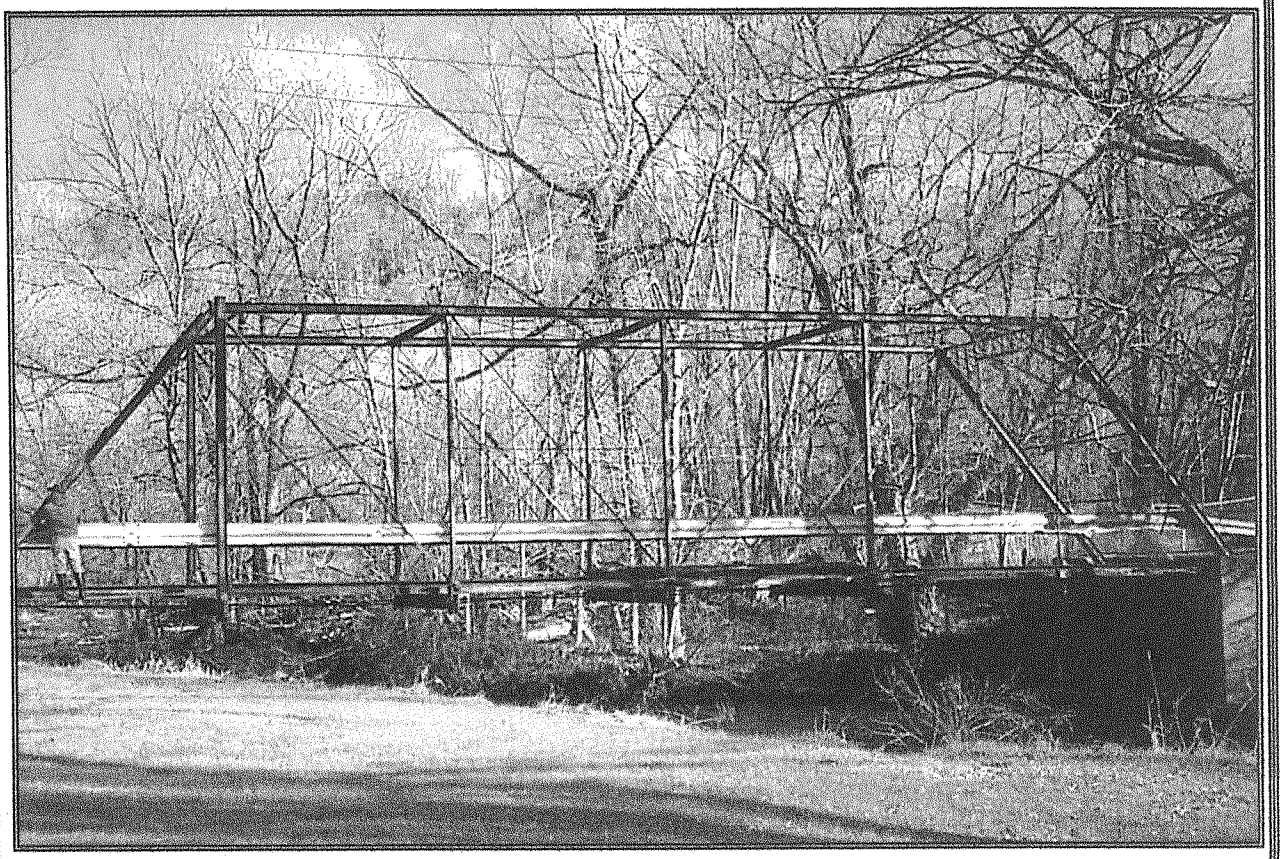
Marty

LOWER TODDSVILLE BRIDGE

BIN #2227960



Existing Conditions Survey

&

Recommended Rehabilitation Steps
To Convert Bridge from a Vehicular Bridge to
A Pedestrian and Bicycle Bridge

January 2007

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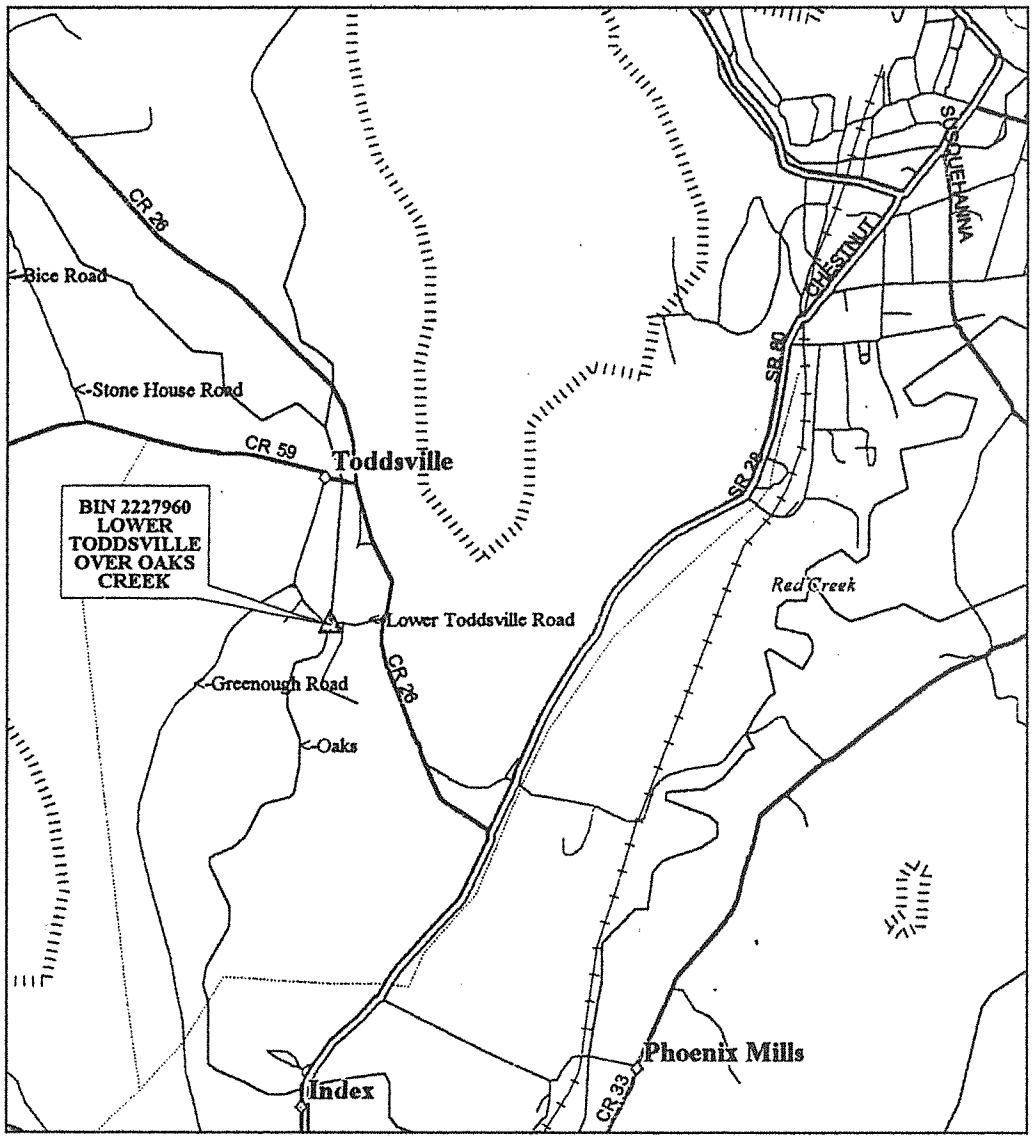
Historical Background

The Lower Toddsville Bridge crosses Oaks Creek separating Upper Toddsville from Lower Toddsville and the Towns of Otsego and Hartwick. It is located approximately one mile southwest of Cooperstown, NY. The bridge was turned over to Otsego County in the early 1990s.

