NPS Form 10-900 (Rev. 10-90)

ited States Department of the Interior National Park Service

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

State or Federal agency and bureau

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property
historic name <u>Bridgeport Lamp Chimney Co. Bowstring Concrete Arch Bridge</u>
^ Location
street & number <u>between Mechanic St. & B.O.R.R. tracks</u> not for publication <u>N/A</u> city or town <u>Bridgeport</u> vicinity <u>N/A</u> state <u>West Virginia</u> code <u>WV</u> county <u>Harrison</u> code <u>033</u> zip code <u>26330</u>
3. State/Federal Agency Certification
As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this 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

I. my opinion, the property meets criteria. (See continuation sheet f		
Signature of commenting or other officia	l Date	
State or Federal agency and bureau		
4. National Park Service Certification		
I, hereby certify that this property is:		
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):		
•		
	Signature of Keeper	Date of Action
5. Classification		of Action
5. Classification Ownership of Property (Check as many boxe private X public-local public-State public-Federal		of Action
Ownership of Property (Check as many boxe private X public-local public-State	======================================	of Action
Ownership of Property (Check as many boxe private X public-local public-State public-Federal Category of Property (Check only one box) building(s) district site X structure (bridge)	======================================	of Action

JSDI/NPS NRHP Registration Form 3ridgeport Lamp Chimney Co. Bowstring Concrete Arch Bridge 4arrison County, WV

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Number of contributing resources previously listed in the National Register $\underline{0}$

Name of related multiple property listing (Enter "N/A" if property is not part of a multiple property listing.) N/A

Architectural Classification (Enter categories from instructions)

other

Materials (Enter categories from instructions)

foundation

roof
walls

other reinforced concrete

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

3. Statement of Significance
Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)
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 values, 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 (Mark "X" in all the boxes that apply.)
A owned by a religious institution or used for religious purposes.
B removed from its original location.
C a birthplace or a grave.
D a cemetery.
E a reconstructed building, object, or structure.
F a commemorative property.
G less than 50 years of age or achieved significance within the past 50 years.
Areas of Significance (Enter categories from instructions) engineering ———————————————————————————————————
Period of Significance 1924
inificant Dates 1924

Verbal Boundary Description (Describe the boundaries of the property on a ontinuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By	
name/title Emory L. Kemp, President	
organization Past & Present date 23 Aug 1996	
street & number 429 Riley Street telephone 304-599-4838	
city or town Morgantown state WV zip code 26505	
Additional Documentation	
Submit the following items with the completed form:	
Continuation Sheets	
Maps A USGS map (7.5 or 15 minute series) indicating the property's location A sketch map for historic districts and properties having large acrease or numerous resources.	n. e
Photographs Representative black and white photographs of the property.	
Additional items (Check with the SHPO or FPO for any additional items)	
Property Owner	====
(Complete this item at the request of the SHPO or FPO.) name City of Bridgeport, Benedum Civic Center	
street & number 164 West Main Street telephone 304-842-8240	
city or town <u>Bridgeport</u> state <u>WV</u> zip code <u>26330</u>	_
Paperwork Reduction Act Statement: This information is being sollected	====

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, W shington, DC 20013-7127; and the Office of Management and Budget, Paperwork Luctions Project (1024-0018), Washington, DC 20503.

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NATIONAL REGISTER OF HISTORIC PLACES CONTINUATION SHEET

Section 7 Page 1

Bridgeport Lamp Chimney Co. Bowstring Concrete Arch Bridge Harrison County, WV

Description

This elegant bowstring reinforced concrete arch bridge represents a traditional bridge type which was readily adapted to what was essentially a new construction material: reinforced concrete. Unlike a rail or road bridge, this bridge can be considered an unusual pedestrian bridge in that it was built by the Bridgeport Lamp Chimney Company in 1924 to provide access from the glass plant to a warehouse on the other side of Simpson Creek. See attached HAER cover sheet with site map. Thus, the bridge was designed to carry hand carts with glass products across the river to the warehouse. The bridge remains the only evidence of the original works, and its successor, Master Glass Company. Thus the bridge stands in splendid isolation from any other structure.

I order to provide the maximum clearance over Simpson Creek and to avoid heavy abutments, a bowstring reinforced concrete arch bridge was selected. The arch form was widely used for concrete bridge structures. The traditional arch however, produced horizontal thrust which had to be sustained by the abutments. By using the deck as a tension tie the arch thrusts are carried by the deck structure so that the piers at each end of the bridge are required to support vertical loads only. The two piers were cast separately from the bridge superstructure. They were cast of concrete in a tapered shape and extend the full width of the bridge. It is not known if steel reinforcing was used in the piers, whereas reinforcing was essential to all of the elements of the bowstring superstructure.

