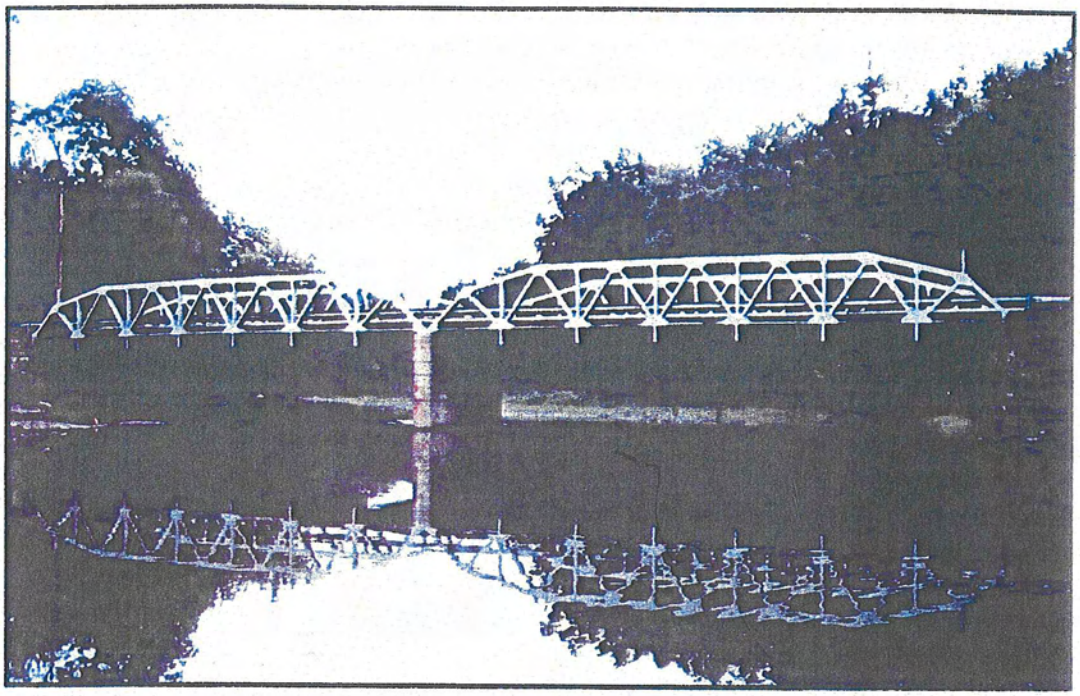
APPENDIX B

BRIDGE INSPECTION REPORTS

2002 HNTB INSPECTION REPORT
2006 RICHLAND ENGINEERING EMERGENCY INSPECTION REPORT
2006 LAKE ERIE DIVING UNDERWATER INSPECTION REPORT
2006 BR-86 FORM

2002 Physical Condition Report



Vrooman Road Bridge over the Grand River

SFN 4337107
Leroy Township
Lake County, Ohio

Prepared for:

Lake County Engineers Office
550 Blackbrook Road
Painesville, Ohio 44077

December, 2002

Prepared By:

HNTB Ohio, Inc.
55 Erieview Plaza
Cleveland, Ohio 44114
(216) 522-1140

HNTB

Introduction

The Vrooman Road Bridge (SFN 4337107) crosses the Grand River on the border between Perry Township and Leroy Township, 0.2 miles south of South Ridge Road (State Route 84). It is two-span steel Warren polygonal pony truss structure built in 1951. Each span is approximately 88′-4″ center-to-center of truss bearings, with an overall structure length of 179′-4$^1/_2$″. The trusses are spaced 23′-0″ center-to-center. A galvanized steel guardrail is attached to the interior of the truss verticals. The bridge is posted with a 24-ton load limit. Photos 1 and 2 show the Elevation and End Views respectively.

In the1980s, the structure underwent a major rehabilitation. The timber deck and steel stringers were removed and replaced with a longitudinal timber floor system. The current deck consists of a 10″ deep timber deck comprised of 4″ wide planks with a 3″ thick asphalt wearing surface.

The bridge deck is supported by floor beams as well as transverse timber bearings at the pier and abutments. Each span has six-W27x94 intermediate floor beams connected to extensions of the truss verticals. Between floor beams are timber spreader beams that maintain load distribution among the deck planks (See Photo 3). A framing plan with member identification is shown in Figure 1. The floor beams are spaced at 12′–7$^1/_4$″ center to center, and are attached to truss vertical extensions with 14-dardelet bolts at each end. A dardelet bolt is a rivet-bolt fastener more appropriately classified as an "interference body" bolt. They are bearing connectors with upset ridges on the shanks that deform during installation to insure full bearing. Their button heads allow for cold driving during erection (See Photo 5).

The superstructure bears on top of stone abutments retained from the previous crossing. Each abutment has a concrete abutment cap that the floor sets on. The pier is constructed of reinforced concrete and supports the fixed bearing of the truss and the timber bearing for the deck. The South Abutment was reinforced with sheet piling in the 1980s. Three of the four wingwalls also have been retained from the previous construction. The southeast wingwall is a sheet pile retaining wall.

As defined by the National Highway Institute, the lower chord and diagonal segments in tension are classified as fracture critical members. Though the floorbeams are spaced less than 14 feet, they are considered as being fracture critical because the floor system above does not consist of continuous span stringers.

William Vermes, P.E. and Noemy Roman E.I.T. performed an in-depth inspection of the bridge on January 27th and 29th, and February 11th. Tri-State Steel Construction, Inc. installed temporary inspection platforms for inspection of the lower chord, floor beams and deck underside under Span 1. Additionally, ladders were used for inspection access under both Spans 1 and 2. A copy of the BR-86 is included in Appendix A. Lake Erie Diving, Inc. performed an underwater inspection of the South Abutment and Center Pier.

The underwater inspection report is attached as Appendix B. Following the inspection, a load rating analysis of superstructure elements was performed.

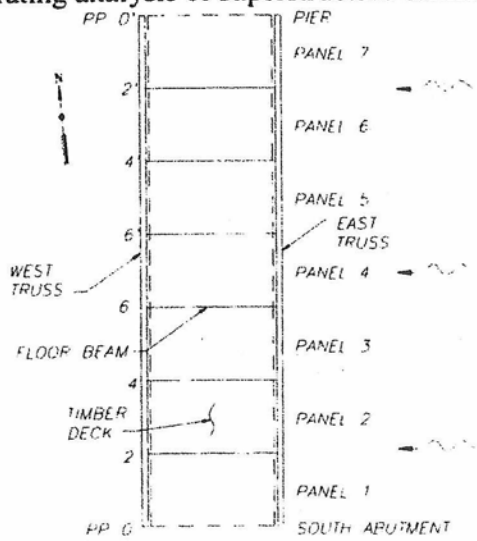


Figure 1 – Span 1 Framing Plan & Member Identification (Span 2 similar)

Physical Condition

Floor

The floor is in good condition as the deck timbers have been incised with wood preservative that is still effective. Generally the underside of the timber deck has random infiltration during wet weather with salt deposits present (Photo 3). However, salt does not have any detrimental effects toward wood deterioration. Additionally the west and east fascia timbers are saturated due to over-deck runoff and standing snow along the lane edges above.

Wearing Surface and Rail

The asphalt wearing system is in fair condition with longitudinal and transverse cracks. The guardrail is also in fair condition.

Floor Beams

The floor beams are generally in fair condition. Typically flake rust is present to the top and bottom flanges resulting in a nominal $^{1}/_{32}$" loss to both flanges at midspan. The floor beam webs exhibit no significant loss, except at the west end of Floor Beam 6, Span 2. Here, between the top flange and the top of the floor beam connection (lug) angle, the web end has complete section loss $^{1}/_{2}$" deep due to paint failure and water runoff caused by the dirt that accumulates on top of the top flange end.

On this structure, four floor beams were erected with splices connecting shorter floor beam segments. These splices occur on Floor Beams 2 and 2′ in Span 1 and 4 and 6′in Span 2. Two-20″ long, full height welded plates make the web splice while the flanges are butt welded together. Three splices occur 3′-10″ from one end while the other occurs 6′-1″ from the floor beam end. These four welded floor beam splices are in good condition with no cracks or excessive corrosion observed. However, the craftsmanship of these flange welds does appear to be rather poor (Photo 4).

Floor Beam Connections

The floor beam connections are in poor condition as approximately 35% of the rivet-bolt fasteners have extensive corrosion to the nut. Based on observations at locations with varying paint conditions, some of this nut deterioration was present before the repainting of the bridge, and no additional section loss to the nuts is present. Most of these nuts have active corrosion and in select instances, the section loss has progressed onto the threaded bolt shank and potentially into the bearing connection itself. At the west connection of Floor Beam 4′, one bolt essentially missing its fastening nut was backed out with a hammer with relative ease (Photo 5). (This bolt was replaced with a $^{3}/_{4}$″ stainless steel bolt.) Also, the east connection of Floor Beam 4, Span 1, has one missing bolt. This open hole is painted, thus the bolt likely was never installed. Table 1 summarizes the quantity of dardelet nuts with significant section loss.

At several locations, the base metal adjacent to the bolt holes of the truss vertical, now exposed due to missing nut corrosion, has signs of misfabricated and unrepaired holes (Photo 6). These mispunched holes result in a slotted opening and reduce the friction area that holds the bearing dardelet bolt in place. Also, these slotted holes provide access for accelerated corrosion to the base metal and the bolt shank.

Floor Beam	Nuts with Significant Section Loss	
	East Connection	West Connection
Span 1		
2	7	4
4	1	5
6	0	0
6′	0	1
4′	1	2
2′	7	7
Span 2		
2	4	3
4	9	0
6	7	5
6′	12	7
4′	7	12
2′	8	8
Total	63	54

Table 1 – Floor Beam Connection Fasteners with Significant Section Loss

(Note: Each connection has 14-bolts)

On the vertical extensions, the interior flange between the truss gusset plate and floor beam lug angles often have section loss both arrested and active (Photo 7). This deterioration is caused by debris accumulations on top of the floor beam top flange. Maximum section loss is approximately 50% and 15% of the flange and total sections respectively.

Trusses

The lower chord, upper chord, verticals and diagonals are generally in fair condition with sporadic areas of deterioration. No significant findings were observed to any of the welded truss connections. Many diagonal and verticals have scraped paint and gouges to flange edges due to contact with wide vehicles. The following comments detail specific comments to truss members:

1. Span 1, East L_0L_2: The east flange has a 3″ wide section with $^3/_{16}$″ average thickness, or approximately 15% total section loss.
2. Span 1, West L_0L_2: At L_0, the last 3″ of the channel web is generally missing due to corrosion.

3. Span 2, West L_0L_2: The west edge of the channel is bent upward. The east flange remains straight. Additionally, two 1-$^1/_2$" long transverse tack welds are on top of the channel web.
4. Span 2, West L_2U_2: Vertical had been hit by a vehicle and has been straightened. Patch applied to web at lower chord level.
5. Span 2, East $L_0'L_2'$: Paint failure has resulted in 25% loss to the west flange of the channel section.

Bearings

The truss bearings are in poor condition. In Span 1, both gusset plates at West L_0 (Photo 10) and the west gusset plate at East L_0 have extensive corrosion below the lower chord connection and above the bearing channel. The east gusset plate at East L_0' in Span 2 also has significant corrosion. Though no deformation was observed, buckling failure similar to that occurred at the Fay Road Bridge (North) structure may eventually happen.

The bearings for the timber deck are in fair condition. No decay was noted to any of the three timber seats.

Lower Lateral Bracing

The lateral bracing is in poor condition. The braces between Floor Beams 6 & 6′ in Span 1, and Floor Beams 4′ & 6′ in Span 2 are loose. In the four panels adjacent to the abutments and pier, the bracing has been removed to facilitate the installation of the timber deck and its sleeper bearing.

Paint

The present paint is generally in fair condition. However, there are significant areas of paint failure to the lower chord and scrapes to the truss vertical and diagonals.

Abutments, Abutment Seats and Backwalls

The stone abutments are in fair condition with random areas of sandstone disintegration and water seepage. At the North Abutment, the original mortar in the joints has disintegrated leaving gaps between stones. In some areas, this mortar was replaced with a cement paste. The South Abutment has been reinforced with sheet piling place in front and the mortar joints were repointed. No findings were identified to the South Abutment.

Pier and Pier Seat

The pier is in fair condition. As noted in the underwater inspection report by Lake Erie Diving, a three foot-long by six inch-high hole is present through the base of the pier approximately at the one-foot datum level. The honeycombed appearance suggests that this hole has been present since the original construction. Above the 2′ water datum mark on the downstream face, the pier has no delamination or cracks, but it does have several honeycomb surface voids that also were likely part of the original construction.

The pier seat is in fair condition. On both sides of the pier, horizontal cracks 10″ from the top result in slight delamination (Photo 11).

Wingwalls

The wingwalls are in fair condition. Though the wale to the Southeast Wingwall is filled with soil, it is sloped which allows water to drain. Thus, little section loss was noted to the web of the wale.