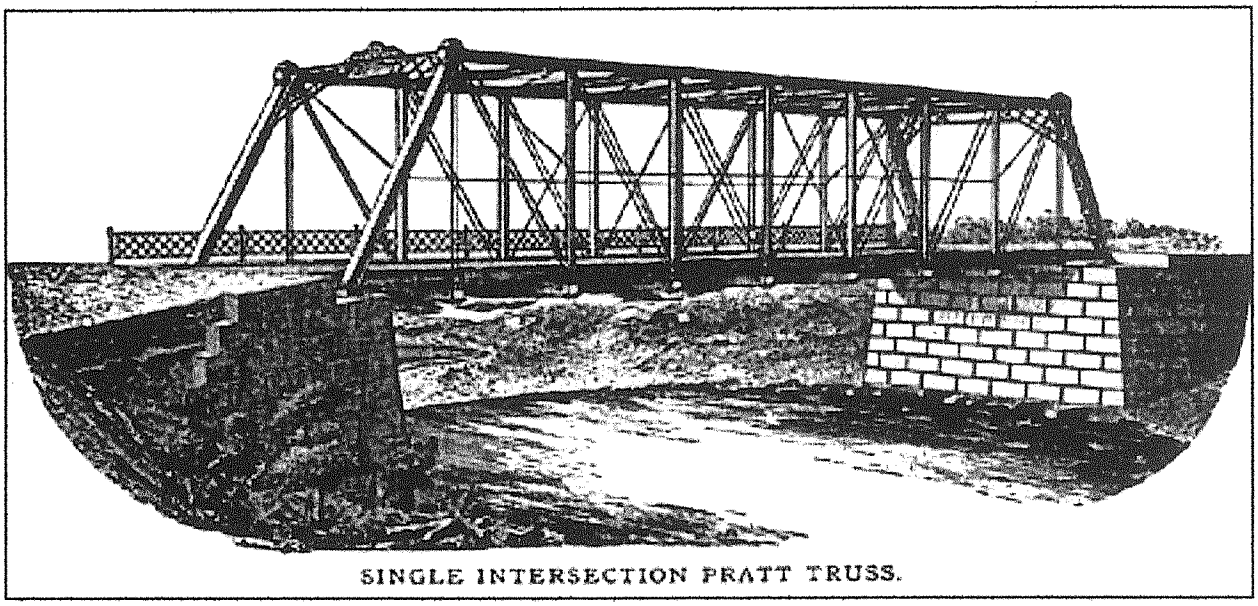


Locus Map of Bridge Site – NYSDOT

Oaks Creek runs southerly past the bridge in a meandering path. Just north of the bridge the creek makes a sharp loop and straightens out below the site with maximum flow and depth on the easterly side of the creek. During a 2006 summer flood the creek rose in elevation, with the bridge deck near the level of flow. Lands west of the bridge were completely inundated by the flood, and debris is still evident on the bridge at panel point L4 on the southerly truss.

The bridge was fabricated and erected by the Wrought Iron Bridge Company of Canton, Ohio. This firm was founded in 1864 and incorporated in 1871. It had agents in Ohio, New York City, Chicago and Kansas City who sold long and short span bridges to county agents or bridge companies throughout the eastern part of the United States. They advertised that all they needed to quote a price was number of spans and length of each span, width of roadway, number and width of sidewalks, kind of lumber to be used for decking, the name of the nearest railroad station and distance from the bridge site. In addition the bridge company would have to give the "strength or capacity" of the bridge and whether it was to be on a county road, located in a city or turnpike. The owner would normally be responsible for placing the abutments and piers, and the bridge company erected the superstructure and decking. With this information the company would quote an erected price and date of delivery. In their pamphlet they announced that frequently the total time from quote to erection was within a month. The truss parts would be shipped by rail and thence by wagon to the bridge site. Since it was a pin connected truss the parts could be easily erected on timber falsework (temporary wooden platform) usually in a day or two with decking taking another day.

The Wrought Iron Bridge Company advertised Pratt trusses of various spans, bowstring trusses, and pony trusses. The Toddsville Bridge is similar to the standard Pratt Truss shown in their pamphlet.



SINGLE INTERSECTION PRATT TRUSS.

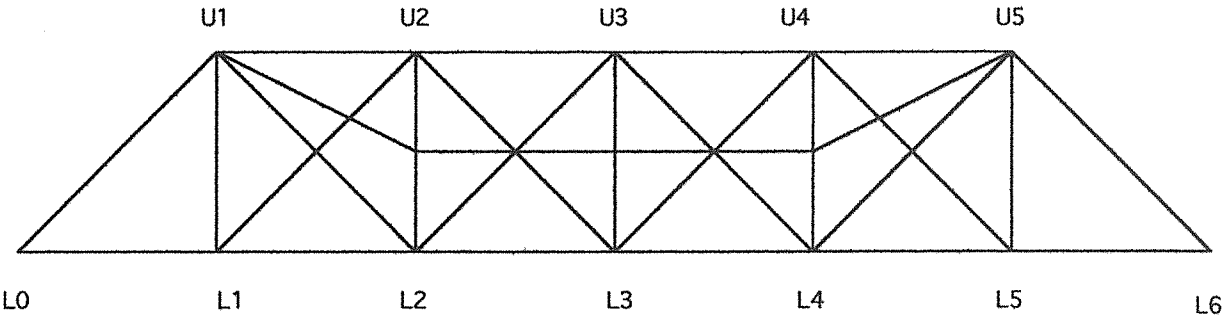
The bridge shown above is an eight panel truss compared to the Toddsville Bridge being a six panel truss. All details of the bridge shown are similar to the Toddsville Bridge. In order to stiffen the vertical posts a tension rod dropped down from the first top chord panel point to the middle of the adjacent post and then was connected by a horizontal rod to the last vertical and then back up to the far top chord panel point. These rods acted only in tension but braced the posts against buckling about their weak axis.

The bridge closed in the early 1990s and dirt piles were placed at both ends to prohibit vehicular traffic. Pedestrians and bicyclists continued to use the bridge. In the summer of 2006 vandals

tore up part of the decking and the county tore up much of the remainder in November 2006 as the first step in its demolition. After meeting with a citizens group the county placed wire and plastic fencing across both ends of the bridge to keep all traffic off. An agreement was made to withhold the demolition until this report and plan of action was completed.

Review of NYSDOT Inspection reports

The last bridge inspection by the NYSDOT was on June 27, 1995 and the bridge had been closed since the early 1990s. Biennial inspection reports from 1983 to 1995 were also reviewed. The 1995 report is summarized below.



East End (Begin) Truss Member Notation West End (End)
North and South Trusses Identical

Abutments: easterly abutment concrete spalled along edge. Patched area at mid height sounds hollow with hammer. Hairline vertical cracks at random locations.

Bearings: vegetation and dirt restrict movement of bearings. No space for expansion at 80° F.

Erosion and Scour: no undermining. Ftg. of left wing wall is not exposed. Right wing wall ftgs. are exposed up to 20" ht. due to erosion.

Drainage: begin (east side) drains onto the bridge. Dirt is dumped on approach to stop vehicles.

Guide Rails: begin rt. guide rail is torn off due to impact....

Primary Members: floor beams and stringers have minor rust, loss of flange thickness < 5%, Top plate of the top chards and end post have crevice corrosion ...forge lines are visible at several loop bars, but dye penetration test in 1991 show no cracks, Lt truss L0-U1 has impact damage, L0-L1 inboard member loose, U1-L2 in board member bent at railing, L4-L5 outboard member is bent at L4.. Right truss (north) L4-L5 inboard member bent, Top bracing bent between U3 (left) and U3(right).

Paint: general corrosion throughout with crevice corrosion in top lats. Locally 5 – 10% thickness loss.

Sign: NA

Inspection December 22, 2006 by F. E. Griggs, Jr.

Abutments: the easterly abutment remains in same condition as 1995. Spalled concrete along top edge, hollow sounding area on vertical face in mid wall, probably due to some erosion behind concrete at boundary of original masonry wall. Wall is generally plumb except for buldge area at middle of wall. Concrete footing is intact and level with no signs of settlement or scour. This footing is the most susceptible to scour, as the stream turns to the right at this abutment. The westerly abutment has some spalling along the top edge. Wall is plumb with no signs of scour. Wingwalls of both abutments in good condition.

Bearings: existing conditions are the same as in 1995 with the end of the truss posts hard against the backwall.

Erosion and Scour: as noted above there is no sign of scour causing settlement or tipping of the abutments.

Drainage: a drain pipe was placed at some time and drains at the face of the southeasterly wingwall.

Guiderails: remain in same condition as 1995 with some additional rust.

Primary Members: lower chord tension members show little section loss except at points near their connection to the end bearing plates. Extent of section loss not determined but some corrective action will be required at these points and members L0-L1, L5-L6 on both the north and south trusses. Verticals members in good condition; Diagonal members in good condition. Top chords show rust bulge (crevice corrosion) but no rivets have been "popped". Plates and channels show some minor corrosion but little section loss. In summary the trusses are in good condition. The floor beams show some corrosion but with little section loss. The steel stringers show some rust but with little section loss.

Decking: the wooden decking was removed in November 2006.

Guide Railing: the guide railing is in a similar condition to 1995.

Paint: little remains of paint are evident. No indication of any lead based paint.

Notes on changes to bridge over time

1. The easterly portal has been replaced with welded steel members.

2. Vertical members L5-U5 have had welded reinforcement members around the original vertical round bars on both the north and south truss.
3. The original wooden stringers were replaced with 8" steel beams.
4. Guide rails were added.
5. The masonry abutments were encased in concrete and new steel bearing plates added.
6. The wooden deck was replaced on several occasions before being torn up in November 2006.

Summary of Inspection

The easterly abutment needs some patching of concrete along top edges and at mid height. The westerly abutment is in good condition. There is no sign of settlement or side sway of the trusses indicating that the foundations and lateral bracing are in good condition. The iron work is in good condition with the exception of some rust bulge in the top chords and section loss in members L0-L1 and L5-L6 on both the south and north trusses. The floor beams are in good condition as are all the lower and upper chord pinned connections. Member L1-U1 is loose but easily tightened. The verticals L5-U5 that were strengthened previously can be restored to their original condition and the welded additions removed. The westerly portal, while adequate, should be replaced with a portal similar to the easterly portal. While there are no signs of abutment settlement due to scour, some rip rap should be placed at the edge of the abutment footings.

