

Twelfth Street Trafficway

JACK21

GENERAL DATA

structure no.:	S030B11	city/town:	Kansas City
county:	Jackson	feature inters.:	railroad yard
		cadastral grid:	S6, T49N, R33W
		highway route:	12th Street
		highway distr.:	4
		current owner:	City of Kansas City

STRUCTURAL DATA

superstructure:	double-deck concrete through arch with 45 deck girder approach spans		
substructure:	concrete abutments and post piers		
span number:	1; 45	condition:	good
span length:	140.0'	alterations:	bridge rehabilitated,
total length:	2054.0'	floor/decking :	concrete deck
roadway width:	52.0'	other features:	modern metal pipe guardrails, upper solid concrete balustrade with recessed panels

HISTORICAL DATA

erection date: 1913-14
erection cost: \$577,330.49
designer: Waddell and Harrington, Kansas City MO
fabricator : none
contractor: Graff Construction Company, Seattle WA

references: Missouri Highway and Transportation Department Structure Inventory and Appraisal: Structure Number S030B11; **Kansas City Times**, 10 April 1913; **Kansas City Journal**, 27 August 1913; Kansas City Public Service Company, **History of Bridges and Viaducts**; E.E. Howard, "The Twelfth Street Trafficway Viaduct, Kansas City, Missouri," **American Society of Civil Engineers Transactions**, Paper No. 1357 presented at the meeting of September 1, 1915, pages 485-487, 525, 531-533; **Kansas City Star**, 28 February 1965; **Kansas City Star**, 9 April 1965; field inspection by Mark Hufstetler, 4 February 1991.

sign. rating: 77
evaluation: NRHP eligible (Missouri's foremost urban viaduct)

inventoried by: Clayton B. Fraser 23 September 1994

HAER INVENTORY

Missouri Historic Bridge Inventory

NAME(S) OF STRUCTURE

Twelfth Street Trafficway
MHTD: S030B11

JACK21

DATE(S) OF CONSTRUCTION

1913-14

LOCATION

12th Street over railroad yard; S6, T49N, R33W
Kansas City; Jackson County, Missouri

USE (ORIGINAL / CURRENT)

city street viaduct / city street viaduct

RATING NRHP eligible (score: 77)

CONDITION

good

OWNER

City of Kansas City

span number: 1; 45
span length: 140.0'
total length: 2054.0'
roadway wdt.: 52.0'

superstructure: double-deck concrete through arch with 45 deck girder approach spans
substructure: concrete abutments and post piers
floor/decking: concrete deck
other features: modern metal pipe guardrails, upper solid concrete balustrade with recessed panels

The significance of the Twelfth Street Trafficway lies partially in its location. The viaduct comprised the main part of the Twelfth Street Trafficway, which was historically the main east-west route through the city, connecting uptown Kansas City with the West Bottoms, an industrial section that included "railroad yards, freight stations, warehouses, packinghouses, wholesale and manufacturing concerns, and the large stock yard interests, including a considerable percentage of the city's businesses." Until the Twelfth Street Trafficway was built, these sections of the city were connected by three indirect routes.

The first municipal authorization for a viaduct here was issued in January 1886, when the city permitted the Corrigan Consolidated Street Railway Company to "construct and operate a cable or electric railway on 12th Street from State Line to the eastern limits of the City of Kansas." In February 1887 the Metropolitan Street Railway Company hired the Phoenix Bridge Company of Philadelphia to build an iron viaduct along Twelfth Street; six months later a contract was let to the Kansas City Bridge and Iron Company for the same viaduct, presumably due to a default by Phoenix. The iron structure lasted for some twenty years before the city and the street railway companies began planning its replacement. The structure's principal drawback—other than its advancing age—was that it carried only railroad tracks. According to engineer E.E. Howard, "A roadway suitable for vehicular, as well as street-car, traffic... has been advocated for many years, and has been made a feature of more than one political campaign, and of franchise negotiations with street-railway interest." In November 1909 the city council passed an ordinance that extended the franchise of the railways to operate along Twelfth Street, provided they build the replacement structure. The viaduct's cost was estimated at \$1.3 million. The council enacted a similar ordinance in August 1911 calling for the receivers of the Metropolitan Street Railway Company to demolish the existing viaduct and construct a new structure.