Channel and Scour

The channel is fair condition with the primary flow of the Grand River occurring below Span 1. As discussed in the Lake Erie Diving underwater inspection report, no scour was noted to either the South Abutment or Pier 1.

Operating Load Rating Analysis

A load rating analyses was performed for the superstructure elements of the Vrooman Road Bridge over the Grand River. The load factor method was used to rate the superstructure elements based on operating rating level. Load ratings based on the operating rating level generally describe the maximum permissible live load to which the structure may be subjected. These ratings are also based on the following manuals:

1. The 1994 Second Edition of the "Manual for Condition Evaluation of Bridges" (including the 1995 through 2001 Interim Revisions),
2. The 1996 Sixteenth Edition of the "Standard Specifications For Highway Bridges" including the 1997 through 2000 Interim Revisions, as published by AASHTO and
3. The ODOT "Bridge Design Manual", April 2000

Rating parameters

1. Superstructure elements were rated for HS 20 loading and four Ohio legal loads (2F1, 3F1, 4F1 and 5C1) as per ODOT Bridge Design Manual Section 902.2, Table 9-1 (See Appendix C). The transverse wheel spacing is 6'-0" for all specified vehicles.
2. The existing roadway is stripped for two traffic lanes. However, since the roadway is less than 24 feet (measured from face to face of guardrail beams), the live load distribution to roadway longitudinal members was based on a bridge design for one traffic lane, as per AASHTO Table 3.23.1. This is due to the approach roadway alignment, narrowness of roadway at structures and light truck traffic volume of local roads.
3. For rating of floor beams and truss members involving the specified truck loading, each vehicle was placed transversely one at a time within the roadway. The vehicle was then shifted to produce maximum stress in the member under consideration.
4. Superstructure member sections were based on existing plans, structure data forms and field measurements. Significant inspection findings were also incorporated in the rating analysis.

Analysis Results

The rating analysis identified either the lower chord or timber deck as the controlling member. Please note that the controlling lower chord members occur to both east and west trusses as well as Spans 1 and 2. The rating factors are shown in Table 2.

Controlling Member	Operating Load Rating Factor (RF)				
	HS20	2F1	3F1	4F1	5C1
L_2L_4 & $L_2'L_4'$	HS23.0	*	*	1.45	1.25
Timber Deck	*	1.50	1.45	*	*

* Does not control rating

Table 2 – Load Rating Factors

Note: For the timber deck, the assumed parameters, based on S.L.D., were used:
Species is Southern pine, Grade No. 1; F_b = 1,300 psi; F_v = 90 psi

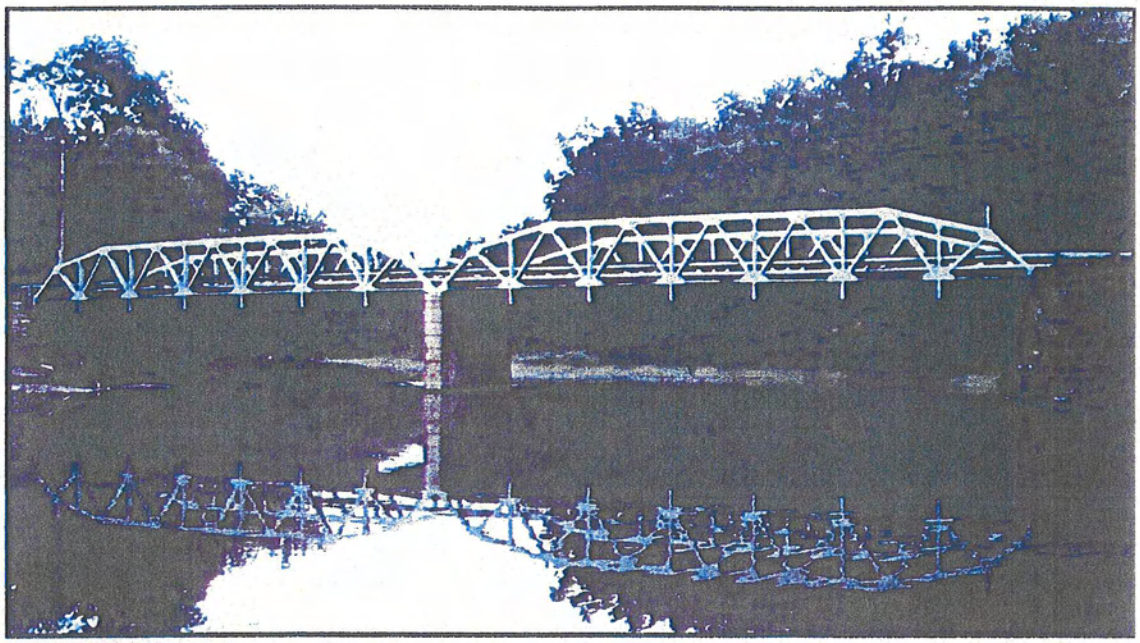


Photo 1 – West Elevation

Photo 2 – North End View

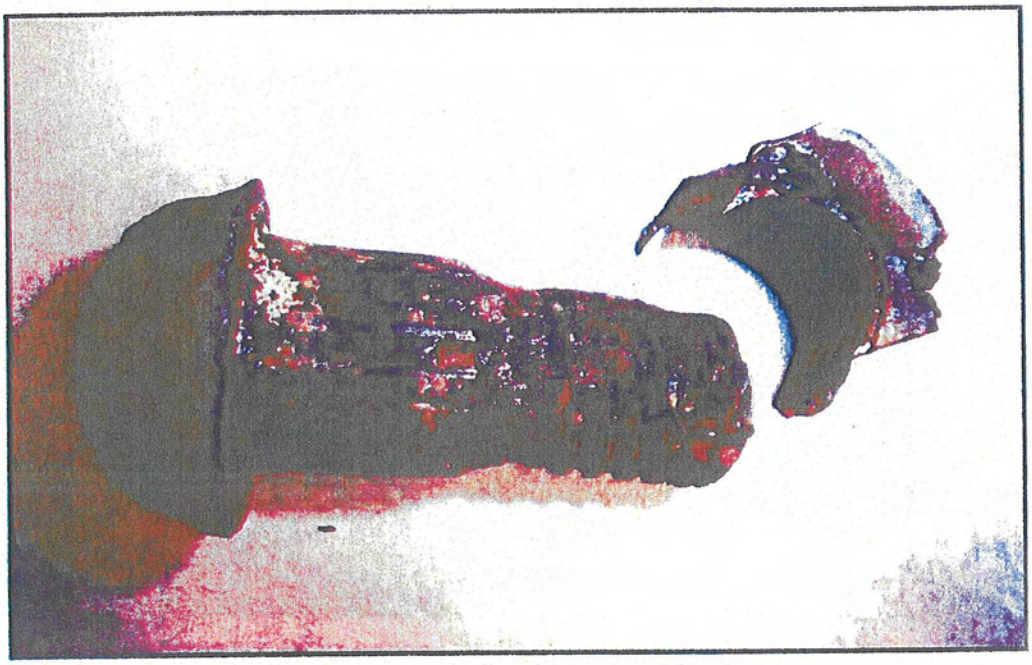


Photo 5 – Corrosion to Shank of Removed Dardelet Bolt
(Note Upset Ridges at Left and Remnants of Nut)

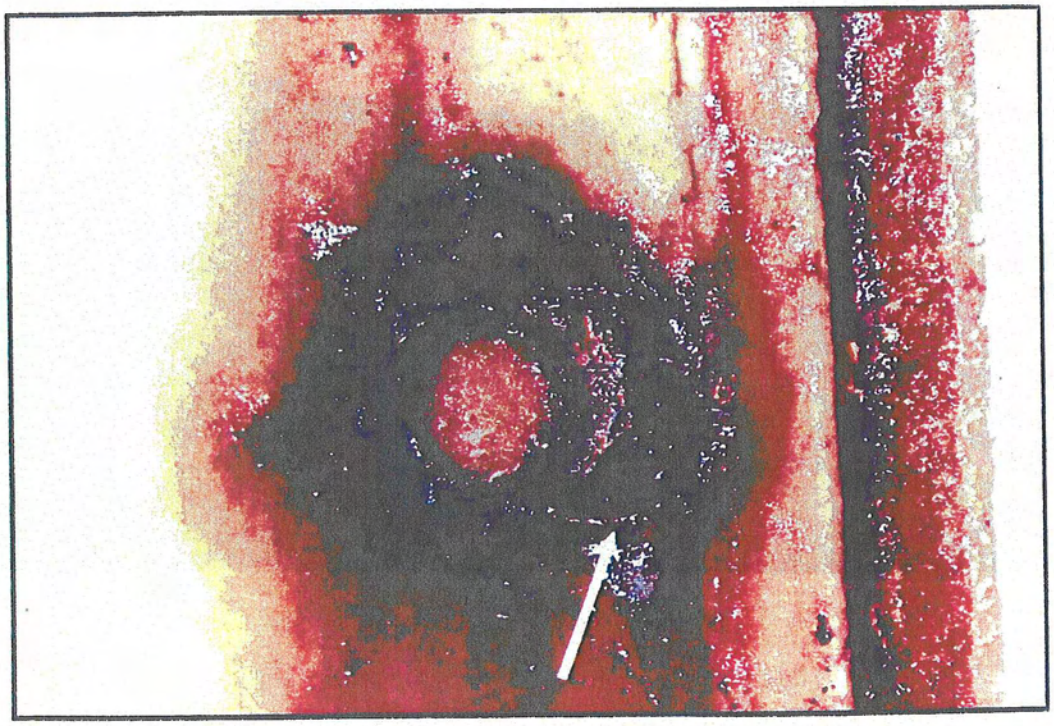


Photo 6 –Deficient Dardelet Nut with Misfabricated Bolt Hole Exposed
(Highlighted by Arrow)

Photo 7 – 1 $^1/_2$" Deep Loss to Vertical Flange from Debris on Top of Floor Beam, Span 2, East L_4' (Note Missing Nut to Dardelet Bolt)

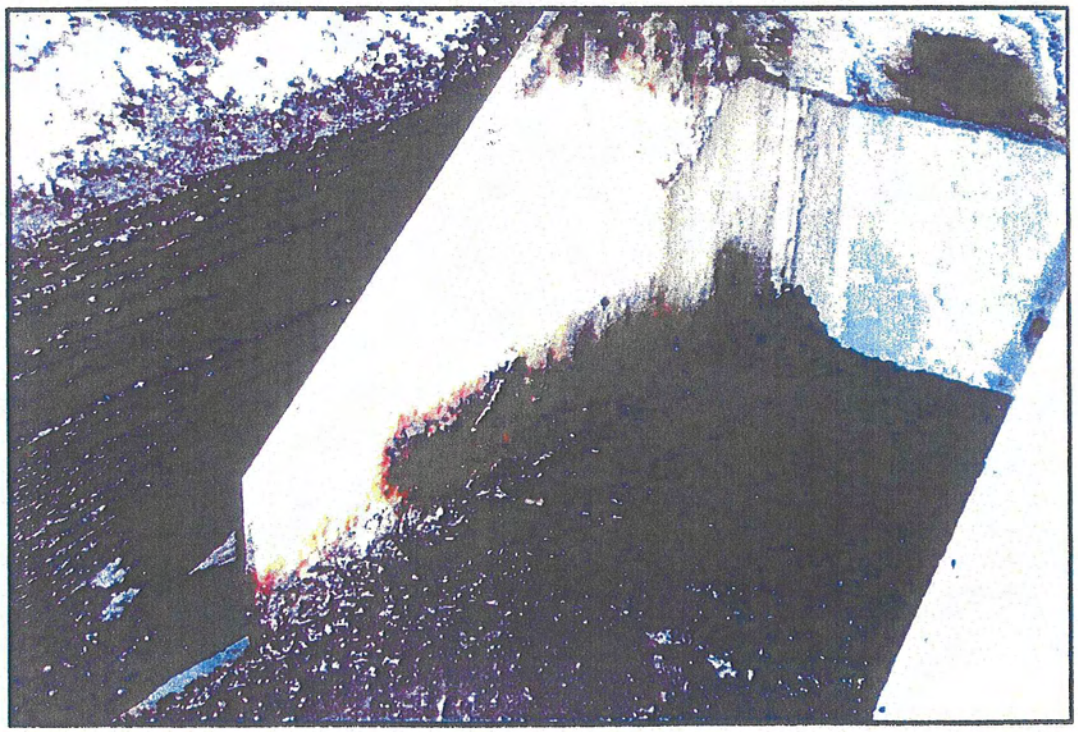


Photo 8 –1/16 " Loss to Gusset Plate Above Lower Chord, Panel Point West L_2, Span 1