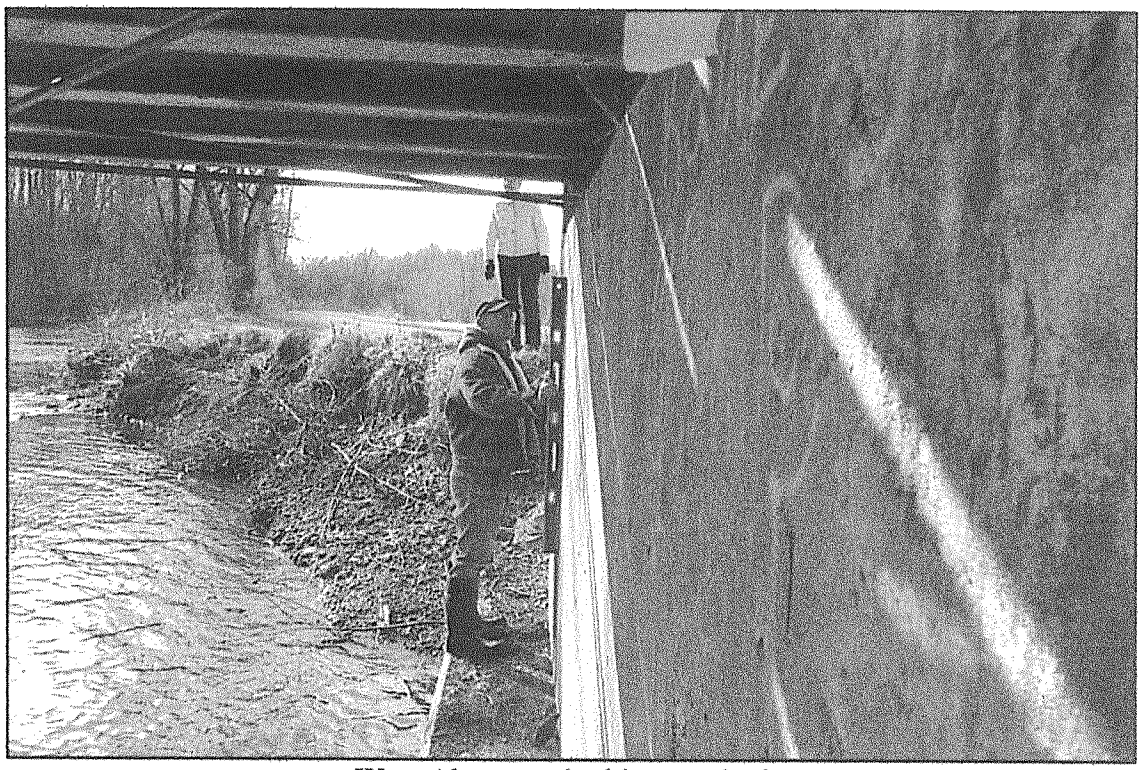
The fact that no lead paint is apparent makes it easy to clean the wrought iron and apply a three coat paint system to extend the life of the iron work into the far distant future. As evidenced by the slow growth of corrosion from the last inspection in 1995 to 2006 illustrates that wrought iron is very resistant to corrosion except in areas where dirt and water accumulate such as at the bearing points of the trusses.

In summary the foundations, trusses, floor beams, etc. are in good condition and the bridge can be easily restored to carry pedestrian and bicycle traffic.

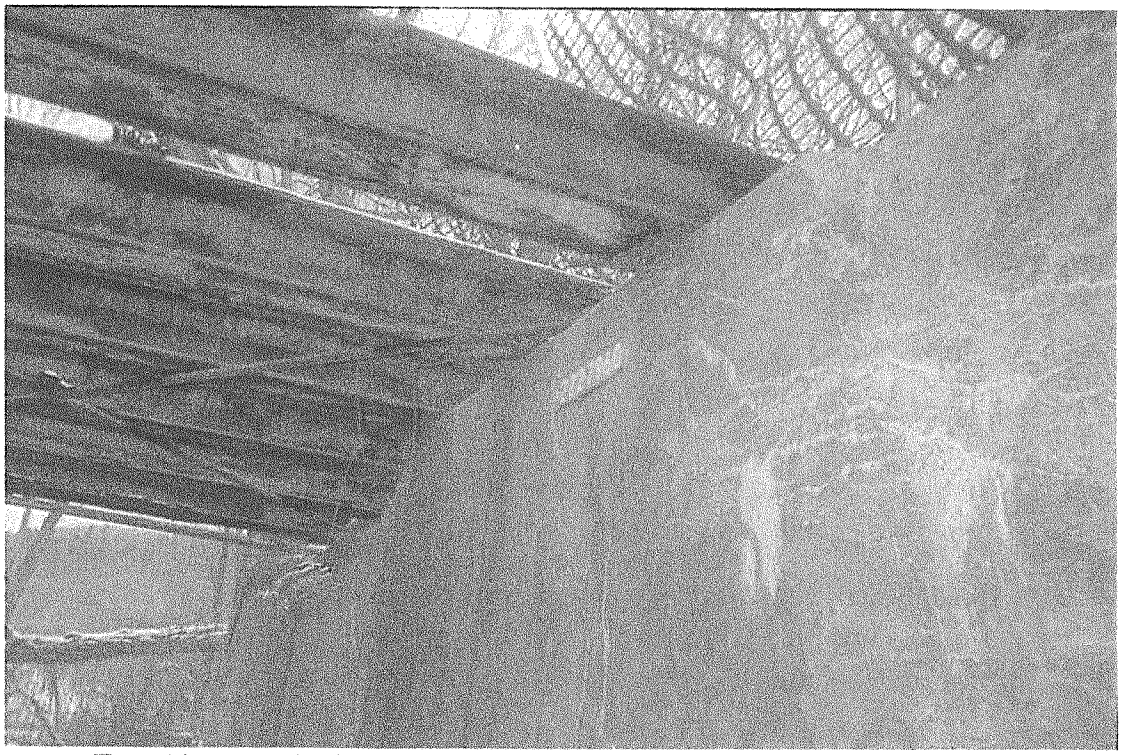
PHOTOGRAPHIC

DOCUMENTATION

Abutments

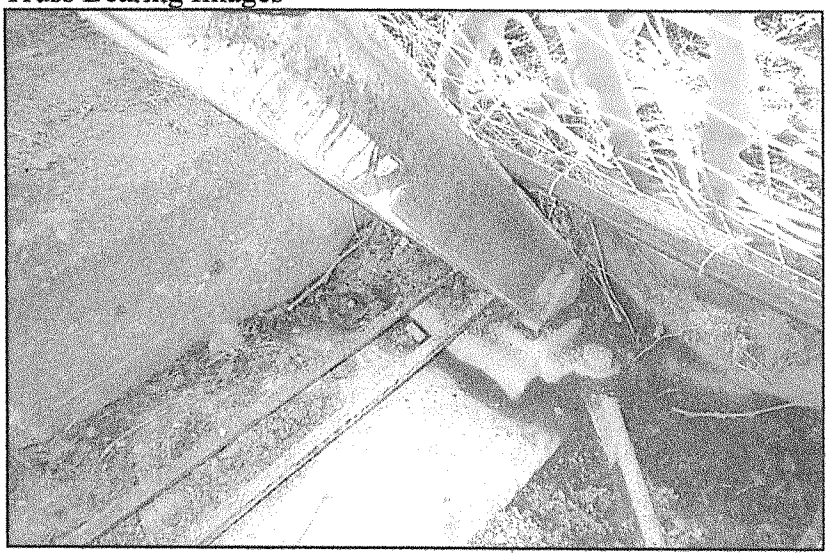


West Abutment looking southerly



East Abutment looking northerly showing chipping and hairline cracking

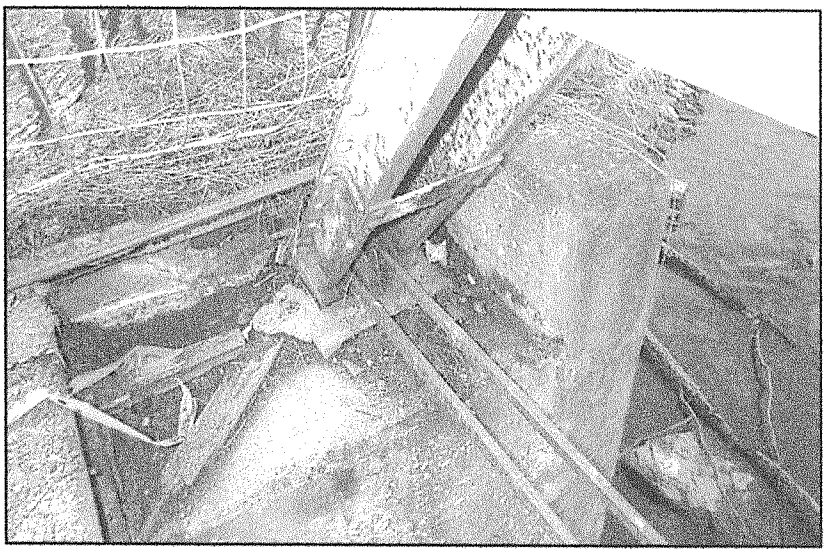
Truss Bearing Images



Northeast Bearing Detail
Bearing and truss end chord hard up against concrete backwall. Roller ineffective.

