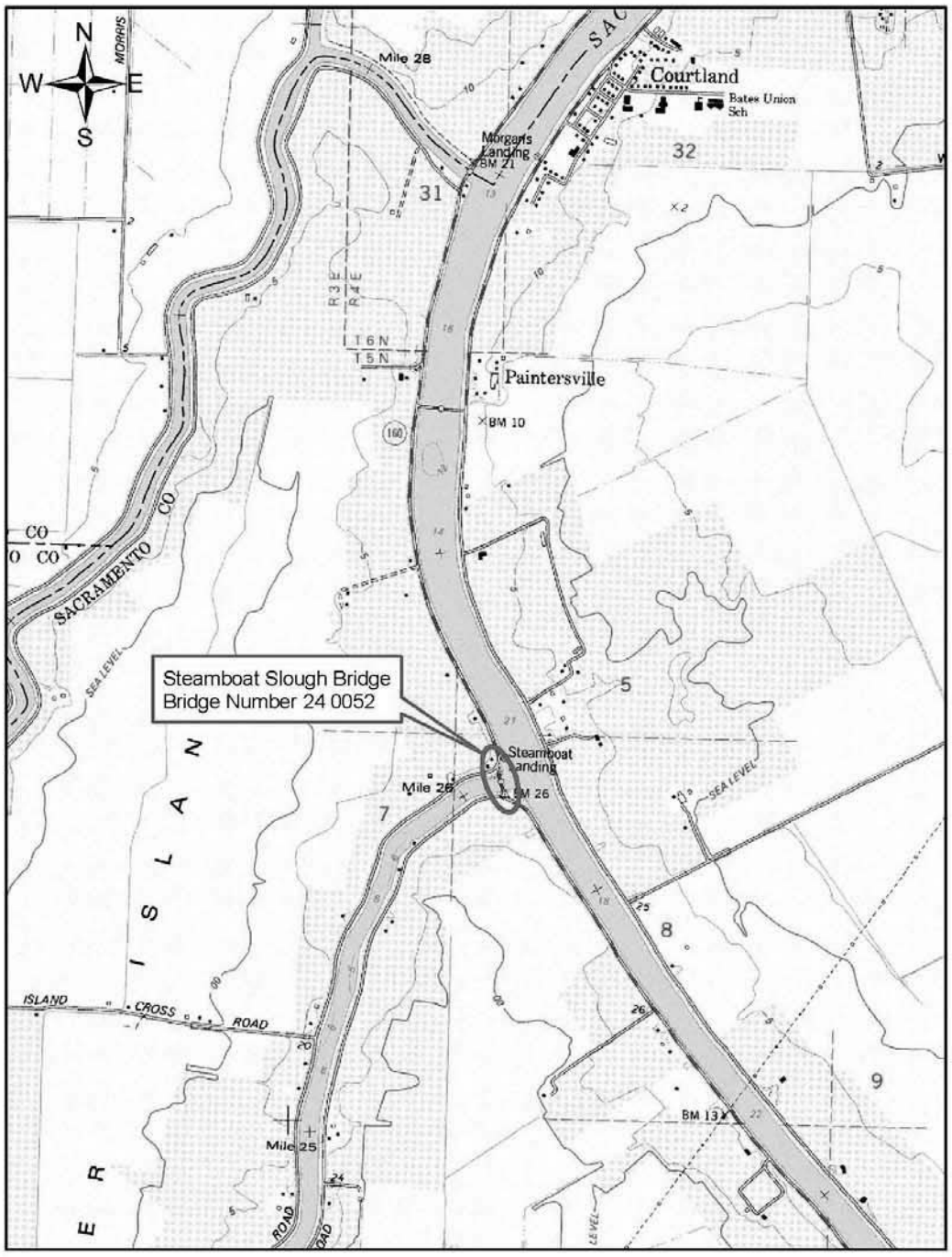

Courtland, CA, U.S.G.S. 7.5' Quadrangle
Scale 1:24,000