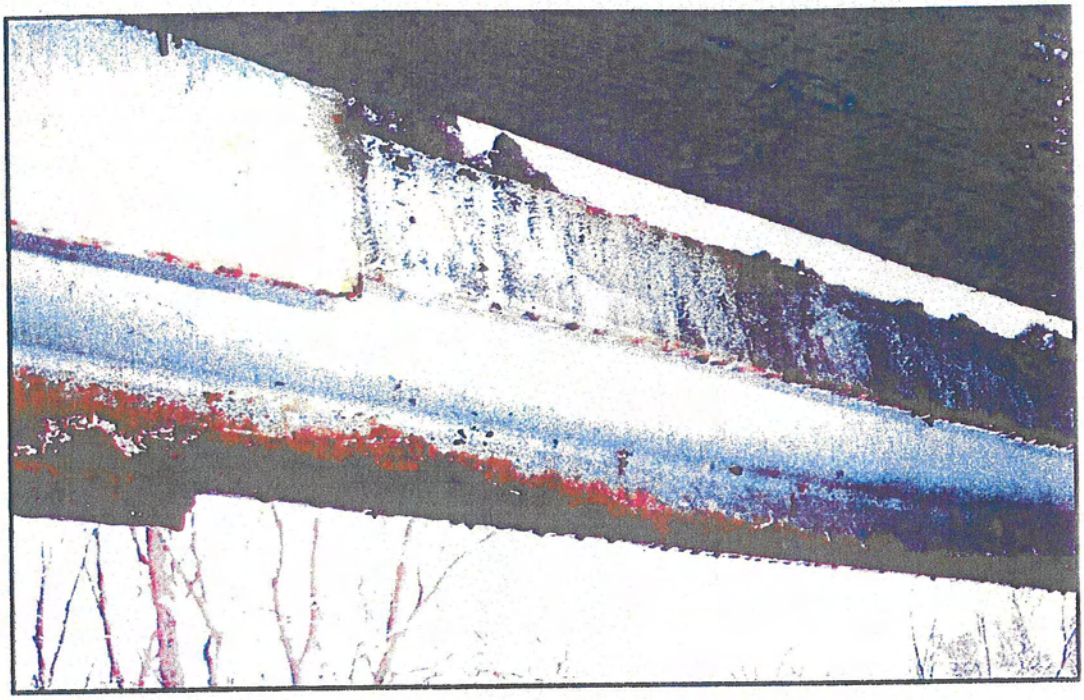


Photo 9 – Corrosion to Lower Chord

Photo 10 – Hole to West Gusset Plate (Circled) Between Lower Chord and Bearing, Panel Point West L_0, Span 1

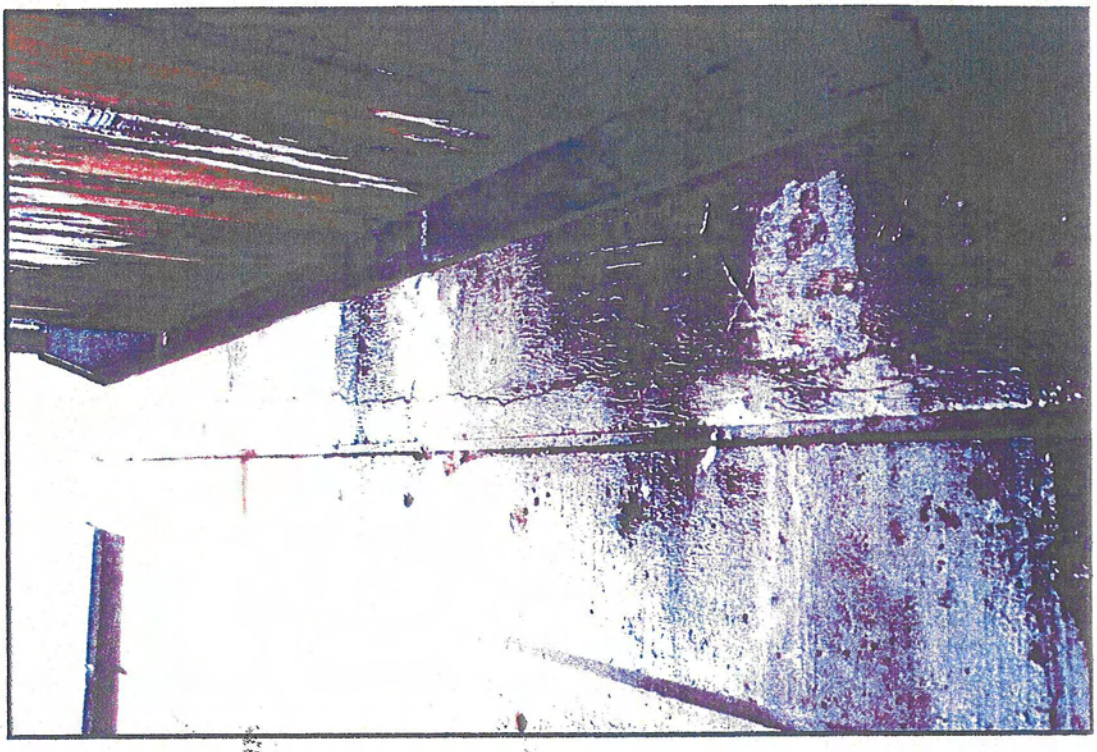


Photo 11 – Crack & Delamination Above, North Face of Pier Seat

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
BRIDGE INSPECTION REPORT

STRUCTURAL FILE NUMBER
4337107

BRIDGE NUMBER
LAK 00227 0283
CO RT UNIT

YR BUILT 52-00

LEGCY TYP

DIST 12 BRIDGE TYPE Steel Truss Thru
TYPE SERVICE 1 1 5

Vrooman o/ Grand R 2002

DECK 1 Floor	2	2 Wearing Surface	2
3 Curbs, Sidewalks & Walkways		4 Median	
5 Railing	1	6 Drainage	2
7 Expansion Joints	2	8 **SUMMARY**	6
SUPERSTRUCTURE 9 Alignment	1	10 Beams Girders Slab	
11 Diaphragms or Crossframes		12 Joist/Stringers	2
13 Floor Beams	2	14 Floor Beam Connections	3
15 Verticals	2	16 Diagonals	2
17 End Posts	2	18 Top Chord	2
19. Lower Chord	2	20 Lower Lateral Bracing	3
21 Top Lateral Bracing		22. Sway Bracing	
23. Portals		24. Bearing Devices	3
25 Arch		26 Arch Columns or Hangers	
27 Spandrel Walls		28 Paint	2
29 Pins/Hangers/Hinges		30 Fatigue Prone Connections	2
31 Live Load Response	S	32 **SUMMARY**	4
SUBSTRUCTURE 33 Abutments	2	34. Abutment Seats	1
35 Piers	2	36 Pier Seats	2
37 Backwalls	1	38. Wingwalls	2
39 Fenders and Dolphins		40 Scour 3	1
41 Slope Protection		42 **SUMMARY**	5
CULVERTS 43. General		44. Alignment	
45 Shape		46. Seams	
47 Headwalls or Endwalls		48 Scour	
49.		50 **SUMMARY**	
CHANNEL 51 Alignment	2	52. Protection	2
53. Waterway Adequacy	2	54. **SUMMARY**	5
APPROACHES 55 Pavement	2	56. Approach Slabs	
57. Guardrail	2	58. Relief Joints	
59. Embankment	1	60 **SUMMARY**	6
GENERAL 61 Navigation Lights		62. Warning Signs	
63 Sign Supports		64 Utilities	
65 Vertical Clearance		66. **GENERAL APPRAISAL & OPERATIONAL STATUS** 4	P

67 Inspected by [signature] P.E [ ] Initials NBZ
HNTB Ohio, Inc
Date 02/1/05

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Date 02/28/03

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Appendix A

BRIDGE INSPECTION REPORT

August 2006

VROOMAN ROAD BRIDGE
OVER GRAND RIVER
PERRY AND LEROY TOWNSHIPS

SFN 4337107

Prepared for:

Lake County Engineer
550 Blackbrook Road
Painesville, Ohio 44077

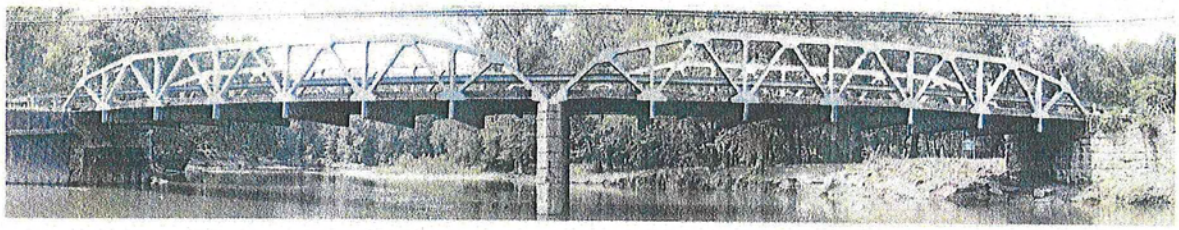
Prepared by:

Richland Engineering Limited
29 North Park Street
Mansfield, Ohio 44902
(419) 524-0074
Email: reltd@r-e-l.com

RICHLAND ENGINEERING LIMITED

DESCRIPTION

The Vrooman Road Bridge (SFN 4337107) crosses the Grand River on the border of Perry and Leroy Townships in Lake County. The bridge carries two lanes of traffic. The structure consists of two single span Warren pony trusses on wall-type masonry abutments and a wall-type reinforced concrete pier. (See Picture #1.) The welded steel trusses were built in 1952 by the Ohio Bridge Company. The structure was inundated by the recent flooding of the Grand River in late July. Large amounts of debris from the flood was entangled with the superstructure and trapped against the substructure. The bridge is posted with a 16-ton load limit. The bridge has been closed to highway traffic since the high water event.



Picture #1 - Looking downstream at bridge.

A major rehabilitation in 1986 replaced the steel stringer and timber deck floor system with a longitudinal timber floor system with an asphalt overlay. The bridge was also painted and a new bridge rail installed as part of the project. The timber deck is supported by floorbeams and timber sleepers on the pier and abutments. (See Figure 1.) The stone abutments were retained from the previous crossing and a concrete cap was added to support the timber floor. The south abutment breastwall and southeast wingwall have been reinforced with steel sheet piling and tiebacks.

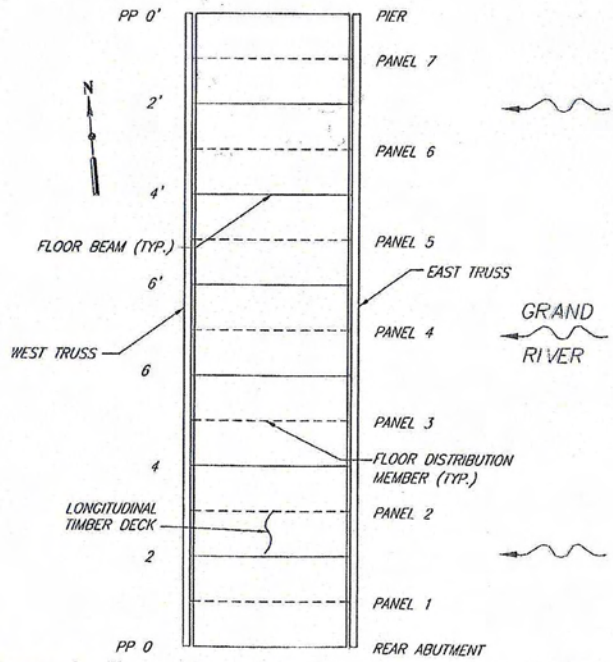
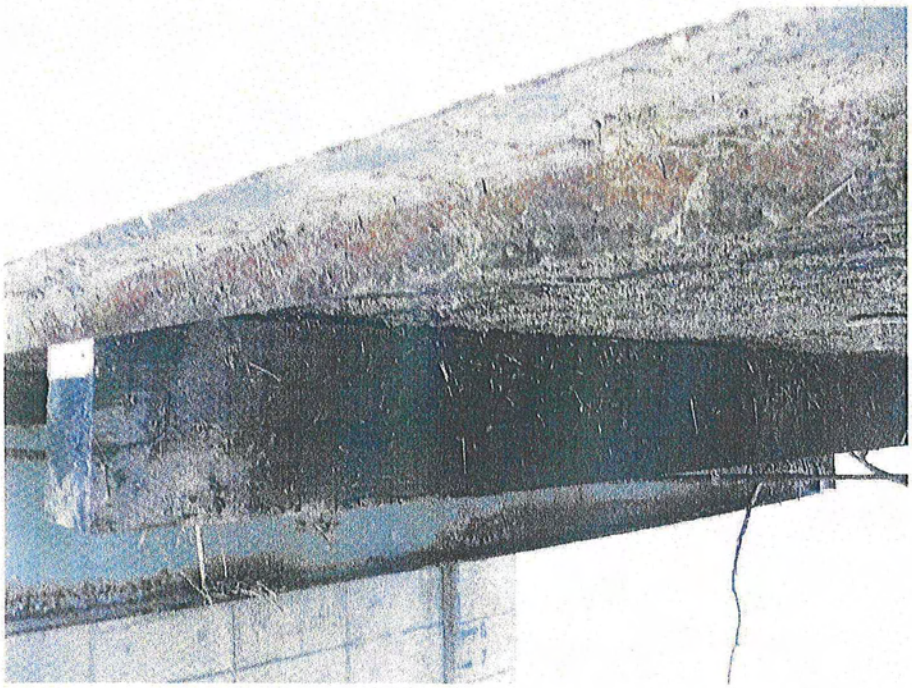


Figure 1 - Span 1 Framing Plan shown (Span 2 similar)

DECK ITEMS

Floor – The longitudinal timber floor is in fair condition. Several of the timber floor distribution members located between floorbeams are rotated, likely from impacts during the flood, leaving a gap between the members and decking up to ¾" in some locations. (See Picture #2.) All fasteners connecting the distribution members to the timber deck were inspected and remain tight. The underside of the floor is covered in flood debris.