Lower chord tension rods show some loss of section near ends.

Concrete spalling at face of abutment. Bearing area good.

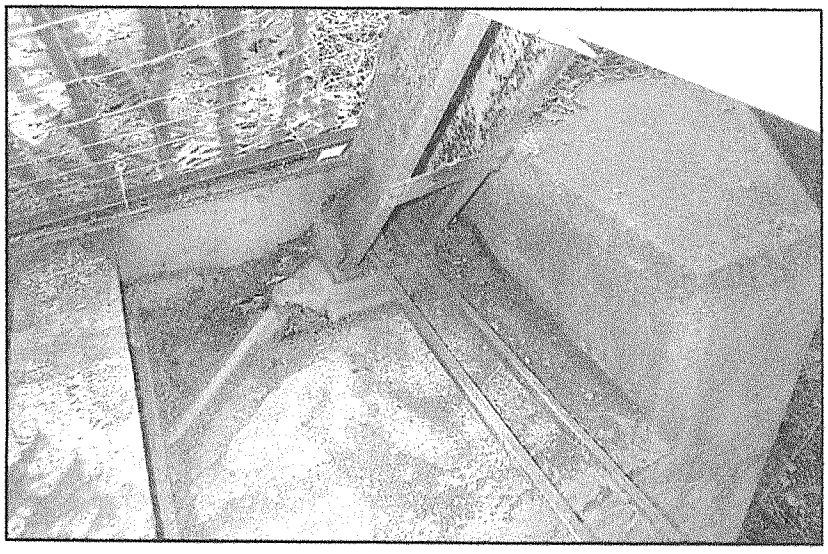


Northwest Bearing Detail

Lower chord tension rods show some section loss.

Diagonal underdeck bracing repaired with welded loop added at an unknown date.

Concrete in good shape.

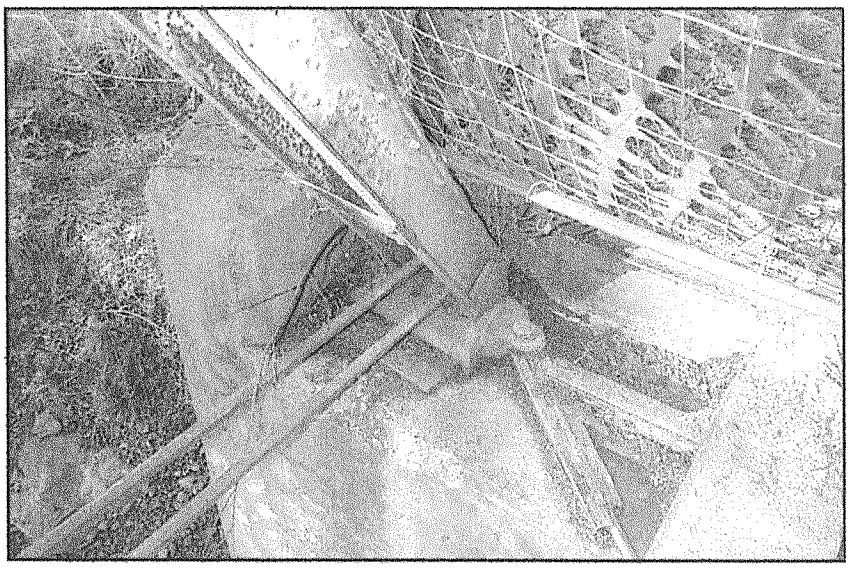


Southeast Bearing Detail

Lower chord tension rods show some section loss.

Bearing hard against backwall. Roller bearings ineffective.

Concrete in good shape, some spalling at edge.



Southwest Bearing detail

Little section loss of tension bars. Diagonal bracing bars updated with welded loop.

Concrete broken at top edge of abutment extending to base plate.

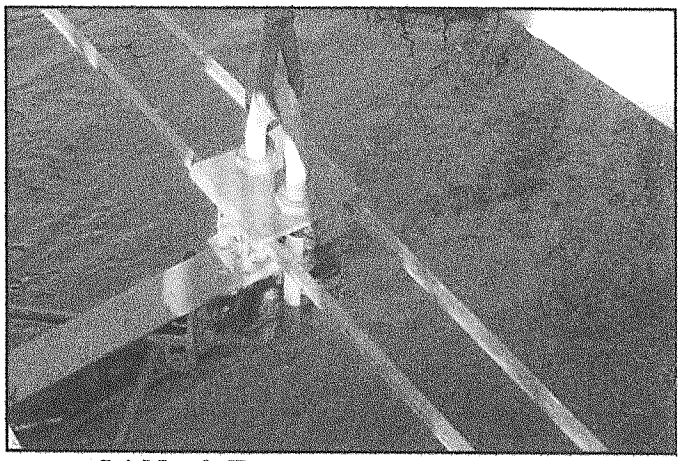
Existing Conditions of truss bearings.

When the concrete facing was added to the original masonry abutments steel plates were cast in the concrete and the iron base plates, sole plates, of the truss were set on these plates. State inspection reports between 1990 and 1995 indicate that at various temperatures the truss ends were near the back edges of the masonry plates and close to the concrete back wall. The inspection reports indicated that at a temperature of 80° F the trusses would be hard against the backwalls.

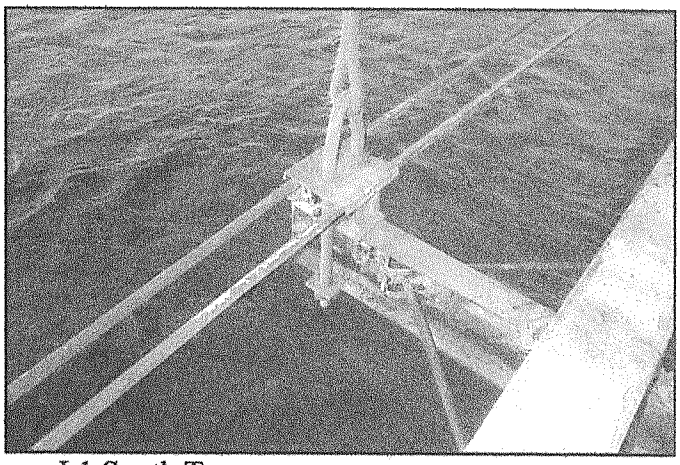
The reinforced diagonal underdeck bracing repair appears to be in good condition.

The cast iron bearing plates are in good condition as is the wrought iron at the lower ends of the end inclined posts.

