

**LOGAN COUNTY
PLEASANT TOWNSHIP**

**LOG C21-1.00
(SFN 4631838)**

**COUNTY ROAD 21
OVER
GREAT MIAMI RIVER**

LOAD RATING ANALYSIS

AUGUST 2011

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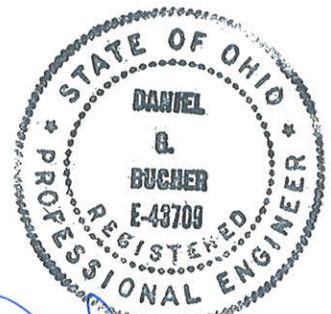
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U1L3; U2L4; U3L5; U4L6; L3U5; and L4U6 using Bars 7 Analysis Results

NO ASPHALT OPTION

- Bridge Load Rating Report
- Recommended Live Load Posting
- Dead Load Calculations for BAR 7 Input
- Bars 7 – Computer Analysis Results
- Hand Calculations for Rating of Whippe Diagonals
U1L3; U2L4; U3L5; U4L6; L3U5; and L4U6 using
Bars 7 Analysis Results



Daniel B. Bucher
8-22-11



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BRIDGE LOAD RATING REPORT

BRIDGE NO.	Logan Co.; Pleasant Twp.; CR21-1.00 over Miami River	SFN	4631838
BRIDGE DESCRIPTION	Whipple (Double Intersection Pratt Truss) Through Truss		
WORK DETAILS	CEAO Fracture Critical Load Rating Program		
SPANS (C/C BEARINGS)	140' -0"		
BRIDGE PLAN INFORMATION	None		
MATERIAL STRENGTHS	Unknown		
RATING SOFTWARE	BRIDGE TRUSS - WS		BARS 7
	STRINGERS & FLOOR BEAMS - WS & LF		PDOT
	GUSSETS: WELDED - FASTENED GUSSET PLATE ANALYSIS & RATING SPREAD SHEET - WORKING STRESS BY ODOT CENTRAL OFFICE		
	GUSSETS: RIVETED/BOLTED GUSSET PLATE ANALYSIS & RATING SPREAD SHEET - WORKING STRESS BY ODOT CENTRAL OFFICE		
SPECIAL ASSUMPTIONS	Bridge built 1882 - Assumed Fy=26KSI, Fu=52KSI per AASHTO Manual for Bridge Evaluation Table 6B.6.2.1		

STRUCTURE RATING ANALYSIS	DESIGN LOADS	INVENTORY	WS		LOAD FACTOR		CONTROLLING MEMBER	
			RF	TONS	RF	TONS		
STRUCTURE RATING ANALYSIS	DESIGN LOADS	HS 20-44 INVENTORY	TRUSS	0.024	0.86			U1L3
			STRINGERS	0.91	32.8	0.79	28.4	
			FLOOR BEAMS	0.93	33.5	0.85	30.6	
			GUSSET/PINS	0.18	6.5			U1 Bearing
		HS 20-44 OPERATING	TRUSS	0.28	10.1			U1L3
			STRINGERS	1.28	46.1	1.31	47.2	
			FLOOR BEAMS	1.37	49.3	1.42	51.1	
			GUSSET/PINS	0.35	12.6			U1 Bearing
	OHIO LEGAL LOADS	2 FI OPERATING	TRUSS	0.64	9.6			U1L3
			STRINGERS	2.04	30.6	2.10	31.5	
			FLOOR BEAMS	2.10	31.5	2.17	32.6	
			GUSSET/PINS	0.67	10.1			U1 Bearing
		3FI OPERATING	TRUSS	0.42	9.7			U1L3
			STRINGERS	1.65	38.0	1.69	38.9	
			FLOOR BEAMS	1.48	34.0	1.52	35.0	
			GUSSET/PINS	0.45	10.4			U1 Bearing
4FI OPERATING		TRUSS	0.37	10.0			U1L3	
		STRINGERS	1.57	42.4	1.62	43.7		
		FLOOR BEAMS	1.41	38.1	1.46	39.4		
		GUSSET/PINS	0.41	11.1			U1 Bearing	
5CI OPERATING	TRUSS	0.31	12.4			U1L3		
	STRINGERS	1.65	66.0	1.69	67.6			
	FLOOR BEAMS	1.50	60.0	1.61	64.4			
	GUSSET/PINS	0.38	15.2			U1 Bearing		