Picture #2 - Rotated floor distribution member at span 2, L_3.

Wearing Surface – The asphalt wearing surface is in fair condition with longitudinal and transverse cracks. Approximately 50% of the timber batter blocks which retain the asphalt on the sides of the bridge are missing. There are grooves in the asphalt where an excavator was driven across the bridge.

Railing – The bridge railing is in poor condition. Several of the bolts connecting the C15x33.9 rail to the W6x15 support rail have been broken by vehicle impacts. Between L_3 and L_6 in span 1 of the west truss, six consecutive bolts are broken off, allowing the channel to sag approximately 2 inches. (See Picture #3.)

Picture #3 - Loose west bridge railing due to missing bolts.

SUPERSTRUCTURE ITEMS

Alignment – The superstructure's alignment is in poor condition due to several vehicle and flood impacts. L_0-L_2 span 2, east truss and L_6'-U_5' span 2, west truss have kinks from impacts. Both members are tension only members, so the kinks do not reduce the structure's load carrying capacity. All truss verticals were measured for vertical alignment during this inspection to ensure flood debris had not deflected the trusses. Generally, the flood appears to have had minimal affect on the alignment of the trusses. The worst location is L_6-U_6 span 1, west truss which is 0.7° from vertical, which results in approximately 1 ¼ inch deflection over the 9 foot truss height.

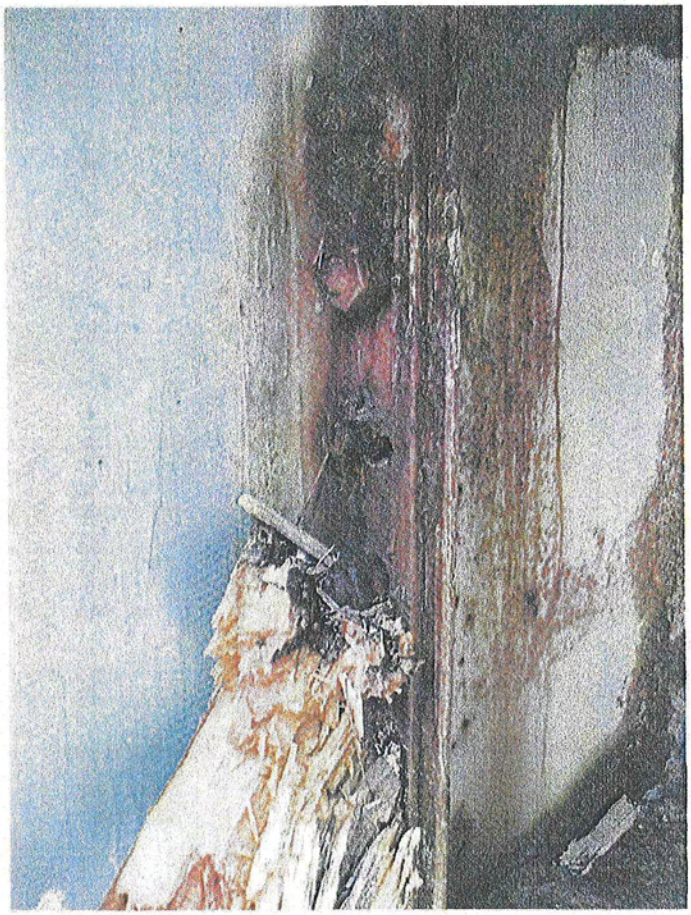
Floorbeams – The floorbeams are generally in fair condition. Surface rust is active on all floorbeams resulting in minor section loss. The ends of a few floorbeams were bent by debris impacts during the flood. The damage does not reduce the structural capacity of the floorbeams.

Floorbeam Connections – The floorbeam connections are in poor condition. Approximately 36% of the bridge's connectors have significant section loss to the dardelet bolt or nut. At 11 of the structure's 24 floorbeam ends, 7 or more of the 14 connectors have significant section loss. (See Table 1 and Picture #4.) The east connection of floorbeam 4 in span 1 has a missing connector. At the west connection of floorbeam 4' in span 2 a connector was replaced with a stainless steel bolt. The floorbeam connections to the truss verticals have several holes that were redrilled in the verticals during original construction. The result is an oversized hole for a bearing type connection. (See Picture #4.)

Floorbeam Location	East Connection	West Connection
SPAN 1		
2	7	4
4	1 *	5
6	0	0
6'	0	1
4'	1	2
2'	7	7
TOTAL	**16**	**19**
SPAN 2		
2	6	3
4	9	.0
6	7	5
6'	12	7
4'	7	12
2'	10	8
TOTAL	**51**	**35**
TOTAL	**67**	**54**

* The east connection of floorbeam 4 is missing one connector.
Each connection is made up of 14 dardelet bolts.

Table 1 – Floorbeam connection dardelet bolts with significant deterioration.



Picture #4 - Deteriorated floorbeam connectors at L_6' span 2, east truss.

Verticals – The truss vertical members are in poor condition. Several verticals have section loss to the interior flange floorbeam connection. The vertical members in a Warren truss are non-load carrying members between the top and bottom chords and are only required to brace the top chord and support the floorbeams. Impact damage from vehicles and storm debris has damaged several truss verticals throughout the structure. The following is a list of specific damaged locations:

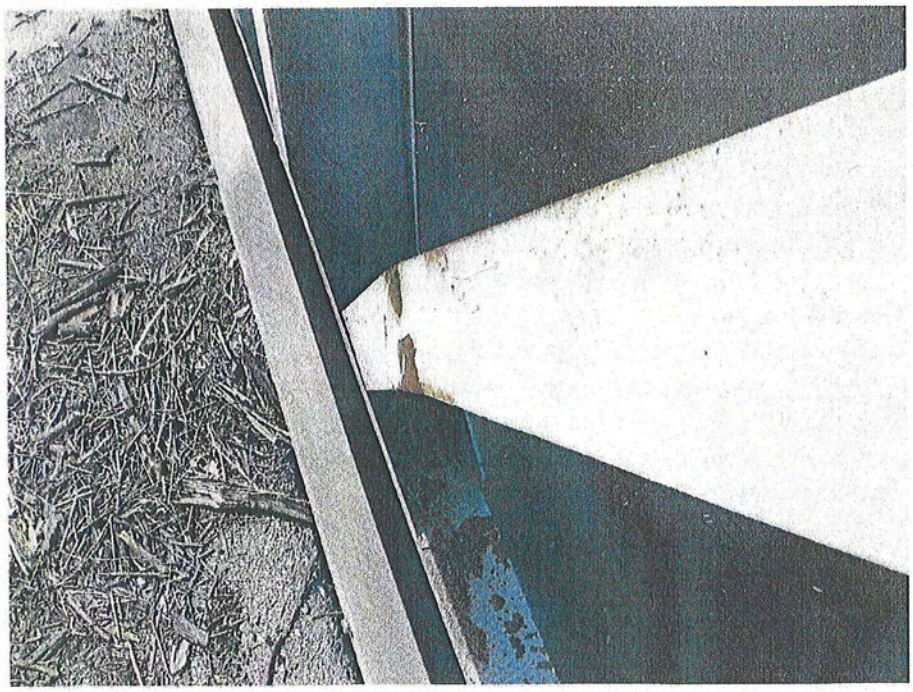
- L_4-U_4 span 1, west truss has several gouges and a bent east flange from vehicle impact.
- L_2-U_2 span 2, west truss was previously bent by vehicle impact. The member has been straightened and a steel plate was added to the web at the lower chord level.
- L_4-U_4 span 2, east truss was damaged at the floorbeam connection by flood debris. (See Picture #5.)

Picture #5 - Flood damaged vertical L_4-U_4, span 2, east truss.

Diagonals – The truss diagonal members are in poor condition. Vehicle impacts have damaged several truss diagonals throughout the structure. None of the damaged members would benefit from heat straightening due to the type of damage or the members being tension only. The following is a list of specific damaged locations:

- U_1-L_2 span 1, east truss has a bent west flange.
- L_4-U_5 span 1, west truss has gouges from vehicle impact.
- U_5-L_6 span 1, west truss has vehicle impact damage. (See Picture #6.)
- L_2-U_3 and U_3-L_4 span 2, west truss appear to have been heat straightened to repair previous damage.
- L_6-U_7 span 2, east truss has a bent east flange.
- L_6'-U_5' span 2, west truss was bent by vehicle impact. (See Picture #7.) The impact put a kink in the entire member and caused noticeable rotation at the upper chord gusset plate connection. All welds appeared to be intact. This is a tension member so the kink does not reduce the members load carrying capacity.

Picture #6 - Damaged U_5-L_6 span 1, west truss.

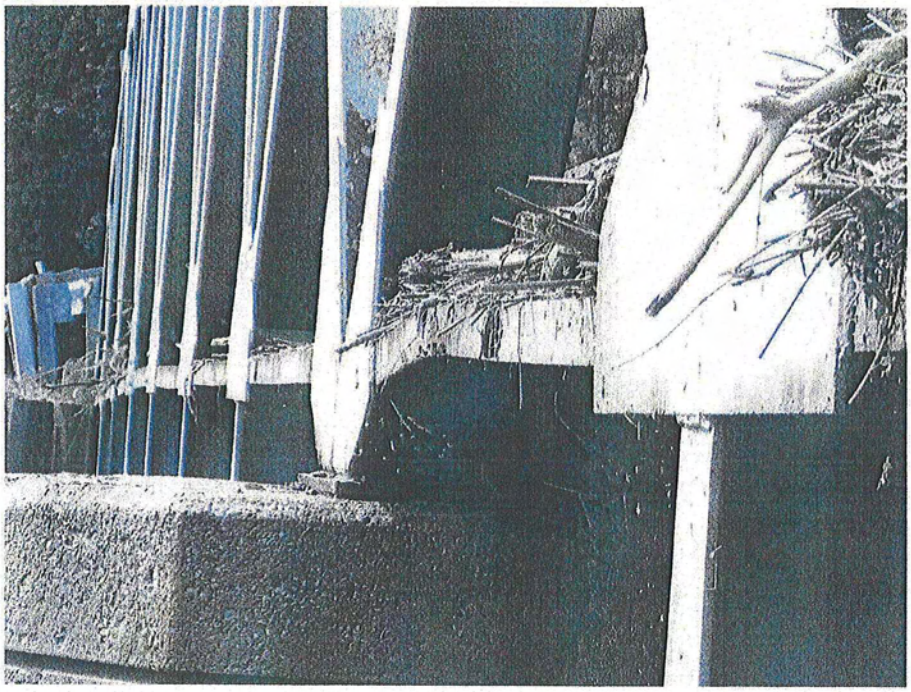


Picture #7 - Damaged L_6'-U_5' span 2, west truss.

<u>End Posts</u> – The truss end posts are in fair condition. L_0-U_2 in span 1 of the east truss has minor damage due to vehicle impact. L_0'-U_2' span 1 and L_0-U_2 span 2, east truss, have several gouges from an excavator reaching over the truss to clear debris out of the river.

Top Chord – The truss top chords are in good condition with no significant damage found. Minor surface rust and flood debris are present throughout the top chords.

Lower Chord – The truss lower chords are in fair condition. Several members have significant section loss due to corrosion including L_0-L_2 span 1, east and west trusses and L_0'-L_2' span 2, east truss. L_0-L_2 span 2, east truss is bent upward, likely from a log jam in the river. (See Picture #8.) This is a tension member so the kink does not reduce the member's load carrying capacity.



Picture #8 – Damaged L_0-L_2 east, span 2. Note amount of debris on bottom chord.

Lower Lateral Bracing – A combination of deterioration and flood damage has rendered the trusses' lower lateral bracing ineffective. Ten of the original 28 lower lateral braces are missing with the remaining braces bent, sagging and full of debris. (See Picture #9.) The structure remains in horizontal alignment due to the diaphragm bracing provided by the timber floor system.

Picture #9 - Damaged lower lateral bracing and flood debris, span 2.

