STOCKYARDS VIADUCT
Northeast Twenty-eighth Street Overpass
Atchison, Topeka & Santa Fe Railroad & Burlington Northern Railroad Overpass
Texas Historic Bridges Recording Project II
Spanning the Atchison-Topeka-Santa Fe & Burlington Northern Railroads at State Hwy 28~~th~~
Fort Worth
Tarrant County
Texas

HAER No. TX-89

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C St. NW
Washington, DC 20240

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HISTORIC AMERICAN ENGINEERING RECORD

STOCKYARDS VIADUCT HAER No. TX-89

(Atchison, Topeka & Santa Fe Railroad and Burlington Northern Railroad Overpass)

(NORTHEAST TWENTY-EIGHTH STREET OVERPASS)

<u>Location</u>: Spanning Atchison, Topeka & Santa Fe Railroad and Burlington Northern Railroad at S. H. 183 in Fort Worth; Tarrant County, Texas
UTM: West 14/654945/3629590
East 14/655215/3629595
USGS Quad: Fort Worth, Tex.

<u>Date of Construction</u>: 1935

<u>Designer</u>: George G. Wickline, Texas Highway Department

<u>Builder/Contractor</u>: Earl Yates & Son, Contractors, Fort Worth, Texas

<u>Present Use</u>: Railroad overpass

<u>Significance</u>: An example of Fort Worth's exceptional network of railroad grade separation structures, the Stockyards Viaduct serves as a good example of a cooperative effort by the Texas Highway Department and the U.S. Bureau of Public Roads to eliminate dangerous grade crossings in Texas during the Great Depression..

<u>Historian</u>: Robert W. Jackson, Ph.D., August 2000

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INTRODUCTION

The Stockyards Viaduct at State Highway (S. H.) 183 in Fort Worth, Texas, was constructed in 1935 to span tracks of the Chicago, Rock Island & Gulf Railroad (CRI&G), the Gulf, Colorado & Santa Fe Railroad (GC&SF), and the Fort Worth Belt Railroad. The Texas Highway Department built the bridge as part of a systematic attempt during the 1930s to improve urban-area grade separation structures. This effort was in response to an explosive growth in automobile and truck traffic during the early decades of the twentieth century, which led to dangerous conflicts at points of intersection between road and rail transportation systems.

BUCKLEY BURTON PADDOCK

The roots of this conflict in the Fort Worth area may be traced to the rail promotion activities of civic, business, and political leader Buckley Burton Paddock (1844-1922). As editor of the Fort Worth *Democrat*, Paddock published the so-called "Tarantula Map" on 26 July 1873, which depicted nine railroad lines radiating like a spider's legs from Fort Worth. Although there were no railroads terminating in Fort Worth when the map was first published, it served as a visual representation of the hope that Paddock and other civic boosters had for their city's future.

Due in large part to Paddock's vigorous promotion at the local, state, and national levels, the Texas & Pacific Railroad succeeded in completing the first rail line into Fort Worth on 19 July 1876. Seven other railroads entered the city during the following decade, including the GC&SF in 1886. The Chicago, Rock Island & Texas Railroad completed a line from Paradise to Fort Worth in 1894, eight years before being acquired by the CRI&G Railroad. The Fort Worth Belt Railroad was organized in 1903, the same year that arrival of the International & Great Northern Railroad essentially completed the network of railroads envisioned by Paddock in 1873.[1] This pattern of rail lines was therefore well established by the dawn of the automobile age.

A rapid increase in automobile ownership during the first two decades of the twentieth century led to a dramatic rise in fatalities and serious injuries at points where rail lines crossed roads. Warning signs were often inadequate or non-existent, and the motoring public was generally ignorant of the danger posed by trains. Railroad corporations usually defended their right-of-way as paramount, and blamed motorists for the accidents that occurred. Reluctant to spend the great amounts of money necessary for a systematic program of grade separation, the railroads generally consented to build structures on a case-by-case basis, and only when forced to do so by city or county governments. But urban growth and industrialization would eventually

[1] Marcelle Hull, "B. B. Paddock and the Railroads of Fort Worth," *The Compass Rose* 9, no.1 (Spring 1995), 1-5; Ron Tyler, ed., *The New Handbook of Texas*, vol. 5 (Austin, Tex.: Texas State Historical Association, 1996), 5; Charles P. Zlatkovich, *Texas Railroads: A Record of Construction and Abandonment* (Austin, Tex.: Bureau of Business Research, University of Texas at Austin, 1981), 64, 67.

combine to force railroad corporations and public officials to make greater efforts in the elimination of conflicts at grade crossings.

