

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section number _____ Page _____

SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 04001092

Date Listed: 9/29/04

Arrawanna Bridge
Property Name

Middlesex
County

CT
State

N/A
Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

*Entered in the
National Register*

Signature of the Keeper

9-29-04

Date of Action

=====
Amended Items in Nomination:

8. Statement of Significance: Period of Significance:

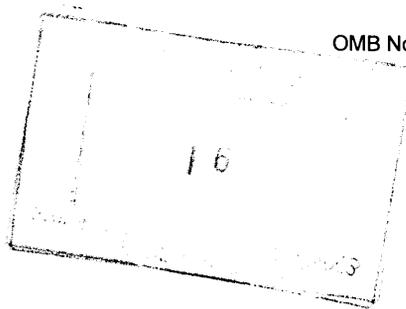
The period of significance for this property's historical and engineering significance under criteria A and C is 1918.

This was confirmed with CTSHPO staff by telephone.

DISTRIBUTION:

- National Register property file
- Nominating Authority (without attachment)

**United States Department of the Interior
National Park Service**



**National Register of Historic Places
Registration Form**

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 an 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 ARRAWANNA BRIDGE

other names/site number Bridge No. 4536

2. Location

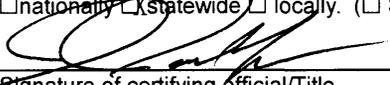
street & number Berlin Street at Coginchaug River not for publication

city or town Middletown vicinity

state Connecticut code CT county Middlesex code 007 zip code 06457

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, 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 meets does not meet the National Register criteria. I recommend that this property be considered significant nationally statewide locally. (See continuation sheet for additional comments.)

 08/10/04
Signature of certifying official/Title Date

J. Paul Loether, Division Director, Connecticut Commission on Culture & Tourism
Deputy State Historic Preservation Officer

State or Federal agency and bureau

In my opinion, the property meets does not meet the National Register criteria. (See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

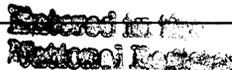
4. National Park Service Certification

I hereby certify that the 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 the Keeper

Date of Action



9-29-04

Arrawanna Bridge (Bridge No. 4536)
Name of Property

Middlesex County, CT
County and State

5. Classification

Ownership of Property

(Check as many boxes as apply)

- private
- public-local
- public-State
- public-Federal

Category of Property

(Check only one box)

- building(s)
- district
- site
- structure
- object

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
_____	_____	buildings
_____	_____	sites
_____ 1 _____	_____	structures
_____	_____	objects
_____ 1 _____	_____ 0 _____	Total

Name of related multiple property listing

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

_____ N/A _____

Number of contributing resources previously listed in the National Register

_____ 0 _____

6. Function or Use

Historic Functions

(Enter categories from instructions)

TRANSPORTATION: road-related

Current Functions

(Enter categories from instructions)

TRANSPORTATION: road-related

7. Description

Architectural Classification

(Enter categories from instructions)

Other: open-spandrel concrete arch

Materials

(Enter categories from instructions)

foundation N/A
walls N/A

roof N/A
other N/A

Narrative Description

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

8. Statement of Significance

Applicable National Register Criteria

(Mark an "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.
- 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.)

Property is:

- A** owned by a religious institution or used for religious purposes.
- B** removed from its original location.
- C** a birthplace or grave.
- D** a cemetery.
- E** a reconstructed building, object, 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
TRANSPORTATION

Period of Significance

1915-1935

Significant Dates

1918

Significant Person

(Complete if Criterion B is marked above.)

N/A

Cultural Affiliation

Architect/Builder

Connecticut Highway Department, engineers

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographic References

Bibliography

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- preliminary determination of individual listing (36 CFR 67) has been requested
- previously listed in the National Register
- previously determined eligible by the National Register
- designated a National Historic Landmark
- recorded by Historic American Building Survey # _____
- recorded by Historic American Engineering Record # _____

Primary location of additional data:

- State Historic Preservation Office
- Other State agency
- Federal agency
- Local government
- University
- Other

Name of repository:

Connecticut Historical Commission,
59 South Prospect Street, Hartford, CT 06106

Arrawanna Bridge (Bridge No. 4536)
Name of Property

Middlesex County, CT
County and State

10. Geographical Data

Acreage of Property less than one

UTM References

(Place additional UTM references on a continuation sheet.)