SUBSTRUCTURE ITEMS

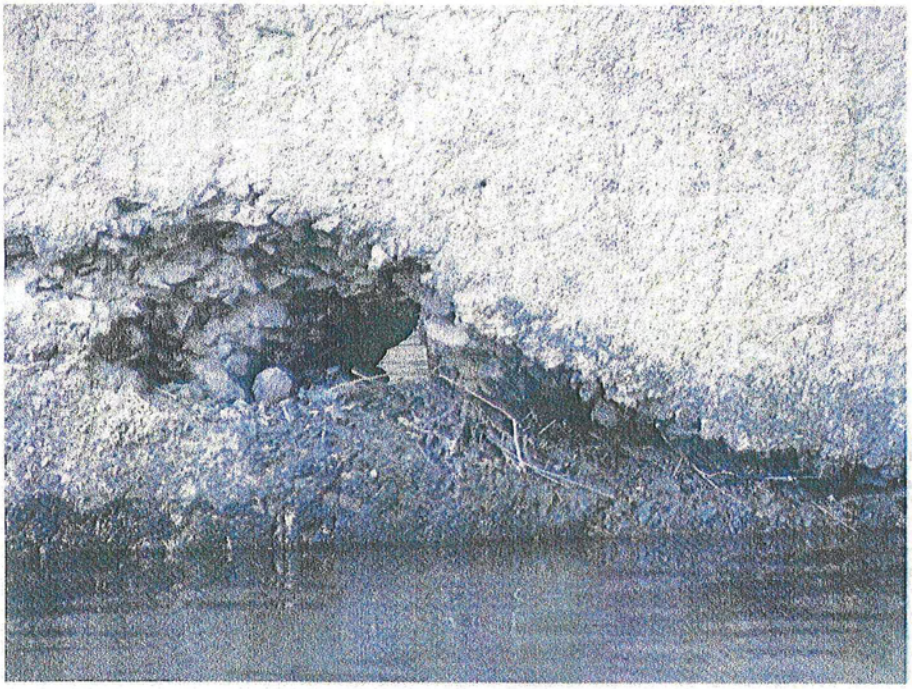
Abutments – The stone masonry abutments are in fair condition. The rear abutment breastwall was reinforced with a steel sheet pile wall that was tied back and then grouted between the stone masonry and sheet piling to fill any voids. The wall was sounded during the inspection with only a few minor voids detected.

Abutment Seats – The abutment seats are in fair condition. The seats are still covered in debris from the flood and the east end of the rear abutment had standing water on the seat.

Pier – The reinforced concrete wall-type pier is in fair condition. There is a 6 inch hole completely through the pier approximately one foot above normal water. The hole appears to be from original construction. (See Picture #10.) The pier also has several spalls on the east end from flood debris impacts.

Pier Seat – The pier seat is in fair condition. Horizontal cracks are present approximately ten inches down from the top of the seat on both sides of the pier.

Wingwalls – The stone masonry wingwalls are in fair condition. The rear abutment's east wingwall was previously reinforced with a steel sheet pile wall. There is a minimal amount of washout behind the end of the wall. The wall also has a slight bulge between the water level and the tieback wale.



Picture #10 - Hole through base of pier.

Scour – Lake Erie Diving, Inc. performed an underwater inspection of the rear abutment and pier. (See attached Lake Erie Diving, Inc. report.) The river's gravel bottom was washed away, exposing the shale bedrock during the recent high water event. No deep scour problems were noted during the inspection.

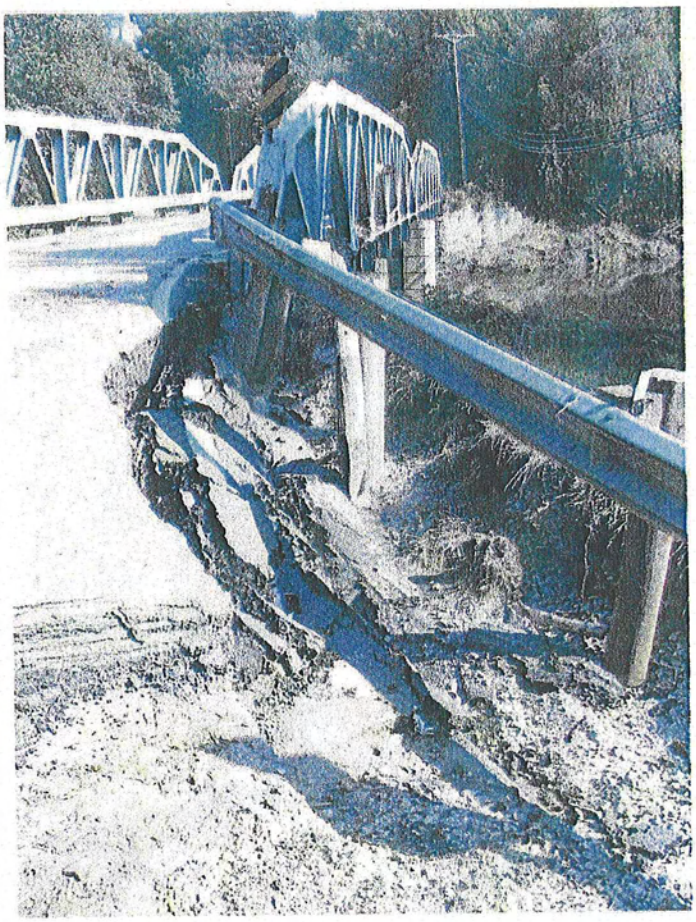
CHANNEL ITEMS

Protection – The recent 500 year frequency high water caused significant erosion to the river banks, removing embankment, vegetation and trees from in front of the breastwalls and wingwalls.

Waterway Adequacy – The recent 500 year flood overtopped the top chord of the bridge, completely submerging the entire structure. The approach roadways were also overtopped and several areas of pavement and guardrail were undermined. The contraction of the river, caused by the approach embankments, creates high water velocities under the bridge, which has lowered the streambed approximately four feet below its normal bottom.

APPROACH ITEMS

Pavement, Guardrail, and Embankment – The approaches are in critical condition following the recent flooding. Several areas of embankment were washed out, undermining the pavement and guardrail. (See Picture #11.)



Picture #11 - Flood damage to rear approach roadway.

SUMMARY

The Vrooman Road Bridge has a General Appraisal Rating of 3, serious condition, and an operational status of X, bridge closed for reasons other than condition or load-carrying capacity.

INSPECTION

The in-depth physical inspection was performed by Richland Engineering Limited on August 23 and August 25, 2006. The inspection team consisted of Jason D. Burgholder, P.E. and Chad E. Owens, Inspector. Lake Erie Diving, Inc. performed an underwater inspection of the rear abutment and pier.

Underwater Bridge Inspection Report

Prepared by: Lake Erie Diving, Inc.
362 Blackbrook Road
Painesville, Ohio 44077

Appendix B

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

UNDERWATER BRIDGE INSPECTION REPORT

Location:

Bridge #: Vrooman Rd.
Waterway: Grand River
City: Perry, Ohio

Inspected By:

Diver: Youri Bardyguine
Tender: Pat Murphy – Mark Maquire
Date: 25 November 2002

Inspection Performed For:

Name: HNTB Corporation
Address: 55 Erieview Plaza, Suite 500
Cleveland, Ohio 44114-1816
Field Representative: Mr. Bill Vermes
Telephone #: (216) 522-1140

Water Elevation:

Reference Location: From top of the pier to the waterline at the downstream end.
Water Elevation (Field Measurement): 14.7'

Weather Conditions: Overcast – 50 Degrees

Water Conditions: Minor flow – 3' Visibility

Soundings: Equipment Used: Surveyors Rod
(See Attached Print)

Number of Piers Inspected: 1
(See Attached For Detailed Observations)

Number of Abutments Inspected: 1
(See Attached For Detailed Observations)

Culvert: N/A
(See Attached For Detailed Observations)

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

PIER OBSERVATIONS

Bridge #: Vrooman Rd. **Inspection Date:** 25 November 2002

Pier Number: 1
(Reference Attached Print)

Type of Construction: Concrete: ☒ Cut-Stone: ☐ Timber: ☐ Steel: ☐
Other: ☐ _____

Bottom Material: Shale & Small Stone

Debris Around Pier: One 24" diameter tree against the upstream end.

Scour: No Scour Present

Exposed Footer: Top of footer even with shale channel bottom.

Footer Undermining: None

Exposed Piling Under Footer: N/A

Piling Condition: N/A

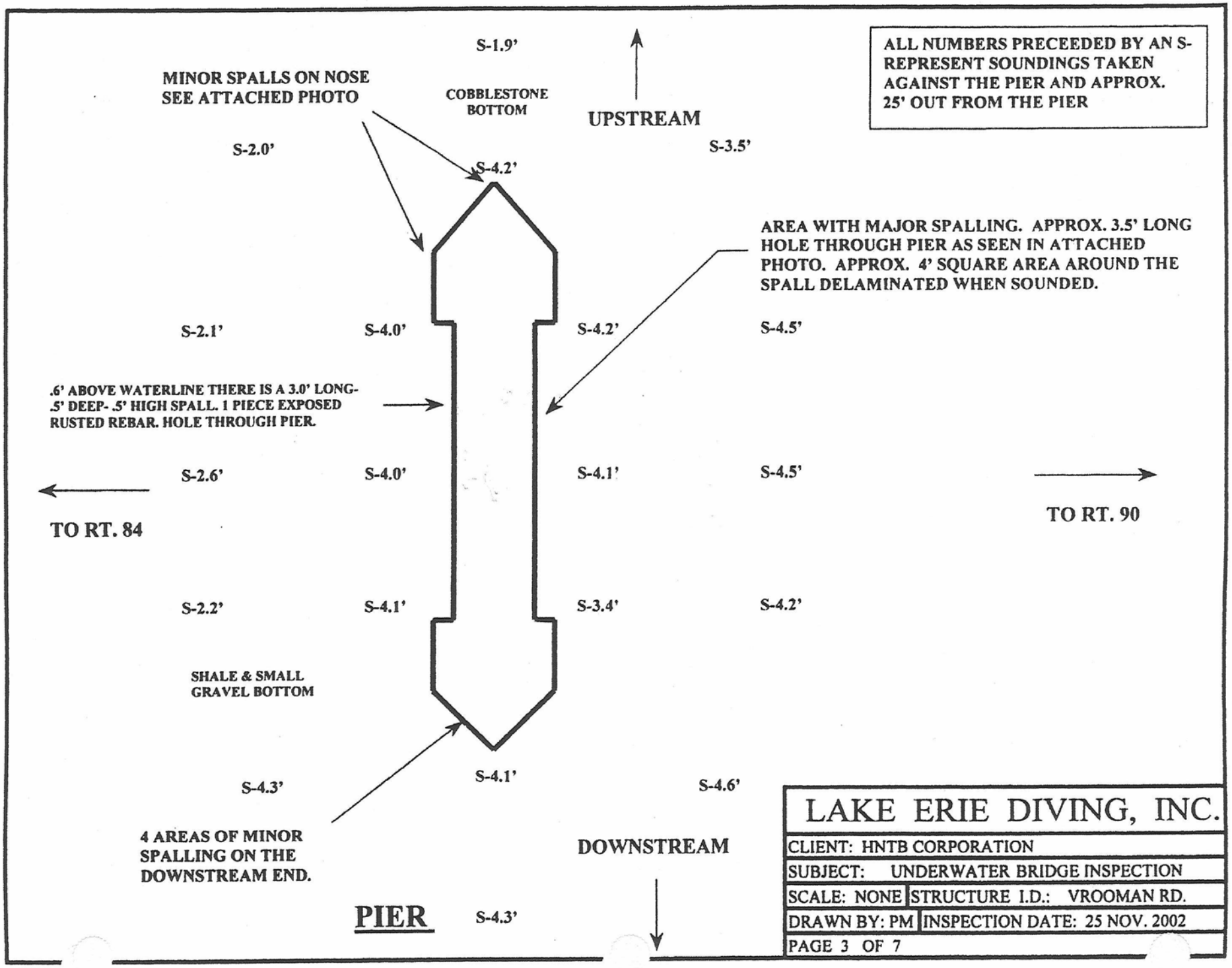
Cracks & Spalls: Yes- See sketch and photo's.

Fender Condition: N/A

Impact Damage: N/A

Unusual Conditions: Hole through pier – see sketch and photo's.

Overall Condition Rating: Fair


ALL NUMBERS PRECEEDED BY AN S- REPRESENT SOUNDINGS TAKEN AGAINST THE PIER AND APPROX. 25' OUT FROM THE PIER
S-1.9'
MINOR SPALLS ON NOSE SEE ATTACHED PHOTO
COBBLESTONE BOTTOM
UPSTREAM
S-2.0'
S-3.5'
S-4.2'
AREA WITH MAJOR SPALLING. APPROX. 3.5' LONG HOLE THROUGH PIER AS SEEN IN ATTACHED PHOTO. APPROX. 4' SQUARE AREA AROUND THE SPALL DELAMINATED WHEN SOUNDED.
S-2.1'
S-4.0'
S-4.2'
S-4.5'
.6' ABOVE WATERLINE THERE IS A 3.0' LONG- .5' DEEP- .5' HIGH SPALL. 1 PIECE EXPOSED RUSTED REBAR. HOLE THROUGH PIER.
S-2.6'
S-4.0'
S-4.1'
S-4.5'
TO RT. 84
TO RT. 90
S-2.2'
S-4.1'
S-3.4'
S-4.2'
SHALE & SMALL GRAVEL BOTTOM
S-4.3'
S-4.1'
S-4.6'
4 AREAS OF MINOR SPALLING ON THE DOWNSTREAM END.
DOWNSTREAM
PIER
S-4.3'
LAKE ERIE DIVING, INC.
CLIENT: HNTB CORPORATION
SUBJECT: UNDERWATER BRIDGE INSPECTION
SCALE: NONE
STRUCTURE I.D.: VROOMAN RD.
DRAWN BY: PM
INSPECTION DATE: 25 NOV. 2002
PAGE 3 OF 7

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

ABUTMENT OBSERVATIONS

Bridge #: Vrooman Rd. **Inspection Date:** 25 November 02

Abutment Number: South
(Reference Attached Print)

Type of Construction: Concrete: ☒ Cut-Stone: ☐ Timber: ☐ Steel: ☐ Other: ☐ _____

Bottom Material: Rock, grout, & mud.