From the arch ring, six reinforced concrete vertical tension members extend downward to the deck beams. These tie beams were cast monolithically to the deck without joints, in fact the entire bridge is a monolithic construction. In this arrangement the deck is required to span a short distance between the tie beams on either side by using the arch which is inherently strong and stiff. All of the other members were designed with slender proportions. The result is an elegant bridge which at the same time serves a utilitarian purpose in an economical manner.

The bridge is 70 feet 4 inches long by 8 feet 11.8 inches in width. The height of the center line transom is 10 feet above the deck. Although hidden from view, a notable feature is the proprietary reinforcement used throughout the structure. The principal reinforcing bars are either of the patented Havemeyer reinforcement, reduced by the Concrete Steel Company of New York, or a similar bar produced by a Cambria Iron Works of Johnston, PA. It was an era of intense competition among reinforcing bar manufacturers with each individual deformed bar pattern carefully protected by patents. Smooth bars of approximately 1/2 inch diameter were employed for stirrups throughout the bridge structure. The following are the

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overall cross sectional dimensions of the main members:

Arch 12" x 19"
Tension ties 9" x 15"
Deck 3"
Verticals 8" x 8"

The clear span, that is the distance between the abutments is 67 feet. The rise to the extrados of the arch is 9 feet 6 inches making the ratio of rise to span approximately 1:7. To provide lateral stability the two arches are joined at the top by a transom member with a vertical clearance of 8 feet 5 inches. The clearance between the longitudinal tension members is 8 feet 3 inches.

bridge was completed in 1924 by Frank Duff McEnteer and his Concrete Steel Bridge Company of Clarksburg, West Virginia.

The property was acquired by the Master Glass Company in 1940 and they remained in business until 1973 at which time the bridge was abandoned. As a result many of the members are badly deteriorated with exposed reinforcement in all the elements. Despite its forlorn appearance it is in original condition with no alterations except for the ramp which extended from the bridge to the warehouse which has been removed.

Plans are underway to restore the bridge to its original condition so that it can provide access to recreational areas on both sides of Simpson Creek. Planning calls for a set of steps on the west end rather than using a ramp. All other elements of the bridge will be restored to their original condition.

Statement of Significance

The reinforced concrete bowstring arch erected in 1924 by Frank Duff McEnteer and his Concrete Steel Bridge Company is an elegant expression of the bridge builders' art executed by one of the pioneers in the use of reinforced concrete for both bridges and buildings. The bridge is a poignant reminder of the early glass industry that flourished in the Clarksburg area and indeed in the state as a whole. The glass industry found a favorable business climate based on cheap natural gas and abundant quartzite for producing products ranging from utilitarian bottles to the finest cut glass. Little remains of the this once flourishing 'dustry.

During this period my company (the Concrete Steel Bridge Company) built approximately 1000 highway bridges, or at the rate of about 50 a year. If by major highway work you mean nationally outstanding bridges or sections of

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road, it was the purpose of our company to avoid such contracts. My realized ambition was to perfect an organization handling from 500 to 1000 men operating in small crews over a half dozen states, through a central engineering purchasing and executive office. The backbone of our business was concrete bridges of 50-100 foot spans.

Frank Duff McEnteer

In this way Frank Duff McEnteer described the company of which he was president and general manager from 1912 to 1931. The Concrete Steel Bridge Company specialized in reinforced concrete structures at a time when a nforced concrete was a fairly new structural material. The main emphasis or the company was in bridge work, ranging from modest spans of 20 feet to major multi-span bridges characterized by bold design, superior workmanship, and construction economy.

Frank D. McEnteer was born on May 23, 1882, in Reynoldsville, Pennsylvania, the son of Michael J. and Carrie Andrews McEnteer. He received his early schooling in Reynoldsville and then attended Cheltenham Military Academy for two years and Kiskiminetas Springs School for one year. From there he went to Harvard, where he graduated with an AB in 1905. While at Harvard, McEnteer attended the Lawrence Engineering School, and his ambition was to pursue a career in mining. Unable to find a job in this field, he worked for two years as resident engineer in charge of constructing a blast furnace in Hamilton, Ontario, Canada. Several other positions as a construction engineer served to give him experience and an abiding interest in construction engineering.