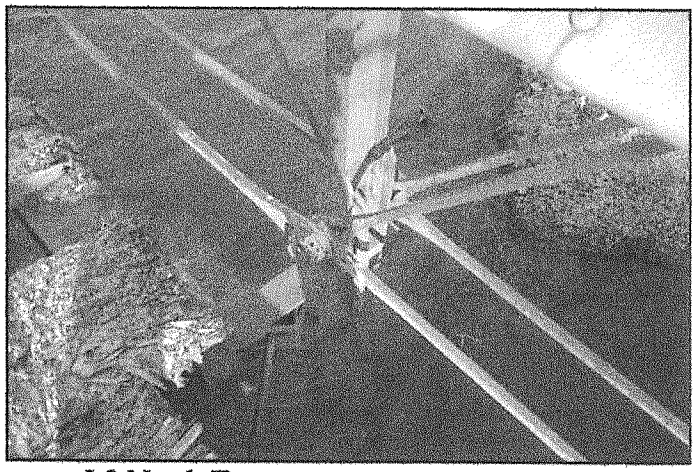
Lower Chord panel points



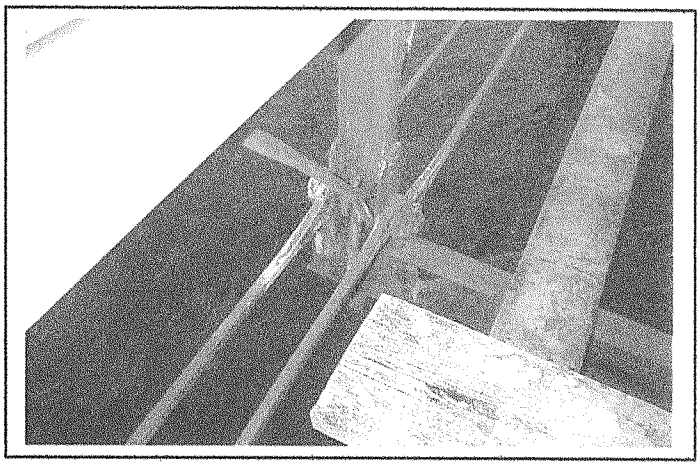
L1 North Truss



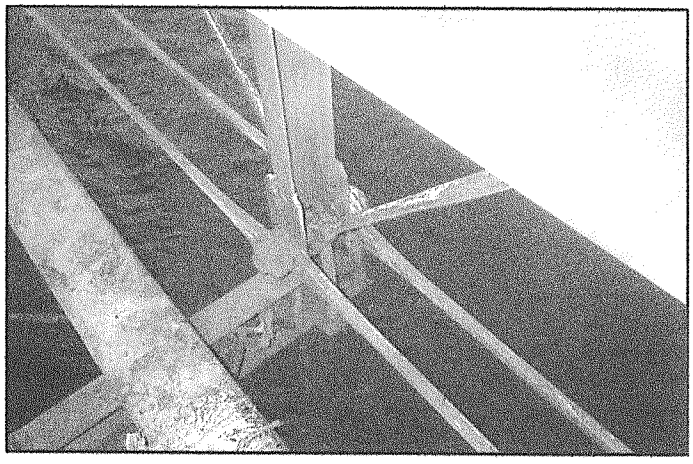
L1 South Truss



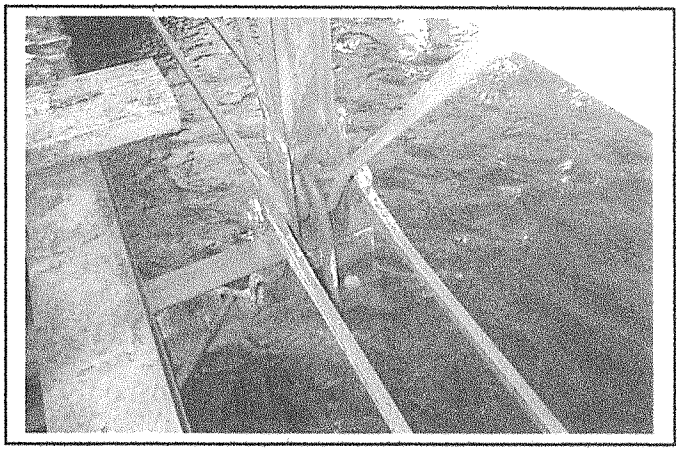
L2 North Truss



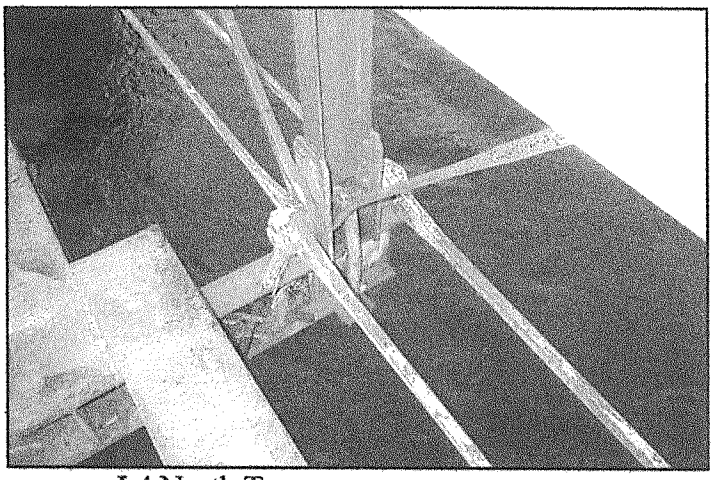
L2 South Truss



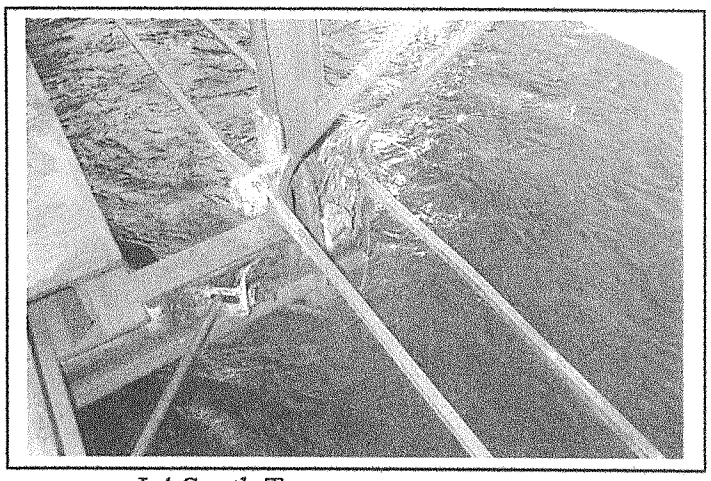
L3 North Truss



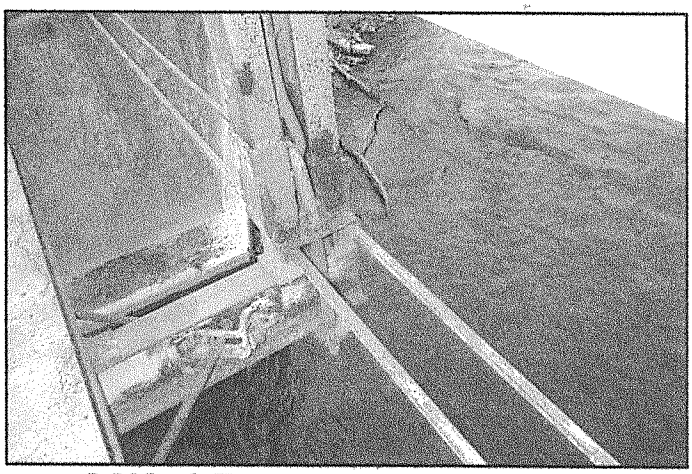
L3 South Truss



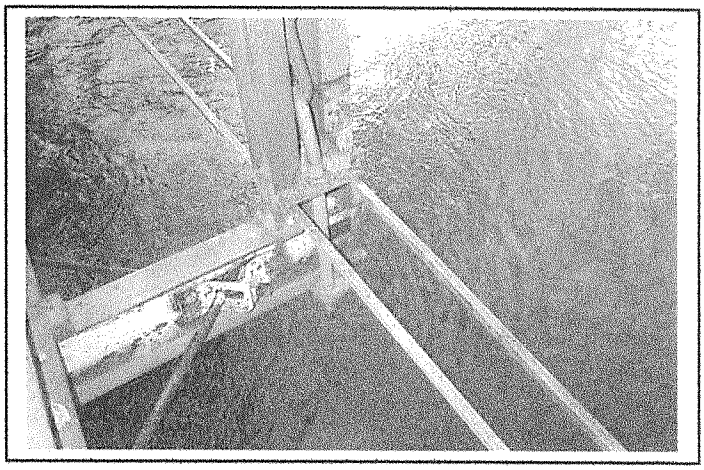
L4 North Truss



L4 South Truss



L5 North Truss

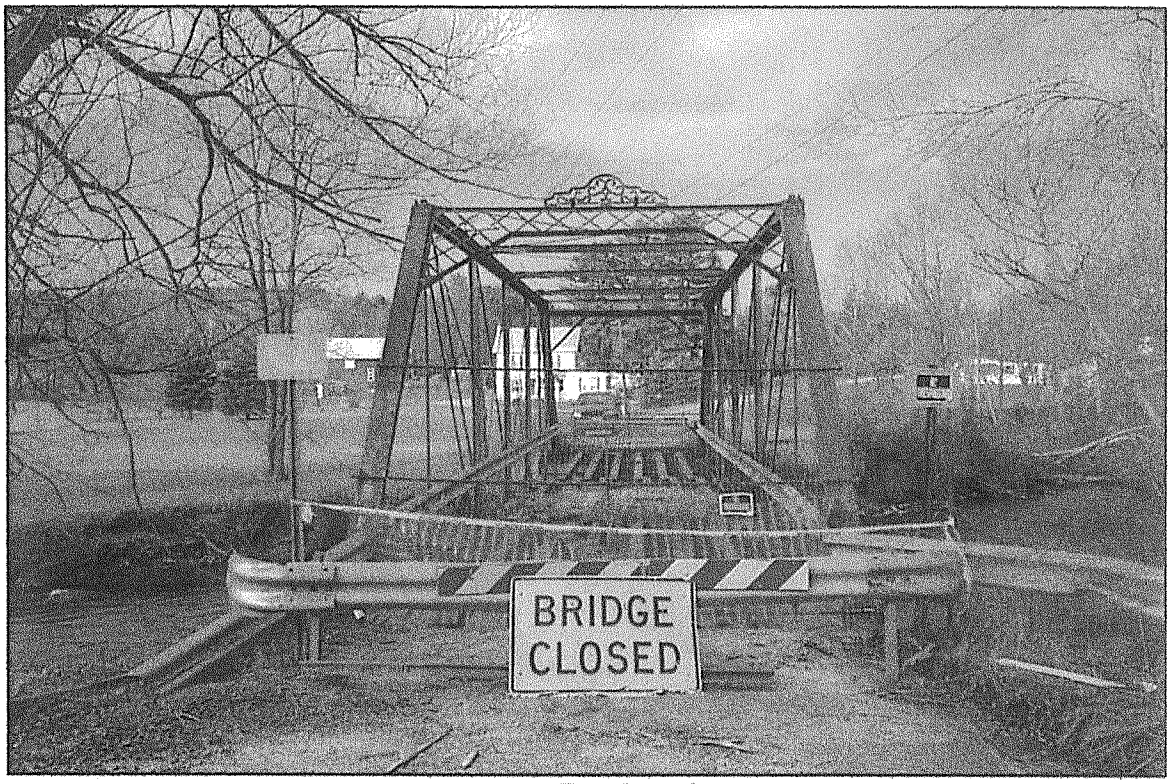


L5 South Truss

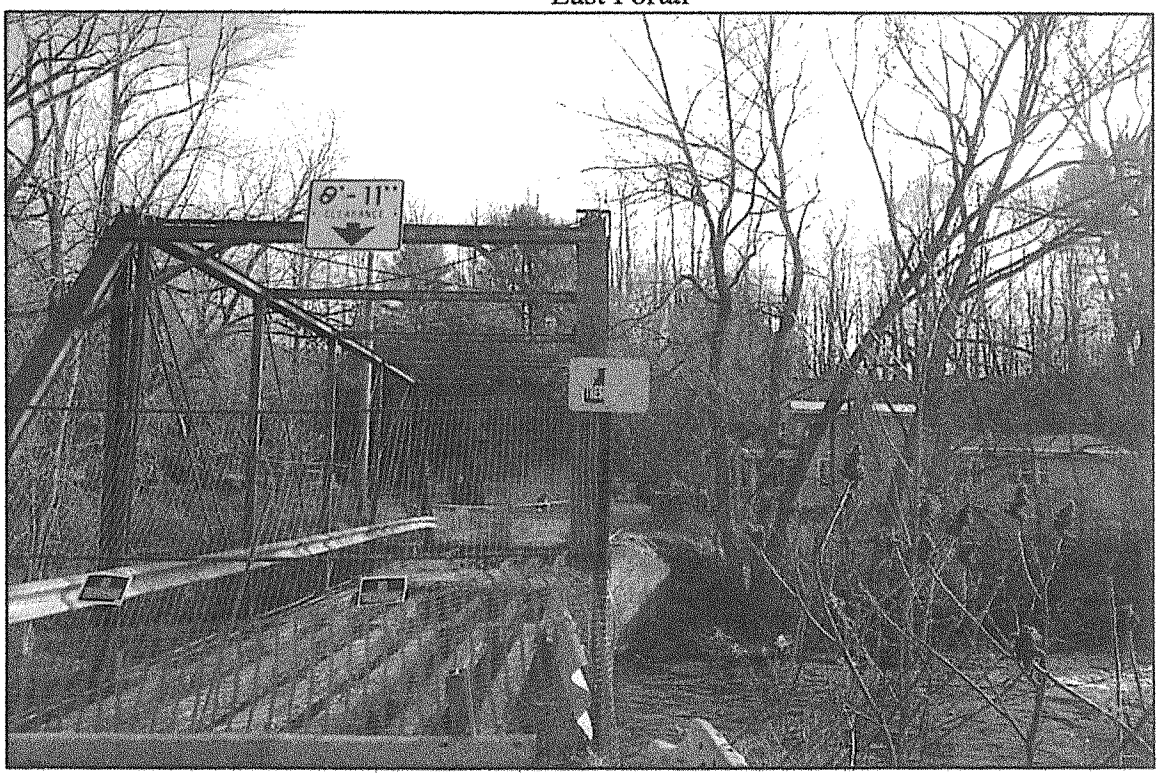
U4 Upper Chord Connection and cross bracing