After a brief economic depression following the end of the First World War, the United States experienced a period of economic expansion that began about 1922, peaked in 1927, and lasted until the beginning of the Great Depression in 1929. This period marked the climax of the so-called "second industrial revolution," an era in which the nation's industrial output nearly doubled and the gross national product rose by approximately forty percent. Electrification, new technologies, more efficient manufacturing methods, and innovative advertising fueled a rise in the consumer-goods economy that gave Americans the highest standard of living in the world.[2]

Automobile manufacturing had already become the nation's largest industry by 1920, and continued to experience spectacular growth throughout the decade. In 1920, there were 9,239,100 motor vehicle registrations in the United States; by 1930, the total had increased to 26,749,800. With more cars and trucks on the road, more and better highways were required, and millions of dollars were spent during the 1920s to upgrade the nation's road system. Road improvement did not keep pace with the rise in automobile ownership, however. There were approximately 387,000 miles of paved roads in the United States in 1921, but the figure had increased to only 662,000 by 1929.[3]

Texas followed national trends with an increase in motor vehicle registrations from 430,377 in 1920, to 1,401,748 in 1930.[4] Moreover, these vehicles were traveling at a much higher rate of speed, thereby increasing the hazard to the motoring public. Unfortunately, increases in the number and speed of vehicles on the road in the 1920s exceeded the Texas Highway Department's capacity to keep pace with necessary highway improvements. As later noted by an article published in *Texas Parade*, the official publication of the Texas Good Roads Association, during this period "more vehicles, traveling more miles, were turned loose on an already inadequate highway system."[5]

When traffic on the state's highways during the earliest years of the century was relatively light and the average speed relatively low, there seemed to be little need for the construction of grade separation structures, except in those cases where a major highway or trunk line railroad with very heavy traffic was involved.[6] Because grade separation structures were

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[2] Robert A. Divine, ed., *America: Past and Present*, vol. 2, 2d ed. (Glenview, Ill.: Scott, Foresman and Co., 1987), 723-24.

[3] Divine, 723-24; Gary B. Nash and Julie Roy Jeffrey, eds., *The American People: Creating a Nation and a Society*, vol. 2 (New York: Harper & Row, 1986), 761-62.

[4] *Texas Highway Department Ninth Biennial Report: September 1, 1932 to August 31, 1934* (Austin, Tex.: Texas Highway Department, 1934), 31.

[5] Charles E. Simmons, "Engineering Death Off the Highways," *Texas Parade* (August 1938), 16.

[6] H. H. Allen, ed., *Texas Highway Department: 1927-1937* (Austin, Tex.: Texas Highway Department, 1937), 113.

very expensive, the Texas Highway Department generally elected to provide for increased safety of the motoring public by relocating highways, by improving the grade of the crossing, by cutting brush to increase sight distance, or by erecting more effective warning signs.[7] But as the number of accidents involving injury or death at highway-railroad crossings in Texas rose steadily from 201 incidents (68 fatalities) in 1920 to 350 incidents (152 fatalities) in 1929, the importance of separating the grades of highways and rail lines became more apparent.[8]

In 1923, the Texas Railroad Commission collected data from railroad companies operating in the state and found that there were 9,313 public road and farm crossings and 533 street crossings in Texas, but only 165 overpasses and underpasses. Most of the crossing elimination achieved up to this time was due to road relocation, with some of the cost covered by federal funds made available under provisions of the various Federal Aid acts passed since 1916.

During the 1920s, some of the leading railroad companies began to employ engineers for the special purpose of conferring with state and county officials on the construction of grade separation structures. But cost participation by the railroads during this period was entirely voluntary.[9] Prior to 1925, when the state or a county desired construction of a grade separation structure, a plan was submitted to the railroad and negotiations were begun regarding the design and cost. Generally, the railroad paid one-half of the cost on any portion of the project within railroad right-of-way, but only contributed about one-third of the cost for work outside their right-of-way.

In 1925, the Texas state legislature passed laws by which the counties were relieved of construction responsibilities, and from 1925 to 1932 the railroads and the state of Texas split the cost of grade crossing elimination. Passage of the Emergency Relief Appropriations Act of 1932 provided federal funds for the entire cost of grade separation structures, payable through the state.[10] The availability of federal funds allowed the Texas Highway Department and the U.S. Bureau of Public Roads to finally began a systematic program of new construction and improvement of existing urban grade separation structures, and a great number were built in the 1930s.