In 1911 McEnteer went to Clarksburg, West Virginia, to superintend the construction of the Palace Furniture Company's new building and embarked upon a career in building reinforced concrete structures.

Although concrete has a long history of use in construction, it was transformed into a new and versatile structural material with the addition of steel reinforcing to provide tensile strength and resilience to a brittle material weak in tension. This new material, called reinforced concrete, was developed in the latter half of the 19th century but was not employed censively until the turn of the century.

Unlike steel, timber, brick, or stone, reinforced concrete could be molded into any shape, which provided a versatility unknown to any other building material. It was first used in imitation of stone masonry in the form of

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solid arches and other shapes, depending on compression to resist any loads. This new material broke the shackles of traditional masonry forms when the flat slab floor system was developed about 1905, together with new monolithic structural forms for bridges and buildings, including the reinforced concrete bowstring arch.

Thus, McEnteer was in the forefront of a development in structural forms made possible by the introduction of reinforced concrete. He continued to use the monolithic reinforced concrete frame and mushroom floor system in numerous buildings in northern West Virginia. These buildings, although impressive engineering accomplishments, lacked the architectural refinements in form and detail that so clearly mark his principal area of activity - bridge work.

After the completion of the Palace Furniture Company building, he remained in Clarksburg, forming a partnership with P.M. Harrison, the representative in Clarksburg of the York Bridge Company. In 1914, McEnteer was appointed to superintend the construction of the Fourth Street bridge in Clarksburg, designed by the Luten Bridge Company, and thus began his interest in reinforced concrete bridges. Also in 1914, his partnership with P.M. Harrison developed into the incorporation of the Concrete Steel Bridge Company. Specializing in reinforced concrete structures, the company built from its own plans more than 1000 bridges, scores of industrial and commercial buildings, and many other structures such as dams, waterworks, and coal facilities.

The bridge company expanded each year and in 1924, the year of the construction of the Bridgeport Bridge, had 52 separate construction crews in the field. By 1925 several branch offices had been established in Pittsburgh and Harrisburg, Pennsylvania; Huntington West Virginia; Knoxville, Tennessee; and a subsidiary company in Jacksonville, Florida. The company policy in the early years had been to avoid large contracts, but in later years several large bridges were built.

The bridge company had diversified its interest from the beginning, and in 1916 McEnteer had incorporated the Clarksburg Supply and Equipment Company and the Clarksburg Fuel Coal Company. The building construction business, which had boomed in Clarksburg during the late teens, had sadly declined by 1926. In an effort to save the Clarksburg Supply and Equipment Company, a consolidation took place with two other companies (suppliers of concrete and concrete blocks) backed by the assets of the Concrete Steel Bridge Company. Assured that the problems of the Supply and Equipment Company were now solved, the bridge company embarked, in 1928-1929, upon a large bridge program. The chief project was the large multi-span bridge at Hyner,

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Pennsylvania. The resources of the bridge company were already hard pressed in supporting the Consolidated Supply Company, when unexpected difficulties were encountered in the foundations of the Hyner bridge, which required more working capital. Additional bank loans could not be secured and, as the Depression hit, the Concrete Steel Bridge Company was finally liquidated in September 1931.

McEnteer showed his disillusionment in the article he wrote for the Harvard class book on the 25th anniversary of his graduation:

I once thought that the design and construction of about 600 bridges (some fairly important) might be considered an achievement, but in retrospect, it looks like just another method of earning a living.

Following the collapse of his company, Frank McEnteer joined the State Road Commission, first as a district engineer, and later as construction engineer for the northern district of West Virginia. He played an important role during World War II in the Middle East and rose to be named chief engineer of the construction division for the U.S. Armed Forces in Africa and the Middle East.

Returning to Clarksburg after the war at an age when most men would think of retiring, McEnteer opened an office as a consulting engineer and served in this capacity until his death in 1957.

Many of McEnteer's bridges and buildings remain in service after half-acentury. Although there are larger bridges bearing the stamp of McEnteer, the Bridgeport Bridge is a most fitting memorial to a pioneer of reinforced concrete.

The Bridgeport Bridge is the sole surviving structure of the Bridgeport Lamp Company and its successor, the Master Glass Company. Founded in 1904, the Bridgeport Lamp Chimney Company was one of many glass factories located from Weston to Morgantown in the Monongahela Valley.