U5 South End post and upper chord detail

End Portal Bracing

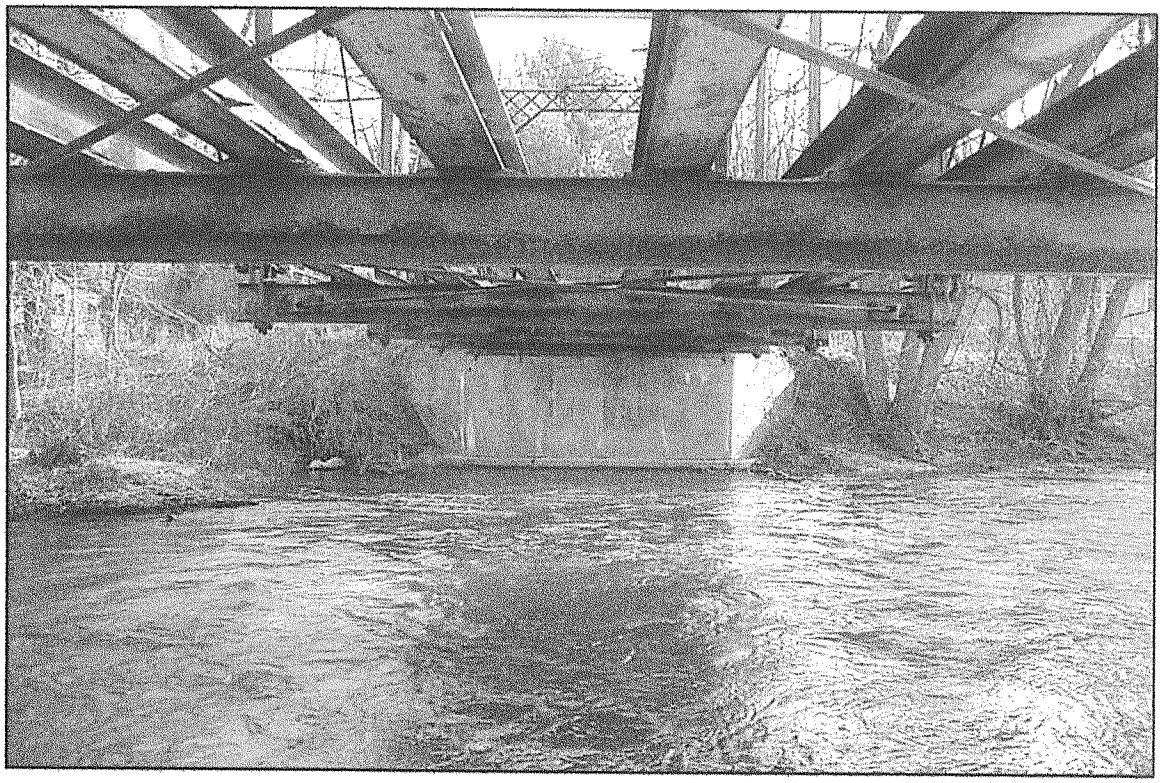


East Portal

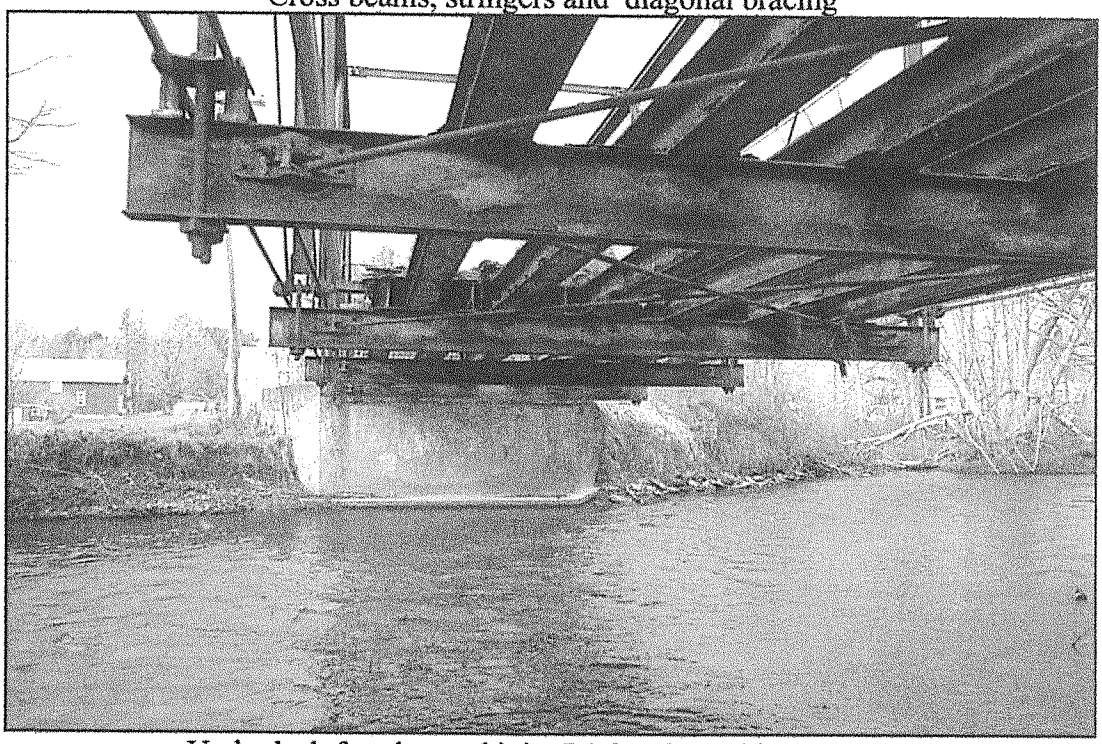


West Portal

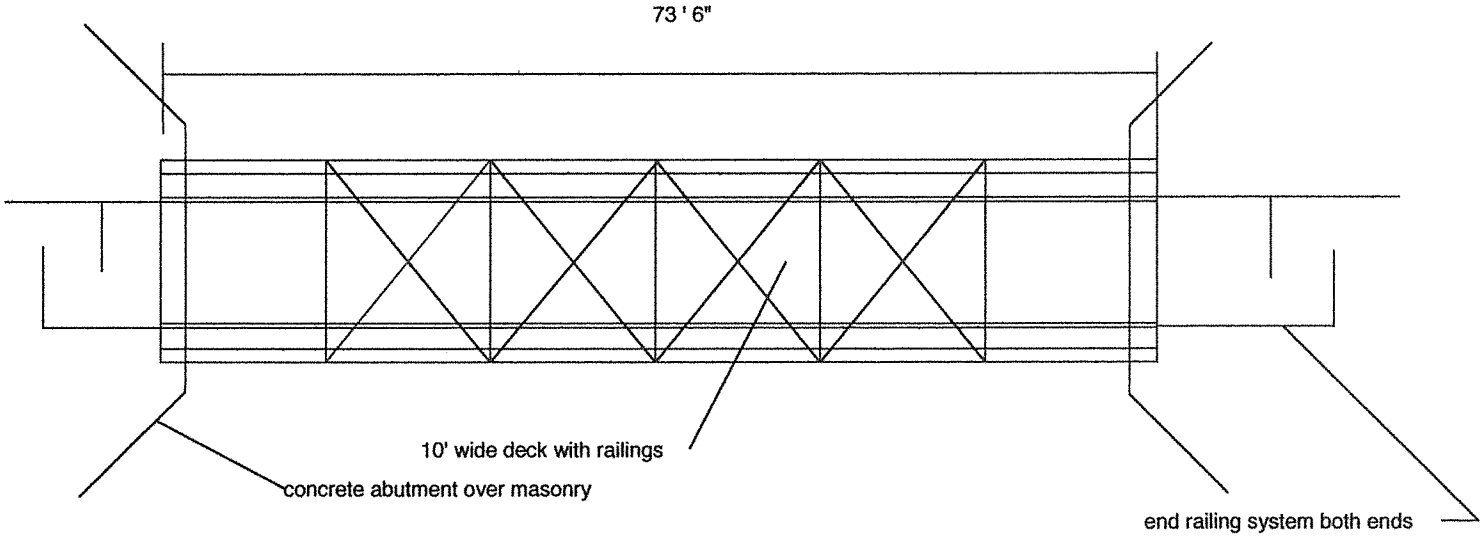
Decking details



Cross beams, stringers and diagonal bracing

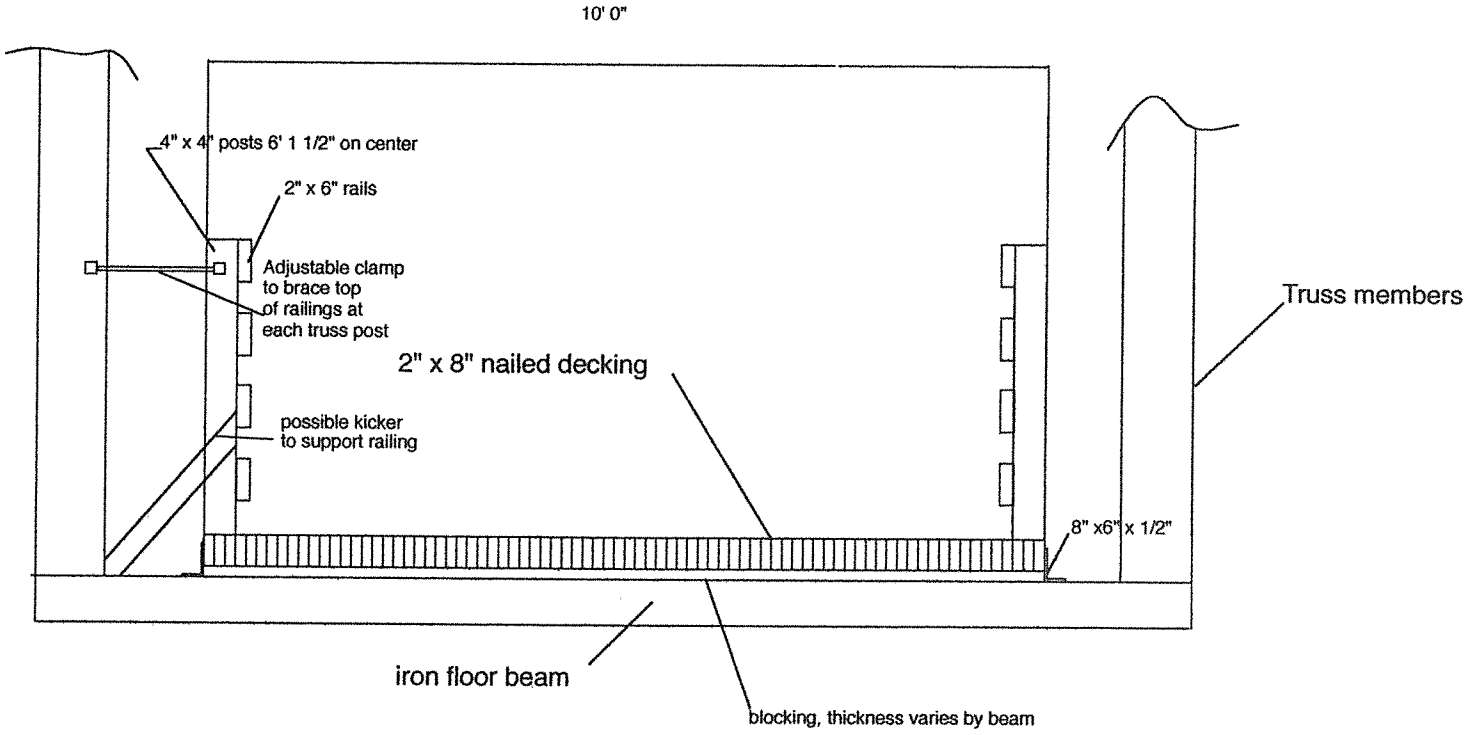


Underdeck framing and joint L1 South Looking westerly

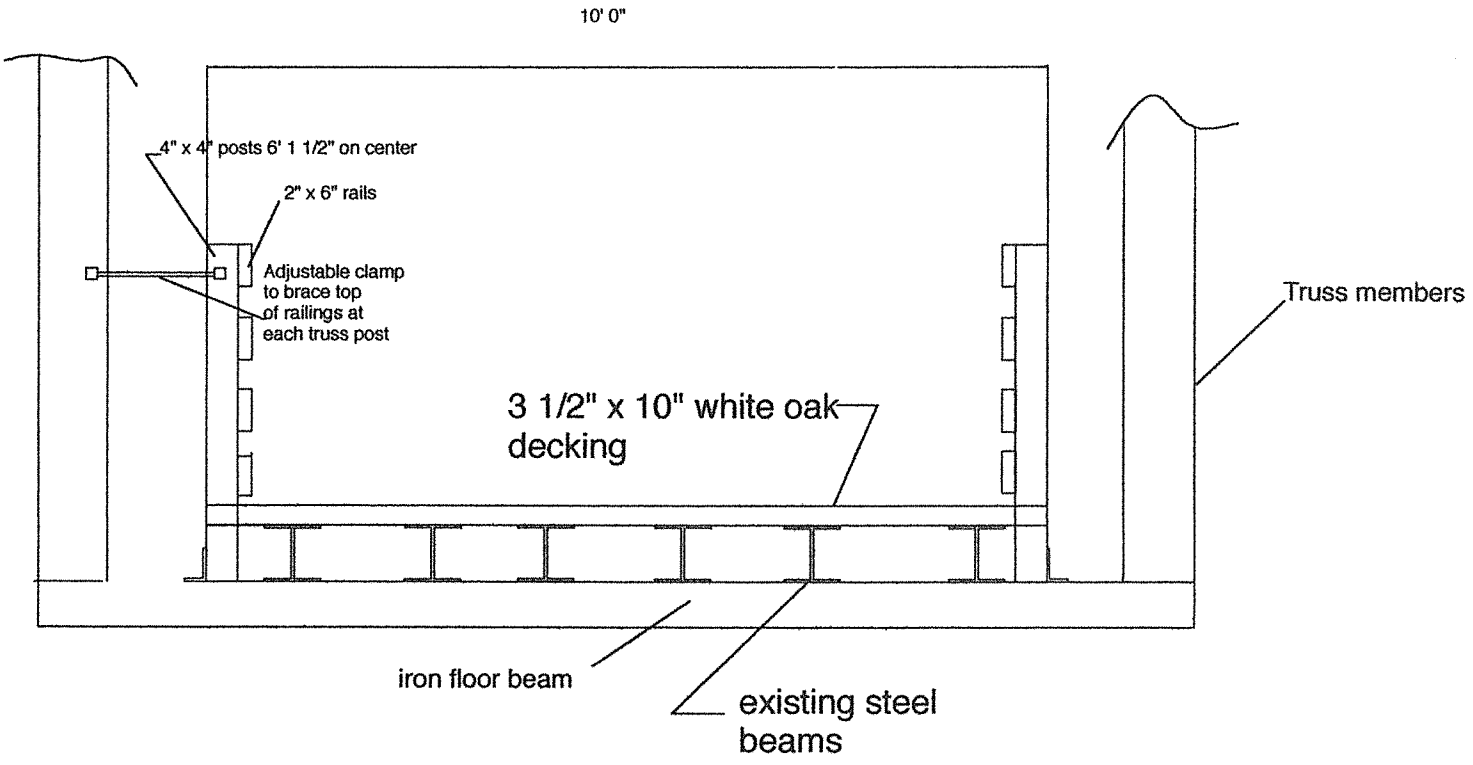


Preliminary Site Plan

Toddsville Bridge



Proposed laminated wooden deck blocked at each cross beam to give slight camber to deck



Alternate decking plan
using existing steel beams

Recommended Rehabilitation Actions

The following recommendations are based upon the conversion of the structure from a vehicular to a pedestrian bridge. Where appropriate the recommended steps are presented in a fashion that will permit the work to be completed in a phased approach. In addition, the work recommended can be done by volunteers or by outside contractors. The cost estimate is of course very preliminary and is given to indicate that the bridge can be rehabilitated at a cost much lower than has previously been discussed.