Debris Around Abutment: None

Scour: None

Exposed Footer: None

Footer Undermining: None

Exposed Piling Under Footer: N/A

Piling Condition: N/A

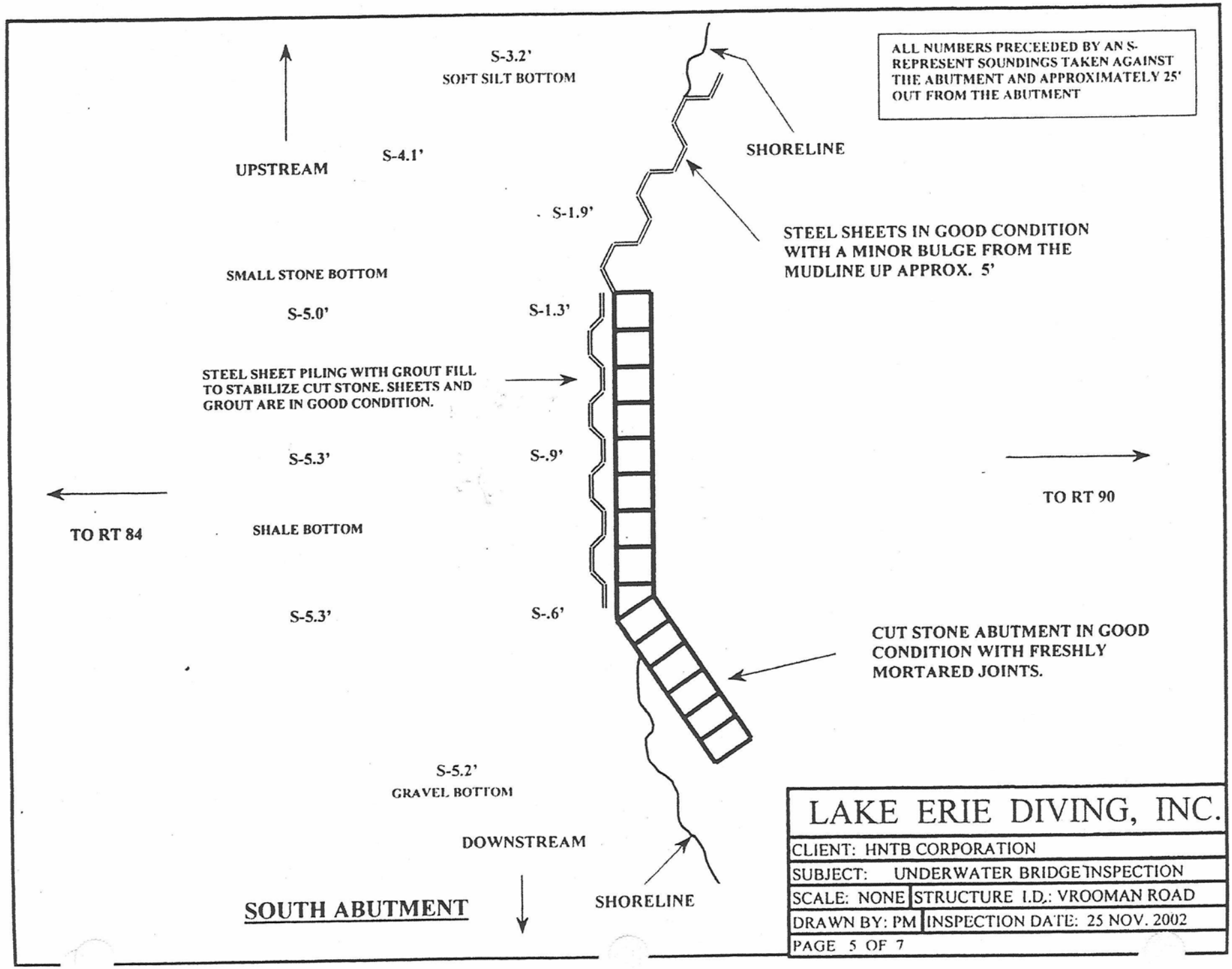
Cracks & Spalls: None

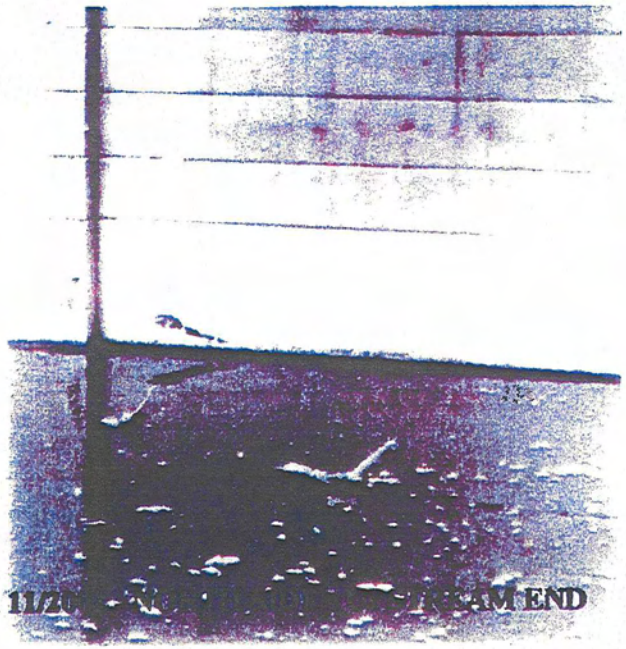
Fender Condition: N/A

Impact Damage: None

Unusual Conditions: Fresh mortar at cut stone joints. Steel sheets protecting cut stone.

Overall Condition Rating: Good

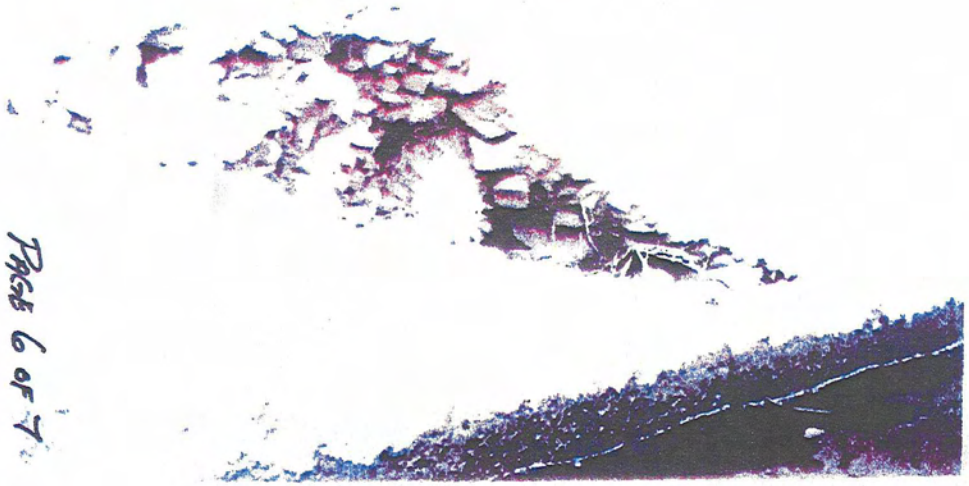

ALL NUMBERS PRECEEDED BY AN S- REPRESENT SOUNDINGS TAKEN AGAINST THE ABUTMENT AND APPROXIMATELY 25' OUT FROM THE ABUTMENT
S-3.2'
SOFT SILT BOTTOM
UPSTREAM
S-4.1'
SHORELINE
S-1.9'
STEEL SHEETS IN GOOD CONDITION WITH A MINOR BULGE FROM THE MUDLINE UP APPROX. 5'
SMALL STONE BOTTOM
S-5.0'
S-1.3'
STEEL SHEET PILING WITH GROUT FILL TO STABILIZE CUT STONE. SHEETS AND GROUT ARE IN GOOD CONDITION.
S-5.3'
S-.9'
TO RT 90
TO RT 84
SHALE BOTTOM
S-5.3'
S-.6'
CUT STONE ABUTMENT IN GOOD CONDITION WITH FRESHLY MORTARED JOINTS.
S-5.2'
GRAVEL BOTTOM
DOWNSTREAM
SOUTH ABUTMENT
SHORELINE
LAKE ERIE DIVING, INC.
CLIENT: HNTB CORPORATION
SUBJECT: UNDERWATER BRIDGE INSPECTION
SCALE: NONE
STRUCTURE I.D.: VROOMAN ROAD
DRAWN BY: PM
INSPECTION DATE: 25 NOV. 2002
PAGE 5 OF 7



VROOMAN RD. PIER 11/20[illegible] [illegible] STREAM END

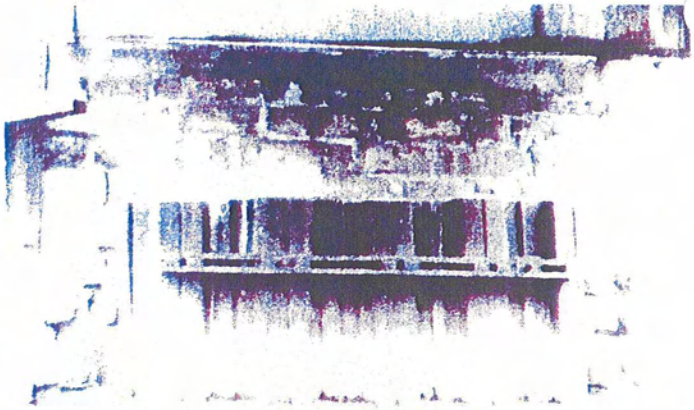
VROO[illegible] PIER 11/2002- NORTH SIDE
HOLE THROU[illegible] LOOKING SOUTH - EXPOSED REBAR