CONTROLLING RATING TONS	9.6 OP Rate 0.9 Inv. Rate	2FI HS20	BRIDGE DESIGN LIVE LOAD	Date Built 1882	Ohio Legal Load 31%
RATED BY:	DGB			DATE:	8/8/2011

RATING SUMMARY TRUSS MEMBERS

BRIDGE SFN 4631838			Logan Co.; Pleasant Twp.; LOG C21-1.00 Over Miami River																Fy=26KSI Assumed					
DATE BUILT 1882			TRUCK 2FI				TRUCK 3FI				TRUCK 4F1				TRUCK 5C1				HS20-44					
MEM NO.	MEM ID	DL COMP/TEN	LL&I COMP	LL&I TEN	RF OPP	TON	LL&I COMP	LL&I TEN	RF OPP	TON	LL&I COMP	LL&I TEN	RF OPP	TON	LL&I COMP	LL&I TEN	RF OPP	TON	LL&I COMP	LL&I TEN	RF OPP	TON	RF INV	TON
1	U1U2	-55.2	-24.9	0.0	6.95	104	-37.5	0.0	4.61	106	-43.2	0.0	4.04	109	-53.8	0.0	3.21	128	-56.4	0.0	3.06	110	2.26	81
2	U2U3	-72.5	-32.5	0.0	4.79	72	-48.9	0.0	3.18	73	-56.5	0.0	2.75	74	-70.7	0.0	2.20	88	-73.0	0.0	2.31	83	1.51	54
3	U3U4	-82.9	-36.9	0.0	3.93	59	-55.9	0.0	2.61	60	-64.5	0.0	2.25	61	-79.4	0.0	1.83	73	-82.8	0.0	1.75	63	1.20	43
4	U4U5	-86.4	-38.1	0.0	3.70	56	-57.8	0.0	2.44	56	-66.7	0.0	2.11	57	-80.4	0.0	1.75	70	-85.4	0.0	1.65	59	1.12	40
5	U5U6	-86.4	-38.1	0.0	3.70	56	-57.8	0.0	2.44	56	-66.7	0.0	2.11	57	-80.4	0.0	1.75	70	-85.4	0.0	1.65	59	1.12	40
6	U6U7	-82.9	-36.9	0.0	3.93	59	-55.5	0.0	2.61	60	-64.5	0.0	2.25	61	-79.4	0.0	1.83	73	-82.8	0.0	1.75	63	1.20	43
7	U7U8	-72.5	-32.5	0.0	4.79	72	-48.9	0.0	3.18	73	-56.5	0.0	2.75	74	-70.7	0.0	2.20	88	-73.0	0.0	2.31	83	1.51	54
8	U8U9	-55.2	-24.9	0.0	6.95	104	-37.5	0.0	4.61	106	-43.2	0.0	4.04	109	-53.8	0.0	3.21	128	-56.4	0.0	3.06	110	2.26	81
9	L0L1	31.0	0.0	14.0	4.04	61	0.0	21.2	2.67	61	0.0	24.5	2.31	62	0.0	31.0	1.82	73	0.0	32.0	1.77	64	1.04	37
10	L1L2	31.0	0.0	14.0	4.04	61	0.0	21.2	2.67	61	0.0	24.5	2.31	62	0.0	31.0	1.82	73	0.0	32.0	1.77	64	1.04	37
11	L2L3	55.2	0.0	24.9	1.90	29	0.0	37.5	1.26	29	0.0	43.2	1.09	29	0.0	53.8	0.87	35	0.0	56.4	0.83	30	0.35	13
12	L3L4	72.5	0.0	32.5	2.23	33	0.0	48.9	1.48	34	0.0	56.5	1.28	35	0.0	70.7	1.02	41	0.0	73.0	0.99	36	0.46	17
13	L4L5	82.9	0.0	36.9	3.03	45	0.0	55.3	2.02	46	0.0	64.4	1.74	47	0.0	79.4	1.41	56	0.0	82.8	1.35	49	0.72	26
14	L5L6	82.9	0.0	36.9	3.03	45	0.0	55.3	2.02	46	0.0	64.4	1.74	47	0.0	79.4	1.41	56	0.0	82.8	1.35	49	0.72	26
15	L6L7	72.5	0.0	32.5	2.23	33	0.0	48.9	1.48	34	0.0	56.5	1.28	35	0.0	70.7	1.02	41	0.0	73.0	0.99	36	0.46	17
16	L7L8	55.2	0.0	24.9	1.90	29	0.0	37.5	1.26	29	0.0	43.2	1.09	29	0.0	53.8	0.87	35	0.0	56.4	0.83	30	0.35	13
17	L8L9	31.0	0.0	14.0	4.04	61	0.0	21.2	2.67	61	0.0	24.5	2.31	62	0.0	31.0	1.82	73	0.0	32.0	1.77	64	1.04	37
18	L9L10	31.0	0.0	14.0	4.04	61	0.0	21.2	2.67	61	0.0	24.5	2.31	62	0.0	31.0	1.82	73	0.0	32.0	1.77	64	1.04	37