Prior to 1932, the individual railroad company involved prepared plans for an underpass and performed the work itself. After the work was completed and inspected, the state reimbursed the railroad based on the formula agreed to before commencement of construction. In the case of

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[7] G.G. Wickline, "Grade Crossing Elimination," *Texas Highway Bulletin 4,* no. 1 (January 1924)" 25; G. G. Wickline, "Making Texas Highway Safe for Traffic with the Grade Crossing Eliminated," *Texas Highway Bulletin 8,* no. 4 (April 1928):9.

[8] Allen, *Texas HIghway Department,* 113; *Texas Highway Department Ninth Biennial Report: September 1, 1932 to August 31, 1934* (Austin, Tex.: Texas Highway Department)

[9] Wickline, "Grade Crossing Elimination," 25.

[10] *Texas Highway Department Seventh Biennial Report: September 1, 1928 to August 31, 1930* (Austin, Tex.: Texas Highway Department, 1934), 56; Allen, *Texas Highway Department* 115.

an overpass, the state prepared the design and an outside contractor performed the actual work in the same manner as with any other state highway improvement project. After 1932, the state generally accepted responsibility for preparation of a preliminary plan, which was then submitted to the railroad. With input from the U.S. Bureau of Public Roads, the railroad then prepared final plans for underpasses, and the state prepared final plans for overpasses. After the U.S. Bureau of Public Roads approved a final design, an outside contractor performed the work under supervision by the state.[11]

The Stockyards Viaduct is located on S. H. 183, also known as NE 28th Street. Prior to construction of the highway, of which this overpass is a part, that portion of NE 28th Street located just east of North Main Street terminated short of the railroad tracks that now run underneath the viaduct. The gap continued to a point just east of the St. Louis & Southwestern Railway tracks, where NE 28th Street resumed at its intersection with Decatur Avenue. There was no east-west arterial north of Northside Drive, which was located several blocks south of the stockyards area.

In order to provide for an anticipated increase in east-west urban traffic as this area developed, and to better connect northern Fort Worth with points further east, the Texas Highway Department began a program in about 1933 to extend and improve NE 28th Street as S.H. 15. This involved the construction of several grade separation structures, including the Fort Worth & Denver City Underpass, the adjacent St. Louis & Southwestern Railway Underpass, the Stockyards Viaduct, and the Texas & Pacific Railway Overpass located further to the east, near Mt. Olivet Cemetery. Because the construction sites were just outside the Fort Worth city limits at that time, all of these projects were eligible for federal funding under provisions of the National Industrial Recovery Act (NIRA) of 1933. The Fort Worth & Denver City Railway Underpass and the adjacent St. Louis & Southwestern Railway Underpass were jointly designated as U.S. Public Works Project NRM 634-A, Part 1, indicating that they were part of the NIRA program for extension of the Federal Aid Highway System into and through municipalities. The Texas & Pacific Railway Overpass was designated NRM 634-B, and the Stockyards Viaduct was designated NRM 634-C.

George G. Wickline, a native Texan who graduated from the civil engineering program of the University of Texas in 1904, designed the Stockyards Viaduct. Wickline was the first man to hold the post of state bridge engineer for the Texas Highway Department following creation of the position in 1918. Except for a brief period from 1935-38, during which he took a leave of absence to supervise construction of the Neches River Bridge near Port Arthur, he continued to serve as the highway department's premier bridge designer until his death in 1943.[12]

Wickline was born in Stephenville, Texas, in 1883. After attending the public school system and Tarleton College in that city, he moved to Austin in 1901 to attend the University of

[11] Allen, *Texas Highway Department*, 116.

[12] The biographical information contained in this report has been taken, unless otherwise noted, from Wickline's application for registration to practice professional engineering, a document in the files of the Texas State Board of Registration for Professional Engineers, Austin, Tex.

Texas. In the year following graduation, Wickline worked as an instrument man and bridge inspector for the St. Louis Brownsville & Mexico Railroad, and as a construction engineer for the Northern Texas Traction Company. After another year spent as an assistant highway engineer for Dallas County, Wickline moved to Los Angeles, where he served as an assistant engineer on aqueduct projects. He returned to Texas to work briefly in El Paso as resident engineer for the El Paso & Southwestern of texas Railroad, and as an assistant city engineer for the city of El Paso.

Wickline was rehired by Dallas County in October 1909, and occupied the post of bridge engineer until March 1912. During the next seven years he worked on a variety of bridge projects for the Texas Electric Interurban Railway, for McClennan County, Texas, and for the city of Dallas, before returning to his former position with Dallas County in 1916. After another one and a half years with the county, Wickline returned to work for the city of Dallas as a designer of bridges, culverts, and storm sewers.