1 18 694570 4603640
Zone Easting Northing

2

3
Zone Easting Northing

4

See continuation sheet

Verbal Boundary Description

(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification

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

11. Form Prepared By

name/title Bruce Clouette, Historian

organization Public Archaeology Survey Team, Inc. date March 31, 2003

street & number P.O. Box 209 telephone 860-429-1723

city or town Storrs state CT zip code 06268

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 acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional Items

(Check with SHPO or FPO for any additional items.)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name City of Middletown, Connecticut

street & number Department of Public Works, 245 deKoven Drive telephone 860-344-3408

city or town Middletown state CT zip code 06457

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 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, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)

Section number 7 Page 1

Middletown, Middlesex County, CT

Description:

The Arrawanna Bridge, last designated as Bridge No. 4536 in the statewide bridge information system, formerly carried Berlin Street over the Coginchaug River in Middletown, Connecticut. In 1974 the bridge was bypassed by a new alignment of Route 72 (now Route 3), and it has been out of service ever since. The bridge is an open-spandrel reinforced-concrete arch, 55 feet long, with a rise of 19 feet (Photographs 1). The arch itself is a single barrel 20 feet in width and varies in thickness from 15 inches at the crown to 40 inches at the springing points. Rising from the arch to support the concrete-slab roadway are a series of eight walls, 12 inches in thickness, with two additional walls against the abutment measuring 18 inches thick. The roadway (Photograph 2) is 23 feet wide inside of the railings, with the excess width carried on coved brackets. The bridge has a skew of 7 degrees, so the supporting walls do not run perpendicular to the sides of the bridge; however, the brackets do extend out at right angles. The openings between the supporting walls are given an arched shape by means of fascia beams at the tops.

The bridge is set against brownstone abutments that were part of an earlier bridge at the site. The large, roughly squared blocks are set in cement mortar. The raised mortar joints probably date from the building of this bridge or shortly thereafter, when portions of the retaining walls for the approaches had to be rebuilt.

The bridge's concrete railings are three feet high and feature recessed round-arched panels. Originally, the panels had a rough hammered finish, but erosion of the surface of the concrete has exposed the aggregate about the same on all surfaces (Photograph 3). The railings end in large piers, two of which are incised with the date "1918" (Photograph 4). Along the approaches, the railing changes to a brownstone rubble wall with raised joint like those in the masonry below.

Although deliberate changes to the bridge since its original construction are few, its historic integrity is threatened by its ongoing deterioration. Thirty years of vegetative growth has resulted in tree-sized shrubs along the edges of what remains of the roadway pavement (Photographs 2 and 5). The lower part of the railing has eroded away on both sides of the bridge, and the brackets in the center of the bridge have been reduced to nubs. Ivy covers the surface of the approaches, which show signs of subsidence. Besides closing the bridge, actions taken to address its deterioration include replacement of sections of approach railing with modern concrete barriers (Photograph 1, left) and installation of steel-plate facing on the inside of the east railing (Photograph 5, left).

The historic name of the structure, Arrawanna Bridge, was taken from the Connecticut Highway Department's 1918 Annual Report, which included a photograph of the bridge as one of the year's notable projects. At that time, the Coginchaug River was sometimes called the Arawana River (spelling varies), supposedly a local Indian name that also was applied to the Arrawanna Mills, manufacturer of mosquito netting, which was located just upstream. The City of Middletown referred to the bridge as the Berlin Street bridge over the West River (another name for this stream).

Next page: Proposed Bridge over the Arawana River, October 10, 1917, Connecticut Department of Transportation Middletown file.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)
Middletown, Middlesex County, CT

Section number 8 Page 1

Statement of Significance:

Summary

The Arrawanna Bridge is significant as an early example of open-spandrel bridge construction (Criterion C) and as a resource that recalls the early 20th-century program of road improvements undertaken by the Connecticut Highway Department, the predecessor agency to today's state Department of Transportation (Criterion A). The bridge is small for the open-spandrel type—most open-spandrel arches are 100 feet or more in length—but it is notable nevertheless because it is the first such design completed by the Department. Finished in 1918, it was prominently featured as an illustration in the Connecticut Highway Commission's 1918 *Annual Report*. In the 1920s and 1930s, the state highway department went on to complete five more, much larger open-spandrel projects on major state roads.