Two more years passed before the viaduct inched closer to construction. The new viaduct was designed by pre-eminent Kansas City engineers Waddell and Harrington. The firm described the structure's general layout:

The improvement finally realized as the Trafficway extends from Liberty Street to Broadway, a distance of 3/4 mile, of which the viaduct occupies about 2,300 feet. The remaining portion consists of earth embankments and cuts, with the usual

street improvements on Twelfth Street, and the regrading of certain side streets to intersect its new grade. A street 60 ft. wide is thus provided on a continuous grade of about 5.5% for a distance of 3,500 ft., substantially from end to end of the improvement. It was physically impossible, without involving prohibitory expense and damage to existing structures, to extend the end of the grade in either direction, so the gradient practically fixed itself. To accommodate traffic desiring a less steep grade, and willing, for such advantage, to travel by a less direct route, a roadway on a lower deck is provided, with a grade of about 2.5 per cent. This lower roadway begins one block east of the upper one and extends to the bluff, a distance of 1,800 ft.; thus enabling all classes of traffic to avoid the grade crossings over the heavy service railway tracks on the street below. Ascending roadways or streets alongside the bluff from the end of the lower deck will terminate in streets at the summit of the hill, giving easy grades, although by indirect routes for team traffic bound up town.

With the structure's design completed, the Kansas City Board of Public Works finally solicited competitive bids for its construction in April 1913. Estimating the cost at between \$600,000 and \$630,000, the city planned to fund it with bond proceeds and \$200,000 from the Metropolitan Street Railway Company, which would then be entitled to use the viaduct until 1925. The city took a number of precautions to ensure that only financial stable companies would bid: it required that all bids be accompanied by certified checks equal to 5 percent of all bids under \$10,000 and 25 percent of those above \$10,000; and a surety bond equal to 75% of the gross amount of the bond.

In August 1913 the Graff Construction Company of Seattle was awarded the construction contract, but not without some difficulty. Graff complained about the Board of Public Works' stringent contract requirements, stating that the financial status of his company should not be questioned as long as he was capable of completing the job. Nevertheless, Graff presented his credentials and qualifications to the board. "We make a specialty of reinforced concrete work," Graff told the board. "We propose to build a structure which will be a monument to Kansas City as well as to the consulting engineers who designed it. And we intend to complete it within the time specified in the contract." Included among Graff's references was the prestigious engineering firm of Waddell and Harrington, which had designed the structure. City officials debated the advantages to both steel and concrete viaducts, and were eventually convinced by the consulting engineers to choose reinforced concrete.

The Kansas City Board of Public Works was principally responsible for the construction. John Lyle Harrington of Waddell and Harrington personally supervised both design and construction, while C.F. Graff, president of the Graff Construction Company gave his personal attention to the construction as well. An average of 200 men, of whom nearly 150 were carpenters, worked nine-hour days to erect the structure. Because the construction had been placed on a tight 15-month schedule, work often continued into the night. This was especially true of the pouring of concrete, a task that frequently stretched until midnight. Other aspects of the construction were frustrating: acquiring clean stone, and managing the costs of sand, steel and concrete.

The 2,054-foot long Twelfth Street Viaduct is a double-deck reinforced concrete bridge with girder spans supported by columns sunk in rock, soil, and concrete piles. A long arch span crosses eight railway tracks on Santa Fe Street. Because the columns are transversely paired, the upper deck cantilevers beyond each side of the columns, while the lower deck advances between them. The upper deck is

composed of forty-five deck girder spans of two girders each, which range in length from 33 to 56 feet. Included in the upper deck is the arch span and two earth filled approaches. The lower deck consists of twenty-seven through girder spans with two girders each. Cross girders and cantilevered beams support the floor slabs. Where both decks cross the street, shallow floors are needed, with concrete encased steel beams and concrete-covered steel girders serving as reinforcements. Both decks are lit by incandescent electric lights. "Careful attention was given to the architectural treatment in an effort to secure something more than a plain series of posts and beams," E.E. Howard stated. "The treatment developed considers the columns as columns with plinths and capitals, and not merely as posts. The bottoms of the upper-deck girders are curved to give an arched or high cambered appearance. The lower-deck girders are straight and in effect are supported by secondary pilasters set out from the main columns. Certain limiting conditions of the railway and street locations crossing under the structure practically determined certain column locations, but the span lengths were made smaller near the lower end of the structure, affording uniformity of appearance and preserving the unity of effect, in spite of the great variation in height of the different columns."