1. Abutment repair. The abutments, as noted, are in good condition with the exception of some spalling along the upper edges and some minor cracking on the vertical face of the easterly abutment.
   a. Easterly abutment – Inject grout, under pressure, to fill in apparent voids behind face of wall.
   b. Chip out concrete along upper edge at northerly and southerly end of abutment. Drill and grout two #4 rebars approximately 12" apart. Tie a #4 rebar to each dowel. Place a damp (drypack) concrete filling in void ensuring that each bearing plate has full support.
   c. Westerly abutment - Chip out concrete along upper edge at southerly end of abutment. Drill and grout two #4 rebars approximately 12" apart. Tie a #4 rebar to each dowel. Place a damp (drypack) concrete filling in void ensuring that the southwesterly bearing plate has full support.
   d. Consider placing riprap along the base of the easterly abutment. Riprap could also be placed along the base of the westerly abutment but at a later date.

2. Floor beams, underdeck bracing, lower chord pins and U bars.

   a. Sandblast or use rotary wire wheels to remove surface rust and dirt accumulation on all subject parts of the bridge. Place a tarp under the area being cleaned to catch debris to minimize any pollution of Oaks Creek. There is no sign of lead paint on the bridge.
   b. Place a primer coat of paint on cleaned iron immediately after the rust has been removed. Place the final two coats of paint as soon as possible. *A recommended paint will be specified at a later date.

3. Deck Structure
   a. Laminated wood plank deck – remove existing steel stringer beams. Place and lag a 2" x 6" treated plank on concrete abutment. Place, and attach, treated wood blocking of variable thicknesses on iron cross beams to provide a camber of 3" at mid span. Using a minimum length of 14' place a nailed laminated treated deck staggering joints and spiking with 20 d nails placed 9" on center. A width of 10' is recommended. Steel angle irons, as shown, are to be welded to the iron cross beams and lagged into the edge planks to keep the deck in place laterally.

b. Wood plank deck on existing steel stringers – Clean, paint, and attach existing stringers to iron cross beams. Place 3 1/2" thick oak plank decking transverse to stringers. Planking to be attached to stringers with "z" clips lagged to underside of planking.

4. Railing – Remove existing steel guide railings. The railing system shown is built of wooden members. Since the bridge will provide access to bicyclist's it must meet FHWA guidelines for bicycle paths as well as having a maximum clear width between vertical or horizontal members of 4". In the final design for the rehabilitation several styles of railing will be suggested to any committee appointed to oversee the bridge. While a wooden railing is probably the least expensive it would have a massive appearance and detract from the light appearance of the truss work. As indicated the railing would be supported at the deck level and by an adjustable member connected to the top of the railing with the vertical posts of the truss work.

5. Truss rehabilitation
   a. Lower chord tension bars. It is likely that the bars L0-L1 and L5-L6 that have some section loss may have to be reinforced by the addition of another rod. Dewidag stainless steel bars have been used in the past and provide large increases in strength in a bar less than 1/2" in diameter. It is likely that a single bar in each member will be adequate to replace the loss in section of the existing rods. The fact that the bridge deck will be narrower and the loading reduced may result in the existing members being strong enough without the addition of any reinforcement. For budget purposes it is assumed that the reinforcement will be installed.
   b. On member L1-U1 the nuts at the end of the "U" bolts should be tightened to transfer the load of the floor beam and deck to the vertical.
   c. On members L5-U5 on both the north and south truss the steel angle iron that has been welded into place should be removed and the existing vertical rods repaired to carry the load of the deck.
   d. On the inclined end posts L0-U1, U5-L6 and top chord members U1-U2, U2-U3, U3- U4, U4-U5, all caked rust shall be removed between the top plates and side channels using wire brushes. After the rust is removed the lower surface of the top plates and the upper surfaces of the channels shall be painted with a primer and one coat of paint. The bulged top plates shall then be pressed or pounded in such a manner to remove the bulge and bring the parts into contact. Care should be taken to minimize any hammer impact marks on the top plates.
   e. Sand blast, or use rotary wire wheel, the inclined end posts and top chord members on all sides and prime immediately after. Place two coats of paint on all surfaces. *At this stage it is not necessary to paint diagonal members or vertical posts nor upper chord lateral bracing. These members exhibit little corrosion and a decision to clean and paint them is more cosmetic than anything.

6. End portals –The original westerly portal has been completely replaced with a welded structure probably after a collision with some high load,. While it is

not an original design feature it is apparently performing its role to keep the trusses vertical and parallel. As such it should be cleaned and painted with a primer and two coats of paint since it is built up with steel members that corrode and welds that corrode rapidly in the atmosphere. The easterly portal is in good condition and needs no work other than a possible cleaning and painting. This work can be done now or postponed to some future time. In order to maintain a similar appearance it may be wise to paint both portals at this time.

7. Approaches and railing – In order to block vehicular traffic from crossing the bridge, bridge railings should be carried off the end of the bridge for 10' to 15' with a "maze" structure at the ends as shown on the proposed site plan. Approach paving could be asphalt or crushed stone. A paved width of 10' is recommended.

PRELIMINARY BUDGET

	Material	Labor	work by
1. Abutment repair	$100	$2,000	O
2. Floor beams, underdeck bracing etc.	$2,000	$0	V
3. Deck Structure			-
a. Laminated	$6,000	$0	V
b. Plank and steel stringers	$5,000	$0	V
4. Railing	$1,500	$2,000	O
5. Truss rehabilitation			-
a. Lower Chord	$500	$2,000	O
b. L1-U1	0	$500	O
c. L5-U5	$500	$1,000	O
d. Inclined end post and top chord rehab	0	$2,000	O
e. Inclined end post and top chord painting	$500	0	V
6. End portals	$500	0	V
7. Approaches and railing	$2,000	$2,000	T
8. Engineering design and supervision		$8,000	na
	$13,600	$19,500	
	Total	**$33,100**	

Town workers
Outside contractors
Local Volunteers with supervision

The costs given are based upon bridges I have done with volunteer labor. On the laminated deck I have placed a 74' x 14' deck with volunteers in 16 hours. Contractors have placed similar decks with fewer men in 3 to 4 days. The method I have used in the past consists of laying masons planking between the floor beams for a working platform. Approximately 10 – 12 laminations are then nailed together with the planks in a horizontal orientation. This assembly is then rotated into its final position and centered on the deck. At this stage a large crew of workers can add plank to both sides of the original assembly simultaneously. In placing the planking, members shall be placed with their natural curvature to follow the camber built into the supporting beams.

The cleaning of ironwork is assumed to be with rotary wire wheels by volunteers working on scaffolding placed in the stream bottom. Ordinary masons scaffolding is adequate and frequently will be contributed by local suppliers. If no scaffolding is available planking can be suspended from the side trusses with rope or cables with workers standing on the planking to clean floor beams and under floor bracing and connections, etc. and the follow up painting All cleaning and painting of the structure above the deck can be done from scaffolding on the deck or extension ladders.

The estimate assumes that all permits, approvals, etc. will be obtained by the Towns of Otsego and Hartwick. Insurance for volunteers working on the bridge is also assumed to be carried by the towns.

If volunteer labor is not permitted and all work is contracted out the cost will be higher. At the outside I would estimate the work could be contracted out for $100,000 to $150,000 depending on conditions existing at the time of bidding. Engineering costs would also increase if a formal set of drawings and specifications are required for bidding purposes.

Summary

The bridge is in very good condition and can be readily rehabilitated for pedestrian and bicycle usage for less than $150,000 if outside specialty contracters are utilized or less than $50,000 if a combination of outside contractors and volunteer labor is utilized.

It should also be emphasized that a final set of drawings has not been prepared at this time, so it is not possible to obtain a formal bid or proposals from any contractor .

The purpose of this study was to inspect the bridge, document its condition, prepare some rehabilitation recommendations and arrive at a preliminary estimate of the cost to rehabilitate the bridge.

I would be glad to answer any questions you may have on the report and its recommendations.