In March 1918, Wickline took the position that was to dominate the remainder of his life. As chief bridge engineer for the Texas Highway Department, he supervised the design and construction of virtually every important bridge built by the state for the next twenty-five years. He was instrumental in developing standard specifications for bridges of all types, and greatly improved the safety of the state's highways. He became well known at the national level among members of his profession., and his degree of skill and knowledge earned him the title "De Pontibus Wickline."[13]

As supervisor of construction on the Neches River Bridge, erected between Orange and Port Arthur on S. H. 87 in Jefferson County, Wickline achieved his greatest single feat of engineering. At 230' above the Sabine-Neches waterway, the structure stood for many years as the tallest bridge in the southern United States. Designed to withstand hurricane-force winds while also allowing for the passage of large ocean-going vessels, the 7,752' long cantilever bridge required new techniques and special equipment for establishment of secure foundations in the marshy floodplain of the river.[14]

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[13] Joseph E. King, "A Historical Overview of Texas Transportation, Emphasizing Roads and Bridges," TS, n.d., in the files of the Environmental Affairs Division, Texas Department of Transportation, Austin, Tex.

[14] King, "A Historical Overview"

Following completion of the Neches River Bridge in 1938, Wickline resumed his duties with the Texas Highway Department. Five years later, in November 1943, he was on his way to Chicago to attend the annual convention of the American Association of State Highway Engineers when he suffered a fatal heart attack. His body was taken off the train in Dallas and returned to Austin for burial.[15]

As designed by Wickline, the Stockyards Viaduct superstructure is composed, from east to west, of the following: one 50'-0" I-beam girder span; one 39'-8-3/8" I-beam girder span; one 66'-8-5/8" deck plate girder spa;, one 88'-11" deck plate girder span; one 77'-0" deck plate girder span; two 90'-9" deck plate girder spans; one 80'-6" deck plate girder span; one 59'-0" deck plate girder span; one 90'-9" deck plate girder span; one 85'-0" deck plate girder span; and three 50'-0" I-beam girder spans.

The girders are of a typical built up design, with a web plate sandwiched between riveted flange angles at the top and bottom of the plate. Cover plates, each ¾" thick, are also riveted to the flange plates at the top and bottom of the web plate. Additional ¾" cover plates on the bottom flange stiffen the girders, which are three plates thick at the center of each span. The girder is also made more rigid by angles riveted vertically along the length of the web plate. Each plate girder is 6'-0-1/2" in height, from initial top cover plate to initial bottom cover plate. The plate girders are attached to cast steel bolsters, which are pinned to a cast steel fixed shoe on one end of the girder and to a cast steel rocker at the other end. Each plate girder span is composed of three plate girders, cross-braced by diagonal angles that are connected to the girders by riveted gusset plates. Each I-beam girder span is composed of ten I-beams, spaced from 4'-6" to 4'-7-1/2" apart. In order to take care of the dead load deflection of the beam, each beam was originally embedded in the concrete deck slab at varying depths.

The girders support a roadway that is 40'-0" wide, and one sidewalk on the south side of the roadway that is 4'-6" wide. The bridge railings consist of cast in place concrete posts and ¾" thick wrought iron bars forming 6" wide panels, with a 3-1/4" wrought-iron pipe for a top rail. The end posts have depressed panels, and are stepped back in two increments (first 3" and then 2") on the sides, and in ¾" increments on the top to provide ornamentation. All of the intermediate posts between the end posts are stepped back in two increments (first ½" and then 1") on the sides, and in ¾" increments on the top. Although pull boxes, sleeves and conduit for a lighting system were placed in the railing, no electric cable or lighting fixtures were installed as part of the original construction project.

Both abutments are 60'-0" wide, three-column, reinforced concrete bents, measuring 20'-9" from center to center of the columns. Each column is 2'-6" wide. The east abutment is 28'-6-1/2" in height, and the west abutment is 26'-0" in height. Each abutment has a base that is 2'-6" in height and 49'0" in length. The east abutment is 12'-6" wide at the base, and the west abutment is 8'-6" wide at the base. All of the piers are three-column bents with tapered columns

[15] *Dallas News*, 28 November 1943.

resting on bases that are 2'-6" in height, but there is considerable variation in the height and width of the piers.

Although the railing has been extensively damaged and the bridge exhibits considerable deterioration, the structure has not been significantly altered and maintains a high degree of integrity. It is significant as an example of a systematic attempt by the Texas Highway Department and the U.S. Bureau of Public Roads during the 1930s to improve urban grade separation structures in response to the explosive growth of automobile and truck traffic during the early decades of the twentieth century. It also serves as an example of the Depression-era street and highway improvement building boom that helped make Fort Worth a modern metropolis.

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