VROOMAN RD. PIER 11/2002 - NORTH SIDE - UPSTREAM END

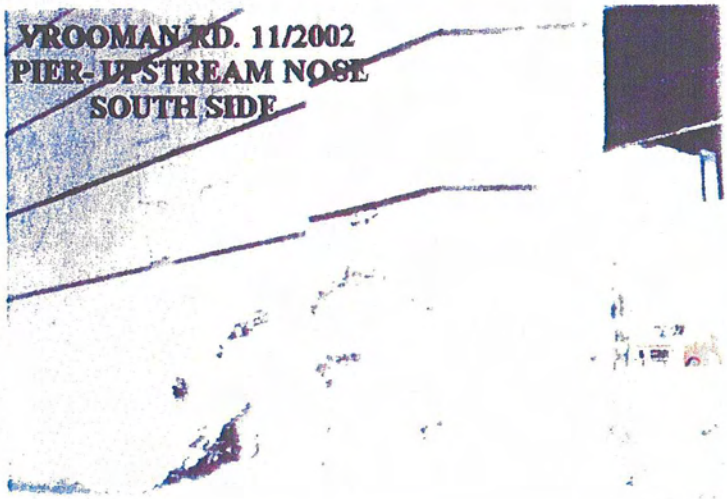


VROOMAN RD. PIER 11/2002 - UPSTREAM END - SOUTH SIDE

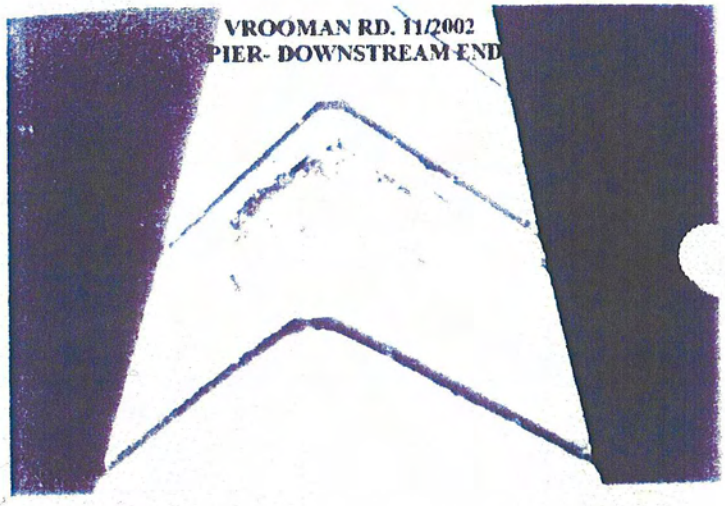
VROOMAN RD. 11/2002



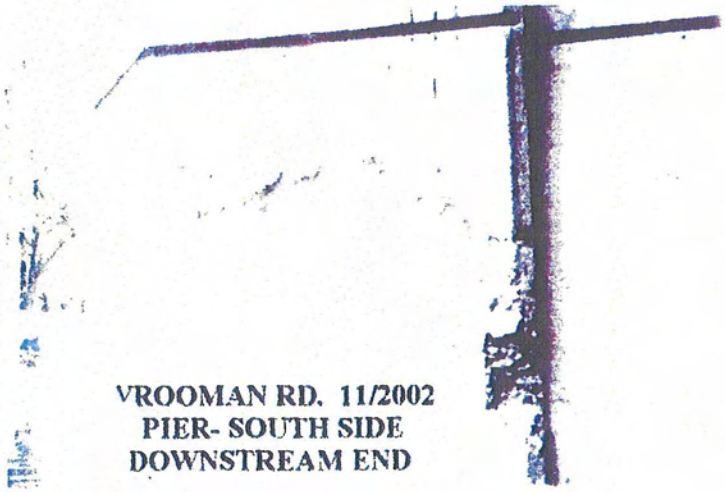
VROOMAN RD. 11/2002
SOUTH ABUMENT



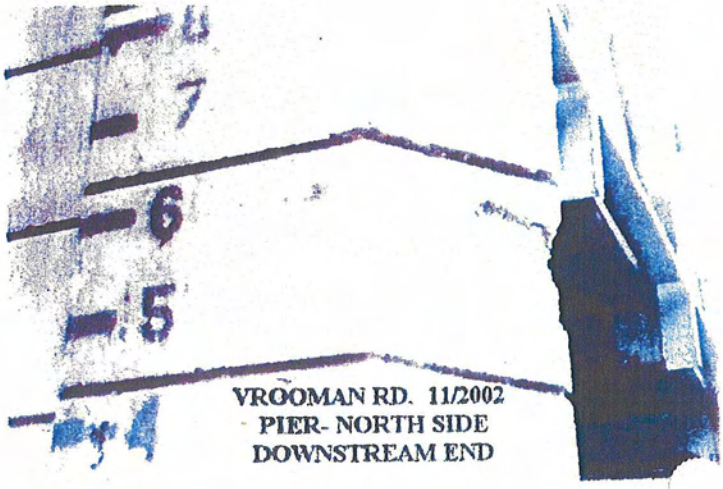
VROOMAN RD. 11/2002
PIER- UPSTREAM NOSE
SOUTH SIDE



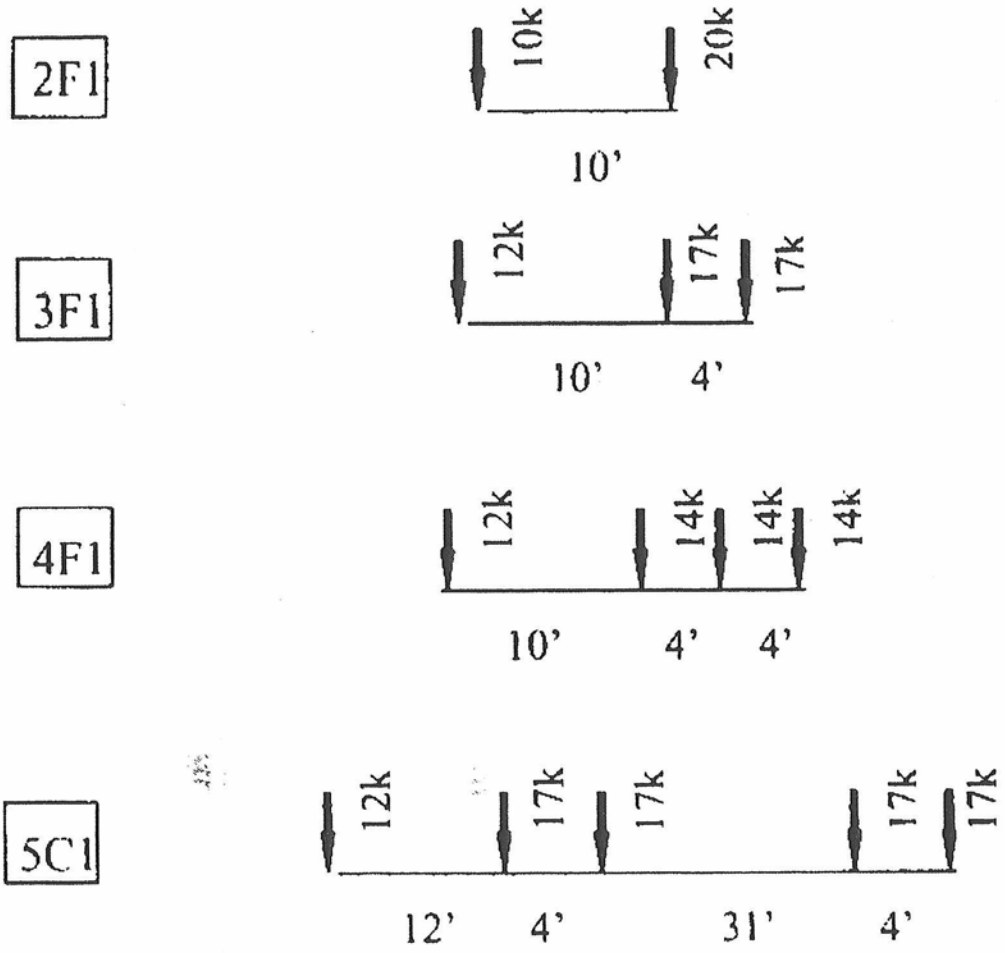
VROOMAN RD. 11/2002
PIER- DOWNSTREAM END



VROOMAN RD. 11/2002
PIER- SOUTH SIDE
DOWNSTREAM END



VROOMAN RD. 11/2002
PIER- NORTH SIDE
DOWNSTREAM END



Ohio Legal Truck Loads
(From ODOT Bridge Design Manual, April 2000)

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

UNDERWATER BRIDGE INSPECTION REPORT

Location:

Bridge #: Vrooman Rd.
Waterway: Grand River
City: Painesville Twp, Ohio

Inspected By:

Diver: Patrick Murphy
Tender: Mike Murphy – Dave Pruit
Date: 18 August 2006

Inspection Performed For:

Name: Lake County Engineer
Address: 550 Blackbrook Rd.
Painesville, Ohio 44077
Field Representative: Mr. Ted Galuschic
Telephone #: (440) 350-2770

Water Elevation:

Reference Location: From top of the pier to the waterline at the downstream end.
Water Elevation (Field Measurement): 14.3'

Weather Conditions: Overcast – 75 Degrees

Water Conditions: Minor flow – 1' Visibility

Soundings: Equipment Used: Surveyors Rod
(See Attached Print)

Number of Piers Inspected: 1
(See Attached For Detailed Observations)

Number of Abutments Inspected: 1
(See Attached For Detailed Observations)

Culvert: N/A
(See Attached For Detailed Observations)

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

PIER OBSERVATIONS

Bridge #: Vrooman Rd. **Inspection Date:** 18 August 2006

Pier Number: 1
(Reference Attached Print)

Type of Construction: Concrete: ☒ Cut-Stone: ☐ Timber: ☐ Steel: ☐
Other: ☐ _____

Bottom Material: Shale, Small Stone, and Silt

Debris Around Pier: None

Scour: None

Exposed Footer: Top of footer even with mudline/ shale.

Footer Undermining: None

Exposed Piling Under Footer: N/A

Piling Condition: N/A

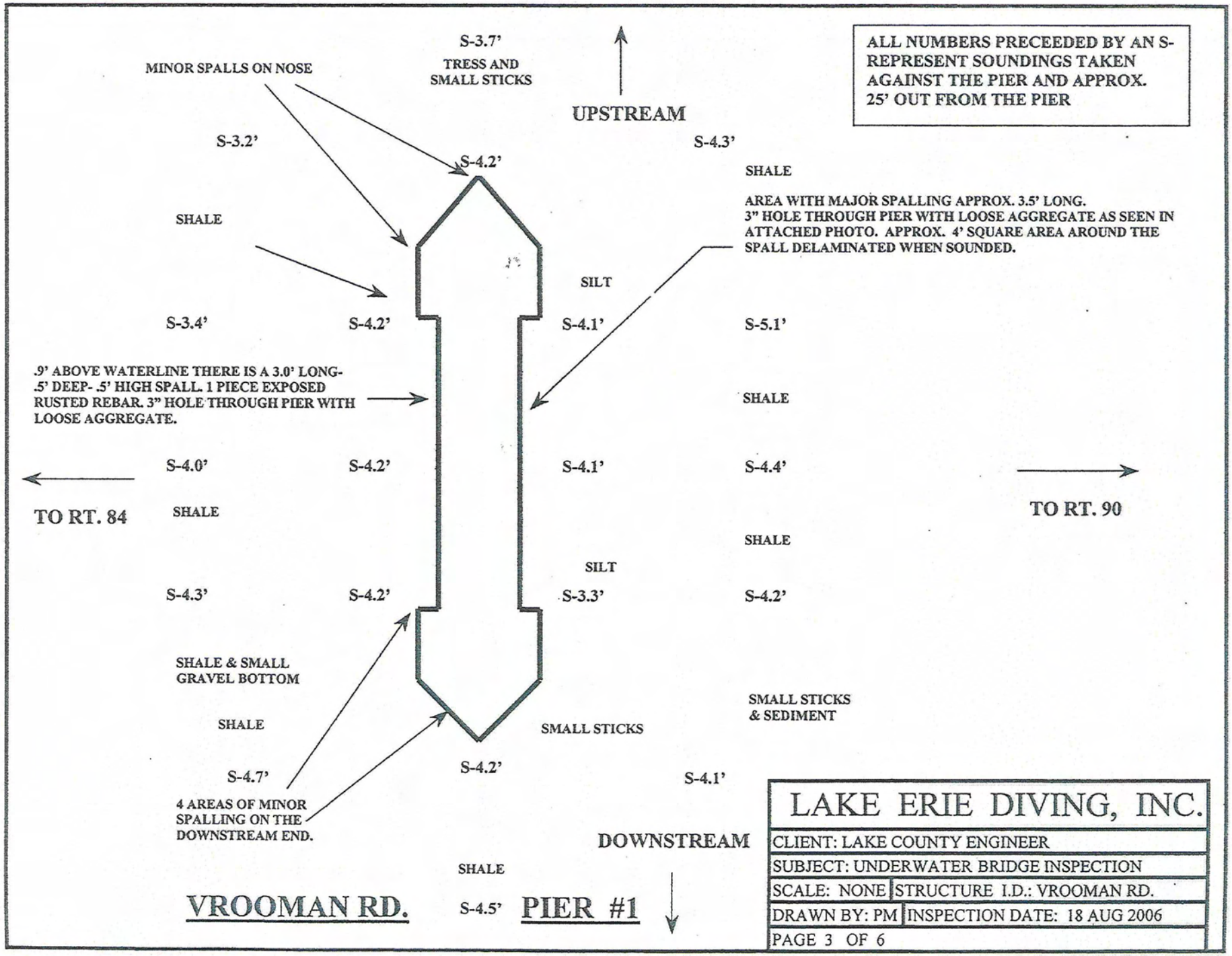
Cracks & Spalls: See sketch and photo's.

Fender Condition: N/A

Impact Damage: None

Unusual Conditions: Hole through pier – see sketch and photo's.

Overall Condition Rating: Good/Fair



LAKE ERIE DIVING, INC.	
CLIENT: LAKE COUNTY ENGINEER	
SUBJECT: UNDERWATER BRIDGE INSPECTION	
SCALE: NONE	STRUCTURE I.D.: VROOMAN RD.
DRAWN BY: PM	INSPECTION DATE: 18 AUG 2006
PAGE 3 OF 6	

Lake Erie Diving, Inc.

362 Blackbrook Rd.
Painesville, OH 44077

Office (440) 352-9472 Fax (440) 352-8471

ABUTMENT OBSERVATIONS

Bridge #: Vrooman Rd. **Inspection Date:** 18 August 2006

Abutment Number: South
(Reference Attached Print)

Type of Construction: Concrete: ☒ Cut-Stone: ☒ Timber: ☐ Steel: ☒
Other: ☐ _____

Bottom Material: Stone, grout, shale, and silt.