19	L0U1	-55.9	-25.3	0.0	6.09	91	-38.2	0.0	4.03	93	-44.1	0.0	3.49	94	-56.0	0.0	2.75	110	-61.3	0.0	2.51	90	1.83	66
20	U1L1	8.7	0.0	20	1.26	19	0.0	28.5	0.89	20	0.0	29.8	0.85	23	0.0	27	0.94	37.6	0.0	30.6	0.83	30	0.53	19
21	U1L2	43.5	0.0	22.6	0.77	12	0.0	34.1	0.51	12	0.0	39.3	0.44	12	0.0	48.7	0.36	14.4	0.0	51.3	0.34	12	0.024	1
22	U1L3	43.3	0.0	27.6	0.64	10	0.0	41.46	0.42	10	0.0	47.7	0.37	10	0.0	57.27	0.31	12.4	0.0	61.98	0.28	10	0.024	1
23	U2L2	-26.9	-16.5	0.0	1.26	19	-24.9	0.0	0.83	19	-28.6	0.0	0.73	20	-34.4	0.0	0.61	24.4	-37.6	0.0	0.56	20	0.31	11
24	U2L4	21.6	0.0	23.7	0.96	14	0.0	35.6	0.63	14	0.0	40.77	0.55	15	0.0	47	0.48	19.2	0.0	52.8	0.43	15	0.18	6
25	U3L3	-16.6	-13.8	0.0	1.52	23	-20.7	0.0	1.01	23	-23.7	0.0	0.89	24	-27.3	0.0	0.77	30.8	-30.7	0.0	0.69	25	0.44	16
26	U3L5	8.7	0.0	19.8	1.28	19	0.0	29.67	0.85	20	0.0	33.7	0.75	20	0.0	36.33	0.7	28	0.0	43.4	0.58	21	0.37	13
27	U4L4	-6.1	-11.4	0.0	2.75	41	-17.1	0.0	1.85	43	-19.4	0.0	1.62	44	-20.9	0.0	1.5	60	-25	0.0	1.26	45	0.96	35
28	L3U5	0.0	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	N/A	#VALUE!
29	U4L6	0.0	0.0	6.7	3.69	55	0.0	14.2	1.73	40	0.0	17.33	1.42	38	0.0	16.36	1.5	60	0.0	24.54	1	36	0.73	26
30	U5L5	-0.9	-3.8	0.0	9.67	145	-8.1	0.0	4.51	104	-9.9	0.0	3.72	100	-9.3	0.0	3.94	157.6	-14	0.0	2.62	94	2.09	75
31	L4U6	0.0	0.0	6.7	3.69	55	0.0	14.2	1.73	40	0.0	17.33	1.42	38	0.0	16.36	1.5	60	0.0	24.54	1	36	0.73	26
32	U5L7	0.0	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	0.0	0.0	N/A	#VALUE!	N/A	#VALUE!
33	U6L6	-6.1	-11.4	0.0	2.75	41	-17.1	0.0	1.85	43	-19.4	0.0	1.62	44	-20.4	0.0	1.5	60	-25	0.0	1.26	45	0.96	35
34	L5U7	8.7	0.0	19.8	1.28	19	0.0	29.67	0.85	20	0.0	33.7	0.75	20	0.0	36.33	0.7	28	0.0	43.4	0.58	21	0.37	13
35	U7L7	-16.6	-13.0	0.0	1.52	23	-20.7	0.0	1.01	23	-23.7	0.0	0.89	24	-27.3	0.0	0.77	30.8	-30.7	0.0	0.69	25	0.44	16
36	L6U8	21.6	0.0	23.7	0.96	14	0.0	35.6	0.63	14	0.0	40.71	0.55	15	0.0	47	0.48	19.2	0.0	52.8	0.43	15	0.18	6
37	U8L8	-26.9	-16.5	0.0	1.26	19	-24.9	0.0	0.83	19	-28.6	0.0	0.73	20	-34.4	0.0	0.61	24.4	-37.6	0.0	0.56	20	0.31	11
38	L7U9	43.3	0.0	27.6	0.64	10	0.0	41.46	0.42	10	0.0	47.7	0.37	10	0.0	57.27	0.31	12.4	0.0	61.98	0.28	10	0.024	1
39	L8U9	43.5	0.0	22.6	0.77	12	0.0	34.1	0.51	12	0.0	39.3	0.44	12	0.0	48.7	0.36	14.4	0.0	51.3	0.34	12	0.024	1
40	U9L9	8.7	0.0	20	1.26	19	0.0	28.5	0.89	20	0.0	29.8	0.85	23	0.0	27	0.94	37.6	0.0	30.6	0.83	30	0.53	19
41	U9L10	-55.9	-25.3	0.0	6.09	91	-38.2	0.0	4.03	93	-44.1	0.0	3.49	94	-56.0	0.0	2.75	110	-61.3	0.0	2.51	90	1.83	66