The Bridgeport Lamp Chimney Company flourished following World War I, requiring an expansion of facilities in 1923, when a total of 24,000 lamp imneys were produced each day. The level of production required extra storage, which led to the construction of a warehouse across Simpson Creek and the need for a bridge.

The company was sold to the Master Glass Company in 1940, which embarked

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upon the manufacture of glass marbles, not only for recreational purposes, but also for roll-on deodorant products and sign reflectors. This firm remained in production until 1973. Later in 1973 the plant was acquired by the city of Bridgeport. In 1975 the buildings were razed to make way for a swimming pool, tennis courts, and parking as part of the city's park and recreation department. Recreational facilities extend on both sides of Simpson Creek.

Bibliography

- Condit, Carl W., <u>American Building Art: The Twentieth Century.</u>
 New York: Oxford University Press, 1961.
- H 1, George A. and Johnson, Nathan C., <u>Concrete Engineer's Handbook</u>. New York: McGraw-Hill, 1918.
- Kemp, Janet K. and Kemp, Emory, "People in Public Works: Frank Duff McEnteer", <u>American Public Works Association Reporter</u> (February 1985): 4-5.

Letter from Quentin P. Bennett, District Conservationist, Soil Conservation Service, U.S. Department of Agriculture, Clarksburg, WV to Rexford K. Stone, Civil Engineer, River Basin-Watershed Planning Staff, Morgantown, WV. May 23, 1972.

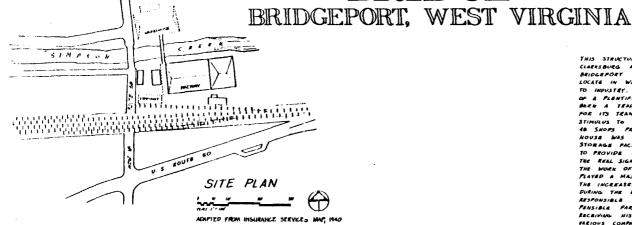
Verbal boundary description

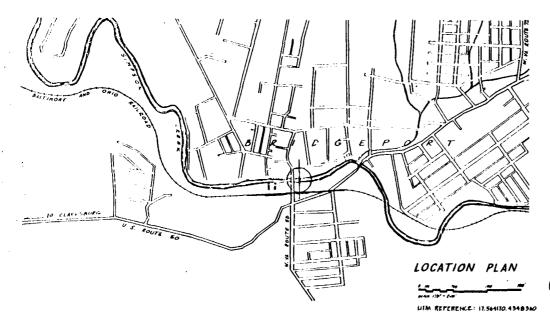
UTM coordinates are for the center of the bridge which is shown on the site map on HAER cover sheet (attached).

Verbal boundary justification

The nominated property is the bridge only.