Engineering Significance

Reinforced concrete was a relatively new material when this bridge was designed. From about 1900 to 1915, there was a period of development in which mixtures and systems of reinforcement varied before becoming reduced to what we would recognize today as standard practice. In fact, the drawings for this bridge made in 1917 indicate a last-minute change from square reinforcement bars to the more familiar round rod still in use. Engineers of the period valued reinforced concrete as a material for building bridges because of its great strength both in compression and in tension and because of its apparent imperviousness to the environmental forces that caused other materials to deteriorate. Concrete was also inexpensive relative to other bridge-building methods, the only large material expense being the reinforcement steel. Labor was another matter, since concrete bridges required intricate wooden forms, and the small cement mixers then in use resulted in many pourings. However, local contractors and workers benefitted from concrete construction, since a larger portion of the cost ended up with them rather than with distant bridge companies.

The design of concrete bridges was extensively discussed in the technical literature of the period, so it is not surprising that the engineers of the Connecticut Highway Department felt comfortable with a concrete arch for the Arrawanna Bridge. Of the several types of concrete bridges, slabs were used for the shortest bridges, concrete beams for somewhat longer spans, solid-spandrel arches (also called filled-spandrel arches) for up to about 60 feet, and open-spandrel arches for the longest spans. Solid-spandrel arches supported the roadway on fill contained between the spandrel walls; they were somewhat less complex to design and required much simpler formwork, so they were the bridge of choice for the 30 to 60 foot range. As the length of the arch increased, however, so did the dead load of the bridge, which included the arch barrel or ribs, spandrels, fill, and roadway. Over a certain point, economy dictated eliminating the fill by using an open-spandrel design and thereby greatly reducing the dead load. With an open-spandrel design, the arch itself and the footings for the bridge could be made much less massive. The drawback was that there were more individual components to design, and the formwork was more complex. Because it reduced the bridge to only its most essential elements, the open-spandrel arch also achieved a graceful appearance that was well appreciated by the engineers of the period.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)

Section number 8 Page 2

Middletown, Middlesex County, CT

The Arrawanna Bridge is thus on the small side for the type; the other five Connecticut open-spandrel arches are all 100 feet or more in span. However, the relatively high rise of the arch needed to maintain the roadway at its existing level, and the re-use of the abutments of the previous bridge as approaches (perhaps restricting somewhat the amount of excavation that could be undertaken for footings) may have tipped the economic considerations in favor of the open-spandrel design. It is equally probable that the Department wanted to use the Arrawanna project as a small-scale prototype of the open-spandrel design before using it on larger projects, such as the five 100-foot open-spandrel arches of the Washington Bridge, then in design but not completed until 1921. Whatever the reason, the result is a bridge that is unlike any other in Connecticut. Instead of the usual paired arched ribs, the Arrawanna Bridge used a single somewhat wider barrel, thereby cutting the formwork in half and eliminating the need for cross-ties. Similarly, the use of supporting walls instead of the usual columns made the formwork simpler and allowed the roadway slab to rest directly on the uprights rather than needing transverse floor beams.

Transportation History Significance

The Arrawanna Bridge recalls the important initiatives undertaken by the Connecticut Highway Department in establishing a state highway network in the early years of the 20th century. Connecticut roads were almost entirely the responsibility of individual towns before 1895, when the Connecticut Highway Commission was established.. Although it provided the towns with some money, its role was largely advisory until 1907, when the Commission, along with its operating agency, the State Highway Department, received authority to designate and directly improve the state's major roads, which were termed Trunk Lines. This was the beginning of a system of highways that addressed the needs of individual regions within the state as well as the state as a whole. The rural interests that dominated the state legislature at the time were especially focused on improving market access for growers of agricultural products, but factory owners and the motoring public stood to benefit as well. In 1915 construction and maintenance of bridges on the Trunk Lines were added to the Department's responsibilities.

The Arrawanna Bridge was one of the first bridge projects undertaken by the Department under its new mandate. Berlin Street was an important road that connected the densely-built downtown commercial district of Middletown with Berlin and New Britain to the north. The Highway Department had prepared drawings of existing conditions on Berlin Street in 1913, including the old one-lane iron truss that crossed the river, so some of the work was already done when the Department was given authority over Trunk Line bridges. A preliminary concept for the new bridge was dated July 1916, with detailed plans finished by October 1917. The actual cost for the bridge cannot be determined because the project included considerable road work on Berlin Street as well, and the work was paid for, along with other projects, from the state's "Trunk Line Bridges-Miscellaneous" account. The contractors for the Berlin Street work were two local firms, S. Mazzotta and F. Arrigoni & Brothers. The town government of Middletown contributed \$6,000.00 towards the project.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)
Middletown, Middlesex County, CT