NOTE: CRITICAL MEMBER MAY BE TRUSS MEMBER, STRINGER, FLOOR BEAM, DECK, GUSSET PLATES, PINS, FLOOR BEAM CONNECTIONS.

NOTE: MEMBER FORCES ARE IN KIPS

THIS SHEET ONLY EXHIBITS TRUSS MEMBERS.

**RECOMMENDED
LIVE LOAD POSTING**

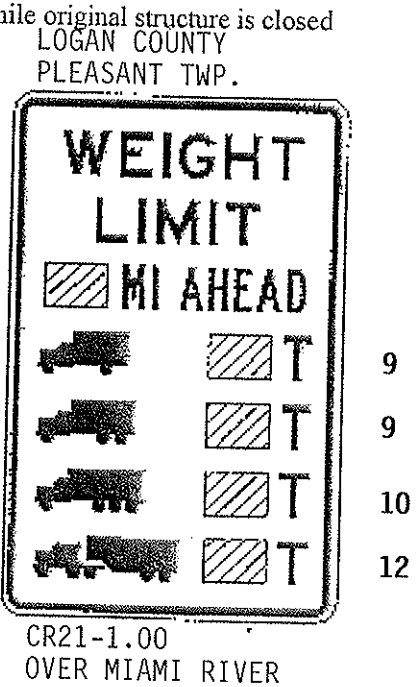
General

Item -
Type -

66. Operational Status

The operational status of the bridge should be coded using the following:

- "A" Open, no restriction
- "B" Open, posting recommended but not legally implemented (all signs not in place)
 - Load Posting Signs:** Verify that the Load Rating Sign matches the posted signage. Record the signed load posting in tonnage in the comments and compare with the inventory. If changes exist then update the BMS inventory.
- "C" Under construction, half of the existing bridge is open to traffic (half-width construction)
- "D" Open, would be posted or closed except for temporary shoring, etc. to allow for unrestricted traffic
- "E" Open, temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation.
- "G" New structure not yet open to traffic
- "K" Bridge closed to all traffic
- "P" Posted for load-carrying capacity restriction (may include other restrictions)
 - Load Posting Signs:** Verify that the Load Rating Sign matches the posted signage. State Routes are posted on the Operating Rating when the rating factor is less than 92.5%. Record the signed load posting in tonnage in the comments and compare with the inventory. If changes exist then update the BMS.
- "R" Posted for other than load-carrying capacity restriction (speed, number of vehicles on bridge, etc.).
- "X" Bridge closed for reasons other than condition or load-carrying capacity.





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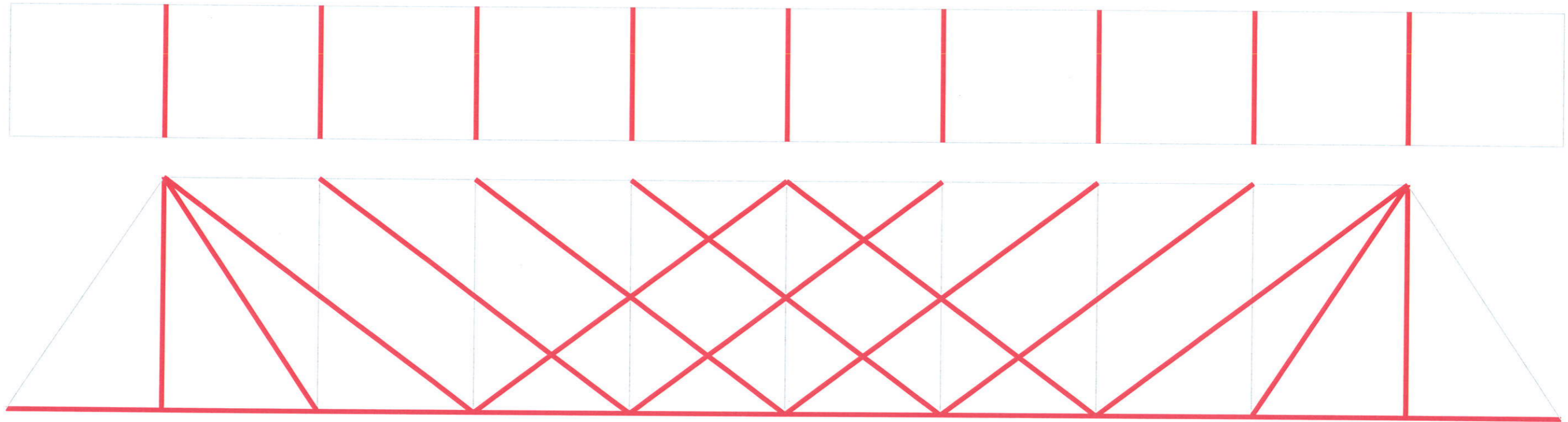
STRUCTURE FILE NUMBER: 4631838

INVENTORY FILE NUMBER: LOG T-21

JOINT NUMBER: FRACTURE CRITICAL

DATE: 08-09-11

DRAWN BY: JRH



FRACTURE CRITICAL MEMBERS



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BRIDGE PLAN WITH MEMBER PROPERTIES