BRIDGEPORT LAMP CHIMNEY COMPANY BRIDGE





CLARKSBURG AREA AND OF THE STATE AS A WHOLE, FOUNDED IN 1904, THE BRIDGEPORT LAMP CHIMNEY COMPANY WAS ONE OF MANY COMPANIES WHICH CHOSE TO LOCATE IN WEST VIRGINIA TO TAKE ADVANTAGE OF RECENT DEVELOPMENTS PAVORABLE TO INPUSTRY. MOST IMPORTANT IN TERMS OF THE GLASS INPUSTRY WAS THE PROSPECT OF A PLENTIFUL AND INEXPENSIVE SUPPLY OF NATURAL GAS AS PUBL. BEEN A TRAPITIONAL PROBLEM W THE GLASS TRAPE AND WAS PRIMARILY RESPONSIBLE FOR ITS TRANSIENT CHARACTER, THE FIRST WORLD WAR PROVED TO BE A GREAT STIMULUS TO THE COMPANY'S BUSINESS. IN 1923, THE PLANT WAS EXPANDED TO 40 SHOPS PRODUCING A TOTAL OF 24,000 CHIMNEYS FOR DAY, AND A WARE-HOUSE WAS BUILT ON THE OTHER SIDE OF SIMPSON CREEK TO PROVIDE ADEQUATE STORAGE PACILITIES, IN 1924, THE REINFORCED CONCRETE ARCH BRIDGE WAS BUILT TO PROVIDE A CONNECTION FROM THE PLANT TO THIS WARRHOUSE, THE REAL SIGNIFICANCE OF THIS BRIDGE LIES IN ITS ENISTENCE AS AN EXAMPLE OF THE WORK OF FRANK P. M'ENTEER, A NATIVE OF PENNSYLVANIA, M'LNTEER PLAYED A MAJOR ROLE IN THE INDUSTRIAL EXPANSION WHICH WAS A RESULT OF THE INCREASED UTILIZATION OF WEST VIRGINIA'S COAL, GAS, AND O'L RESOURCES. DURING THE BUILDING BOOM WHICH ACCOMPANIED THIS EXPANSION, HE WAS PRIMARILY RESPONSIBLE FOR MAKING THE TECHNOLOGY OF REINFORCED CONCRETE AN INDIS-PENSIBLE PART OF THE GRAMMER OF BRIDGE AND BUILDING CONSTRUCTION. BECEIVING HIS DEGREE PROM HARVARD UNIVERSITY IN 1908, MENTEER WORKED FOR VARIOUS COMPANIES IN HAMILTON, ONTARIO; DETROIT; AND PITTSBURGH SEFORE SETTLING IN CLARKSBURG IN 1912. IN THAT YEAR, HE BUILT THE PALACE FURNITURE COMPANY (STILL STANDING), THE FIRST REINFORCED CONCRETE BUILDING IN WAST ON JANUARY 19, 1914, M'ENTEER FORMED THE CONCRETE STREE BRIDGE COMPANY OF WHICH HA SERVED AS PRESIDENT AND GENERAL MANAGER PROM THAT DATE UNTIL 1932 WHEN THE COMPANY WAS DISSOLVED IN THE THROES OF THE PEPRESSION, MERNTER BUILT HUNDREDS OF REINFORCED CONCRETE BUILDINGS AND BRIDGES. ASIDE FROM SUPPLYING A MAJOR PART OF WEST VIRGINIAS HIGHWAY BRIDGES, THE COMPANY BUILT BRIDGES IN NEW YORK, FENNSYLVANIA, MORTH CAROLINA, TENNESSEE, AND ALSO BUILT MANY IN FLORIDA PURING THAT STATES LAND BOOM IN THE 1920'S. IN EFFECT, THE BRIDGEPORT LAND CHIMMEY COMPANY BRIDGE IS AN EXAMPLE OF THE WORK OF WEST VIRGINIA'S MOST IMPORTANT EARLY BUILDER OF REINFORCED CONCRETE STRUCTURES AND ONE OF THE MOST IMPORTANT IN THE COUNTRY.

THIS SURVAY, COMPUCTAD BY THE MISTORIC AMERICAN ENGINEERING RECORD (MARR), IS PART OF A LONG-RANGE PROGRAM TO COMPLETE INVENTORIES OF THE SO STATES, AND INCLUDES A GROUP OF MIST-RICALLY SIGNAFICANT ENGINEERING STRUCTURES IN THE STATE OF WAST VIRGINIA. THE SURVEY WAS SPONJORED BY THE MISTORIAL PARK SERVICE (MARR), THE MEST VIRGINIA DEPARTMENT OF MIVIAL RESOURCES, AND THE DEPARTMENT OF CIVIL ENGINEERING, MEST VIRGINIA UNIVERSITY.

THE FIRLD WORK, WRITTEN DITA, MRASURED DRAWINGS, NISTORICAL INVENTORY, AND PROTOGRAPIS PRODUCED DURING THE SUMMER OF 1973 WERE PREPARED UNDER THE DIRECTION OF POVOLAGE L. GRIPFIN, CHILER, MARR, AND CHARLES PARROTT III. ARCHITECT, MER, WITN DR. DUAME S. ELLIFRITT AS PROJECT SUPERVISOR (OKLANOMA STATE UNIVERSITY) AND DR. EMPLY L. KEMP AS PROJECT ADMISOR (WAST WIRGHIM UNIVERSITY). THE SURVEY TRAM COUSTISTED OF DENNIS M. ZEMBALA, MISTORIAN (GEORGE WASHINGTON UNIVERSITY), PATRICK A. FLORY, ARCHITECT (COLUMBIA UNIVERSITY); R. BELMOUT PRESMAIL, ARCHITECT, (UNIVERSITY OF PRIVASITY OF PRIVASITY OF PRIVASITY OF PRIVASITY OF PRIVASITY OF PRIVASITY OF TRANSITY OF TRANSPORTED.

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ASTER GLASS COMPANY) BRIDG

AMP CHIMNEY COMPANY (MASTER GI CROSSING SIMPSON CREEK HARRISON COUNTY

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WEST VINGINIA SURVEY

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