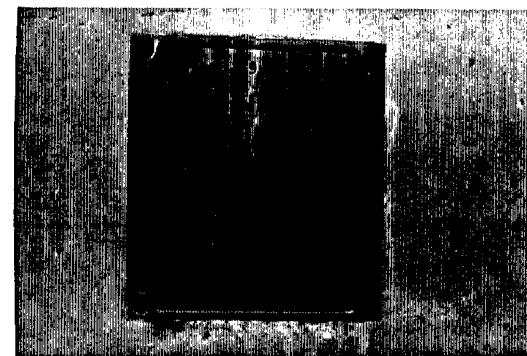
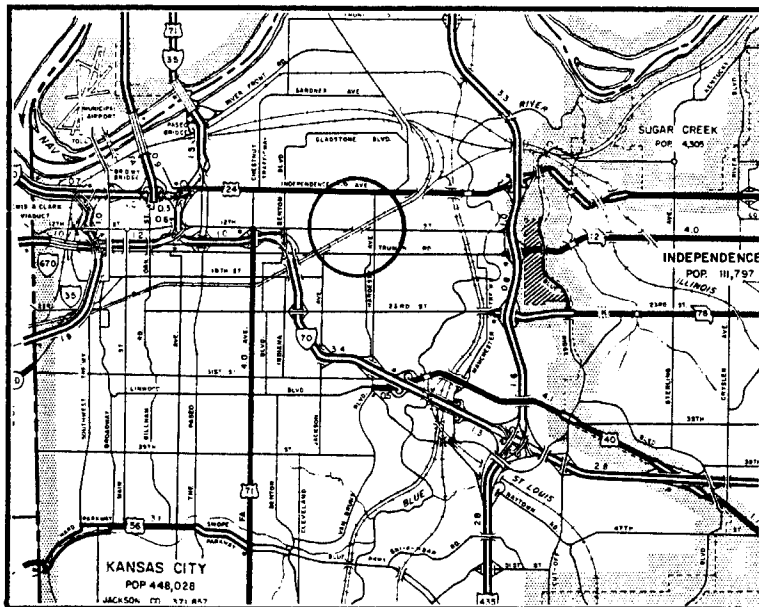
Completed in 1914 for the reported costs of \$577,330.49, the Twelfth Street Trafficway carried increasingly heavy vehicular and rail traffic for almost fifty years without major repair. In the mid-1960s, however, a major rehabilitation of the trafficway was undertaken, involving primarily deck reconstruction and replacement of the guardrails.

Unlike many Midwestern states, Missouri did not employ reinforced concrete extensively for construction of vehicular bridge superstructures in the 1910s. The various counties and, to a lesser extent, the state highway department continued to prefer steel for bridge superstructures well after concrete had received widespread acceptance elsewhere. The notable exception to this was in the large urban areas, where concrete's intrinsic rigidity under heavy vehicular and rail traffic offset its increased cost over steel. Several concrete viaducts and overpasses were built in Kansas City after the turn of the century, but none were larger than the Twelfth Street Trafficway. Considered a "bold departure in many respects from the established canons of design," this massive structure represents an extraordinary feat of civil engineering and construction management. The Twelfth Street Viaduct, according to one of its designers, "marks another important instance of the present tendency in American development to pass from the stage of pioneer civilization, with its temporary, but economical and expedient, types of buildings, works, ways, and systems, to an era of permanence, beauty of line and mass, sufficiency, and efficiency." The structure's double-deck configuration and through arch span are unique in Missouri and uncommon in the country. Given its importance to Kansas City transportation and its technological significance, the Twelfth Street Viaduct can be considered Missouri's foremost urban viaduct.

NAME(S) OF STRUCTURE

Twelfth Street Trafficway

PHOTOS AND SKETCH MAP OF LOCATION



LOCATION MAP

TAKEN FROM MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT
GENERAL HIGHWAY MAP

SOURCES

Missouri Highway and Transportation Department Structure Inventory and Appraisal: Structure Number S030B11; *Kansas City Times*, 10 April 1913; *Kansas City Journal*, 27 August 1913; Kansas City Public Service Company, *History of Bridges and Viaducts*; E.E. Howard, "The Twelfth Street Trafficway Viaduct, Kansas City, Missouri," *American Society of Civil Engineers Transactions*, Paper No. 1357 presented at the meeting of September 1, 1915, pages 485-487, 525, 531-533; *Kansas City Star*, 28 February 1965; *Kansas City Star*, 9 April 1965; field inspection by Mark Hufstetler, 4 February 1991.

INVENTORIED BY

Clayton B. Fraser

AFFILIATION

Fraserdesign, Loveland CO

DATE

24 September 1994