Section number 8 Page 3

Integrity Issues

Because it no longer serves any function, and is closed even for pedestrian use, the bridge appears headed toward continued deterioration. Despite its condition, the bridge remains notable for several reasons: it is one of the oldest state-highway bridges remaining in Connecticut today; it retains its original railing, a character-defining feature because of its simple Neo-Classical styling; and it is the only barrel-arch design among the state's six open-spandrel bridges. Even as a near-ruin, it adds to our appreciation of the high level of technical expertise shown by the state's first bridge engineers, and it recalls the very first years of state-highway bridge construction in Connecticut.

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)
Middletown, Middlesex County, CT

Section number 9 Page 1

Bibliography:

Clouette, Bruce, and Matthew Roth. Connecticut Historic Bridge Inventory. Connecticut Department of Transportation, 1990.

_____. *Connecticut's Historic Highway Bridges*. Newington, Conn.: Connecticut Department of Transportation, 1991.

Condit, Carl W. *American Building: Materials and Techniques from the First Colonial Settlements to the Present*. Chicago: University of Chicago Press, 1968.

Connecticut Department of Transportation, Middletown Town Projects Drawing File.

Connecticut Highway Commission. *Annual Report, 1918*, Table 3-L;.

Connecticut State Highway Department. *Forty Years of Highway Development in Connecticut, 1895-1935*. New Haven: Connecticut Tercentenary Commission, Publication No. 46, 1935.

Hool, George A., and W. S. Kinne. *Reinforced Concrete and Masonry Structures*. New York: McGraw-Hill Book Company, 1924.

Legat, Arthur W. *Design and Construction of Reinforced Concrete Bridges*. London: Concrete Publications, 1948.

McCullough, Conde B. *Economics of Highway Bridge Types*. Chicago: Gillette Publishing Co., 1929.

Middletown, Town of. *Annual Report, 1918*, p. 70.

Urquhart, Leonard C., and Charles-Edward O'Rourke. *Design of Concrete Structures*. New York: McGraw-Hill Book Company, 1926.

Waddell, J. A. L. *Economics of Bridgework*. New York: John Wiley and Sons, 1921.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Arrawanna Bridge
(Bridge No. 4536)
Middletown, Middlesex County, CT

Section number 10 Page 1

Verbal Boundary Description:

The nominated property includes the bridge and abutments.

Boundary Justification:

The nominated property embraces the entire historic structure.

United States Department of the Interior
National Park Service

**National Register of Historic Places
Continuation Sheet**

**Arrawanna Bridge
(Bridge No. 4536)
Middletown, Middlesex County, CT**

Section number Photographs Page 1

All Photographs:

1. Arrawanna Bridge (Bridge No. 4536)
2. Middletown, Middlesex County, CT
3. PAST, Inc. Photo
4. Photographs 1, 3, 4, 5: April 2003; Photograph 2: March 2001
5. Negative filed with PAST, Inc., Storrs, CT

Captions:

West side of bridge, camera facing northeast
Photograph 1 of 4

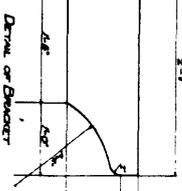
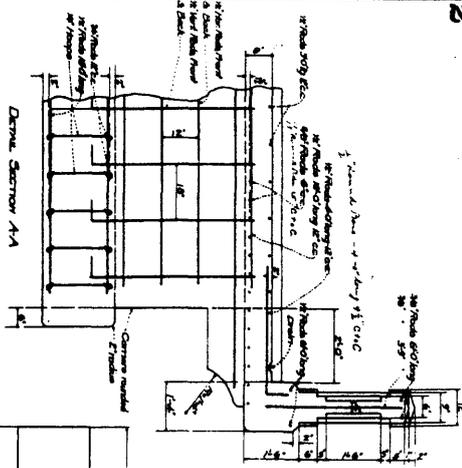
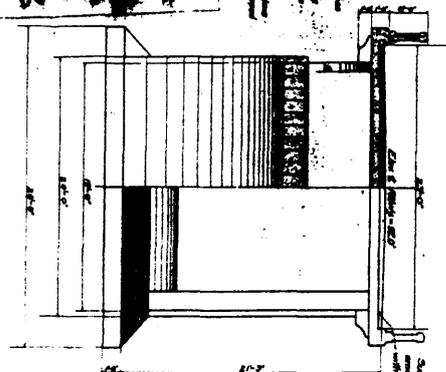
Roadway level, south end, camera facing north
Photograph 2 of 4

Detail of inside of railing, west side, camera facing southwest
Photograph 3 of 4

Detail of date on east railing pier, camera facing east
Photograph 4 of 4

Office of State Highway
 Hartford, Ct.
 Drawn by L.A.B.
 Checked by J.P.
 Approved by J.P.