Debris Around Abutment: None

Scour: None

Exposed Footer: None

Footer Undermining: None

Exposed Piling Under Footer: N/A

Piling Condition: N/A

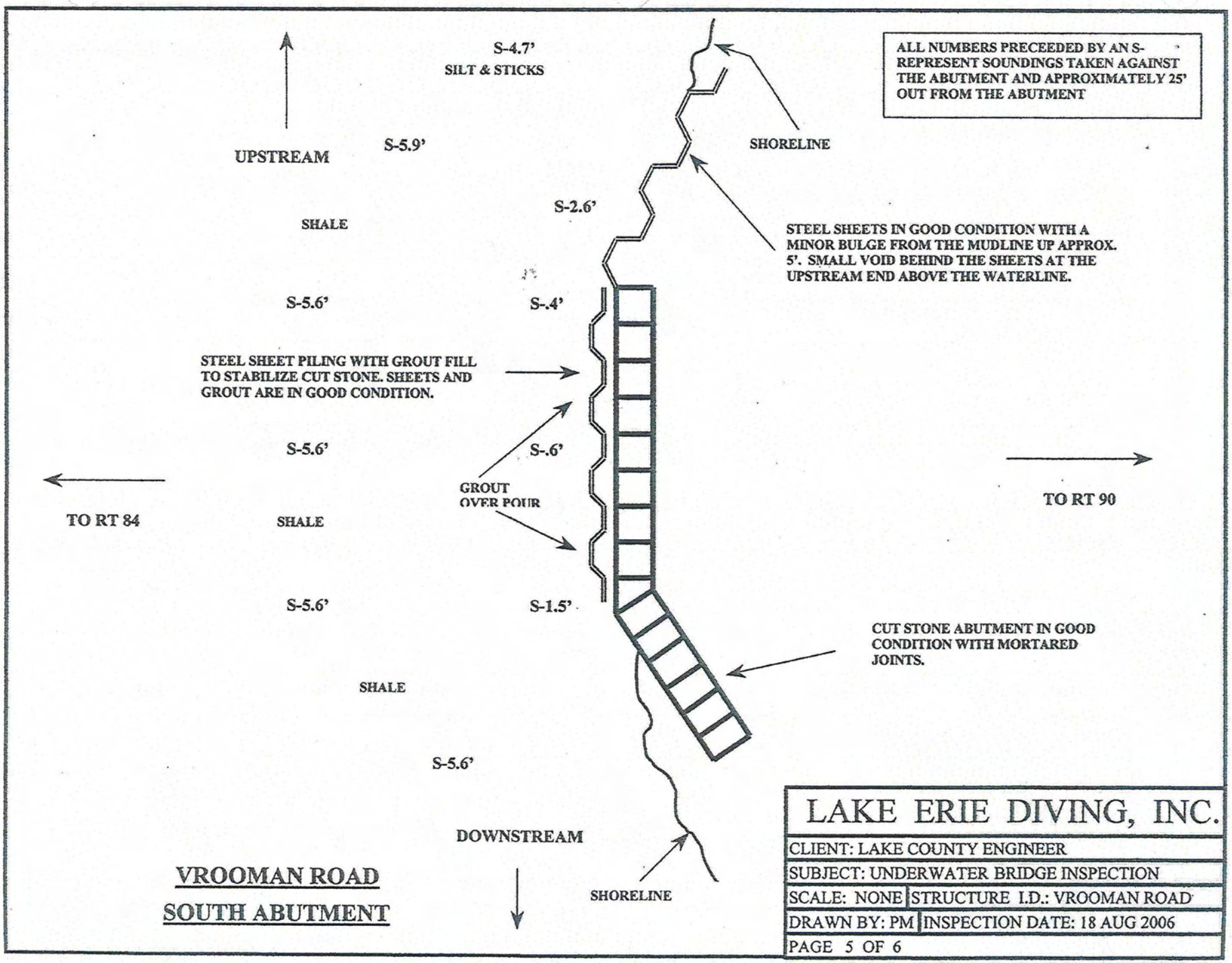
Cracks & Spalls: None

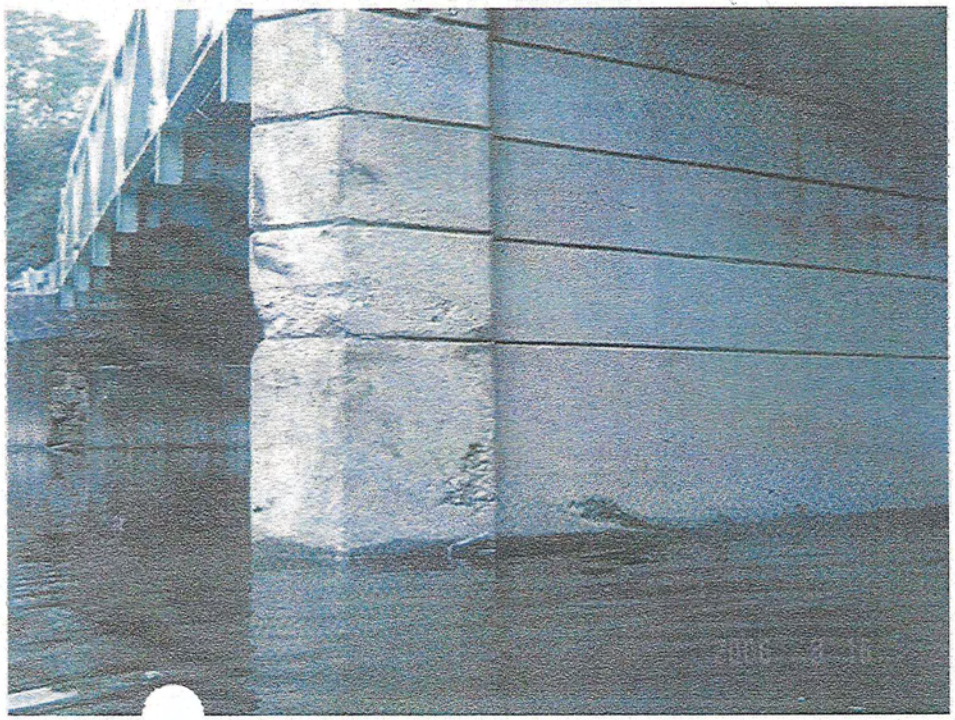
Fender Condition: N/A

Impact Damage: None

Unusual Conditions: Mortar at cut stone joints. Steel sheets protecting cut stone.

Overall Condition Rating: Good


ALL NUMBERS PRECEEDED BY AN S- REPRESENT SOUNDINGS TAKEN AGAINST THE ABUTMENT AND APPROXIMATELY 25' OUT FROM THE ABUTMENT
S-4.7'
SILT & STICKS
UPSTREAM
S-5.9'
SHORELINE
S-2.6'
SHALE
STEEL SHEETS IN GOOD CONDITION WITH A MINOR BULGE FROM THE MUDLINE UP APPROX. 5'. SMALL VOID BEHIND THE SHEETS AT THE UPSTREAM END ABOVE THE WATERLINE.
S-5.6'
S-.4'
STEEL SHEET PILING WITH GROUT FILL TO STABILIZE CUT STONE. SHEETS AND GROUT ARE IN GOOD CONDITION.
S-5.6'
S-.6'
GROUT OVER POUR
TO RT 84
SHALE
TO RT 90
S-5.6'
S-1.5'
CUT STONE ABUTMENT IN GOOD CONDITION WITH MORTARED JOINTS.
SHALE
S-5.6'
DOWNSTREAM
SHORELINE
VROOMAN ROAD
SOUTH ABUTMENT
LAKE ERIE DIVING, INC.
CLIENT: LAKE COUNTY ENGINEER
SUBJECT: UNDERWATER BRIDGE INSPECTION
SCALE: NONE
STRUCTURE I.D.: VROOMAN ROAD
DRAWN BY: PM
INSPECTION DATE: 18 AUG 2006
PAGE 5 OF 6



STATE OF OHIO DEPARTMENT OF TRANSPORTATION

BRIDGE INSPECTION REPORT

BR-86 REV. 02-95

4 3 3 7 1 0 7
STRUCTURE FILE NUMBER

BRIDGE NUMBER LAK (CO) CH227 (ROUTE) 02.83 (UNIT) YEAR BUILT 5286

DIST. 12 BRIDGE TYPE STEEL/TRUSS/THRU TYPE SERVICE 1 15 VROOMAN RD. OVER GRAND RIVER

DECK 1. FLOOR 8	2	CRACKS; EXCAVATOR TRACK INDENTATIONS 7. WEARING SURFACE 41	2
NONE 3. CURBS, SIDEWALKS & WALKWAYS 9		4. MEDIAN 87	
5 MISSING BOLTS IN WEST RAIL, SPAN 1, BETWEEN L3 AND L6; RAIL LOOSE AND SAGGING ≈2" 6. RAILING 10	3	OVER SIDE WITHOUT DRIP STRIP 6. DRAINAGE 43	2
CRACKS IN ASPHALT ALLOWING DRAINAGE ONTO ABUTMENT SEATS 7. EXPANSION JOINTS 11	2	8. SUMMARY 44	5
SUPERSTRUCTURE SEVERAL TRUSS MEMBERS BENT FROM VEHICLE IMPACT 9. ALIGNMENT 12	3	10. BEAMS/GIRDERS/SLAB 45	
11. DIAPHRAGMS or CROSSFRAMES 13		12. JOISTS/STRINGERS 46	
SECTION LOSS AND ACTIVE CORROSION FROM DRAINAGE 13. FLOOR BEAMS 14	2	SIGNIFICANT DETERIORATION TO SEVERAL CONNECTORS; 1 MISSING @ SPAN 1, PANEL 4 EAST 14. FLOOR BEAM CONNECTIONS 47	3
L4-U4 SPAN 1 WEST AND L2-U2 SPAN 2 WEST DAMAGED BY VEHICLE IMPACT 15. VERTICALS 15	3	SEVEN BENT OR DAMAGED MEMBERS FROM VEHICLE IMPACTS 16. DIAGONALS 48	3
L0-U1 SPAN 1 AND L0-U1 SPAN 2 EAST, SEVERAL GOUGES FROM EXCAVATOR IMPACT 17. END POSTS 16	2	MINOR SURFACE RUST AND PITTING 18. TOP CHORD 49	1
L0-L2 SPAN 2 EAST TRUSS IS BENT; ACTIVE CORROSION AND LOSS ON SEVERAL MEMBERS 19. LOWER CHORD 17	2	10 OF 28 MISSING; OTHERS BENT, SAGGING, FULL OF DEBRIS 20. LOWER LATERAL BRACING 50	4
21. TOP LATERAL BRACING 18		22. SWAY BRACING 51	
23. PORTALS 19		24. BEARING DEVICES 52	2
25. ARCH 20		26. ARCH COLUMNS or HANGERS 53	
27. SPANDREL WALLS 21		GENERALLY FAIR ABOVE ROADWAY; POOR CONDITION BELOW ROADWAY, ESP. FLOORBEAM CONNECTIONS 28. PAINT 54	5
29. PINS/HANGERS/HINGES 22		SURFACE RUST ON WELDED FLOORBEAM SPLICES 30. FATIGUE PRONE CONNECTIONS 55	2
BRIDGE CLOSED DURING INSPECTION; PREVIOUS REPORT HAD EXCESSIVE L.L.R. 31. LIVE LOAD RESPONSE 23	E	32. SUMMARY 56	3
SUBSTRUCTURE 33. ABUTMENTS 24	2	DEBRIS AND STANDING WATER 34. ABUTMENT SEATS 57	2
6" HOLE THRU BASE OF PIER; HORIZONTAL CRACKS ≈10" DOWN FROM TOP OF PIER 35. PIERS 25	2	MINOR CRACKS AND SPALLS 36. PIER SEATS 58	2
37. BACKWALLS 26	1	SHEET PILING AT SOUTHEAST WALL HAS MINOR BULGING 38. WINGWALLS 59	2
39. FENDERS and DOLPHINS 27		PERFORMED BY LAKE ERIE DIVING, INC. 40. SCOUR 60	3 1
NONE 41. SLOPE PROTECTION 28		42. SUMMARY 62	5
CULVERTS 43. GENERAL 29		44. ALIGNMENT 63	
45. SHAPE 30		46. SEAMS 64	
47. HEADWALLS or ENDWALLS 31		48. SCOUR 65	
49. 32		50. SUMMARY 66	
CHANNEL 51. ALIGNMENT 33	1	EROSION TO BANKS; VEGETATION WASHED AWAY 52. PROTECTION 67	3
500 YR. FLOOD OVERTOPPED; BRIDGE WASHED OUT APPROACHES; STREAM BED LOWERS @ BRIDGE 53. WATERWAY ADEQUACY 34	3	54. SUMMARY 68	3
APPROACHES PAVEMENT UNDERMINED AND MISSING 55. PAVEMENT 35	4	56. APPROACH SLABS 69	
POSTS HANGING IN AIR ON EAST SIDE OF REAR APPROACH 57. GUARDRAIL 36	4	58. RELIEF JOINTS 70	
LARGE HOLES IN BOTH APPROACHES FROM FLOODING 59. EMBANKMENT 37	4	60. SUMMARY 71	0
GENERAL 61. NAVIGATION LIGHTS 38		NORTHEAST SIGN DESTROYED; OTHER 3 HAVE MINOR DAMAGE 62. WARNING SIGNS 72	3
63. SIGN SUPPORTS 39		NONE 64. UTILITIES 73	
65. VERTICAL CLEARANCE 40	N	66. GENERAL APPRAISAL & OPERATIONAL STATUS 74	COND 3 STAT X

67. INSPECTED BY
Jason D. Burgholder
SIGNED
JASON D. BURGHOLDER #69829
DOT 2852
76 PE: PE
78 INITIALS: JDB
DATE 082806

68. REVIEWED BY
Dean A. Palmer
SIGNED
Dean A. Palmer, PE #37475
81 PE: PE
83 INITIALS: DAP
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DATE 091306