LOG C21-1.00 - PORTAL LOOKING EAST



LOG C21-1.00 - NAME PLATE WEST PORTAL



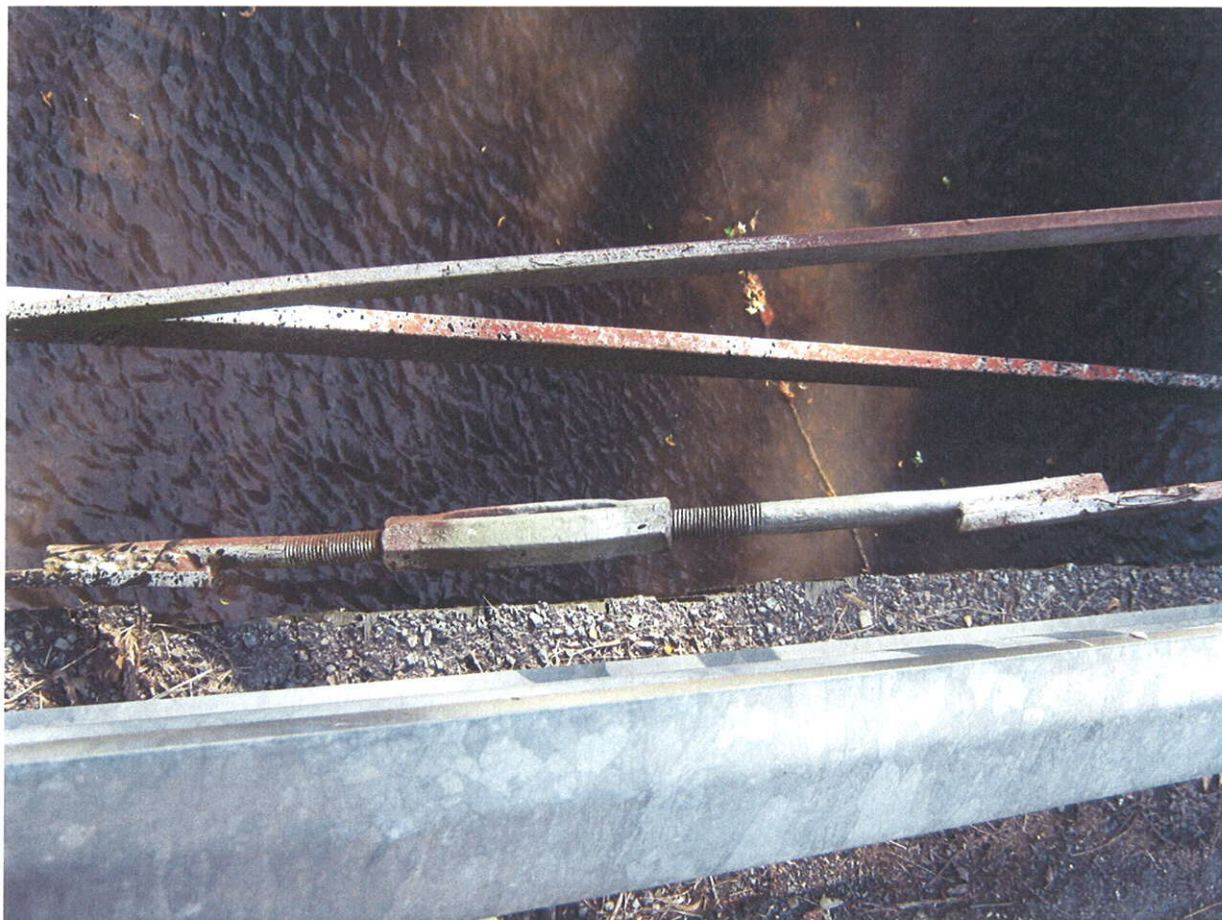
LOG C21-1.00 – ELEVATION LOOKING SOUTH



LOG C21-1.00 – TYPICAL BEARING SOUTH WEST CORNER



LOG C21-1.00 – U1L1 SOUTH TRUSS WEST END HIGH



LOG C21-1.00 – L5U7 SOUTH TRUSS WEST END



LOG C21-1.00 – U1L1 SOUTH TRUSS EAST END - NOTE REPAIR



LOG C21-1.00 – EAST SIDE OF U5L5 NORTH TRUSS



LOG C21-1.00 – WEST SIDE OF U5L5 NORTH TRUSS



LOG C21-1.00 – L0U1 NORTH TRUSS EAST END – NOTE DAMAGE



LOG C21-1.00 – FLOOR SYSTEM



LOG C21-1.00 – U1L1 SOUTH TRUSS WEST END – LOW SHOT



LOG C21-1.00 – U2L2 LOWER PIN TYPICAL



LOG C21-1.00 - L1 TURN BUCKLE REPAIR



LOG C21-1.00 - TYPICAL L1U1