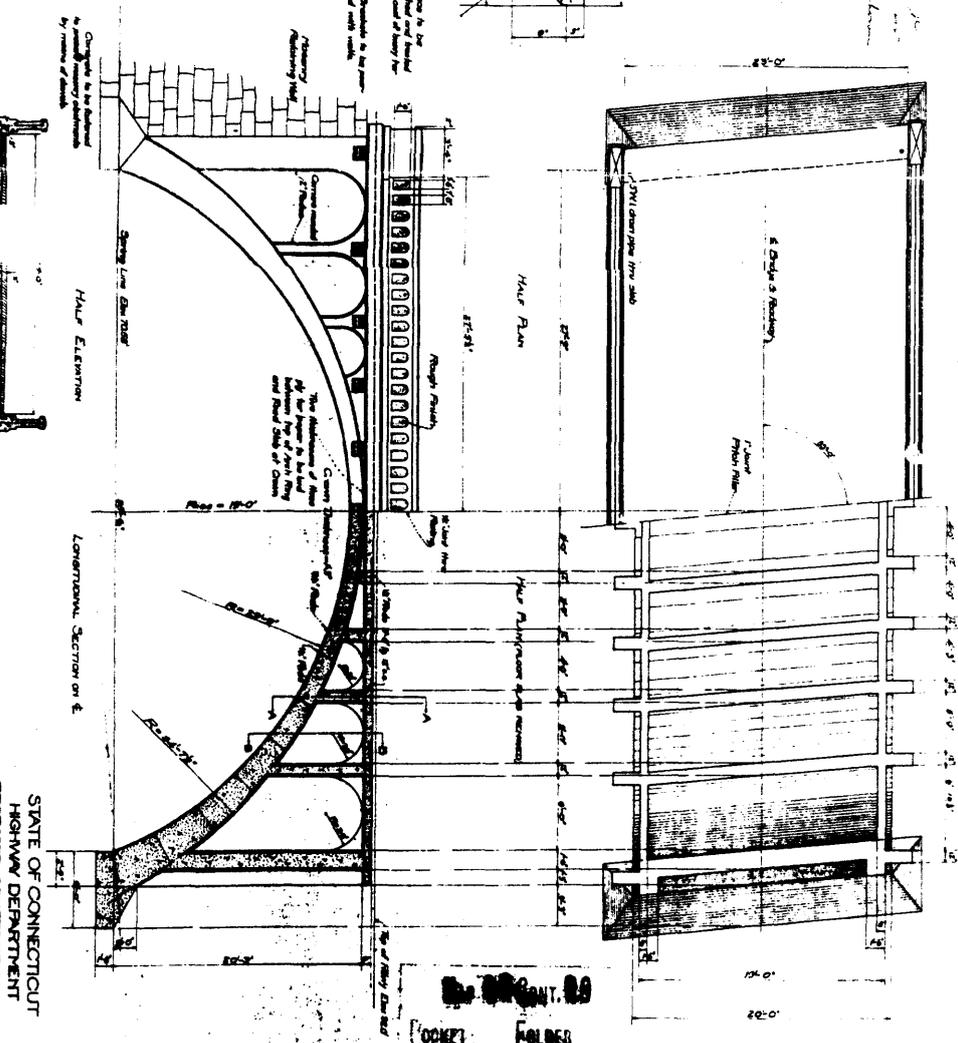
Half Section BB Half End Elevation



Half Section CC Half End Elevation

Half Section DD Half End Elevation

Longitudinal Section on E



STATE OF CONNECTICUT
 HIGHWAY DEPARTMENT
 PROPOSED CONCRETE BRIDGE
 OVER THE
 SARAWANA RIVER
 IN THE TOWN OF
 MIDDLETOWN
 DRAWN BY L.A.B. OCT 10 1927

