Load Rating Report

Bickham Covered Bridge over the South Fork of the Great Miami River

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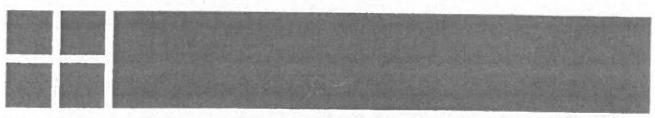
Logan County, Ohio

October 2001



BURGESS & NIPLE

Introduction

On July 10, 2001, Burgess & Niple Ltd. (B&N) was contracted by the Logan County Engineer's office to conduct a load rating analysis of the proposed rehabilitated truss and floor systems on the Bickham Covered Bridge over the South Fork of the Great Miami River. This timber Howe truss bridge can be found along County Road 38 in Richland Township near Indian Lake. The Smith Bridge Company of Toledo, Ohio built this 98-foot long structure in 1877. In 1959, the wooden floor joist system was replaced with steel floor beams and stringers, and the truss was strengthened. The Logan County Engineer's office is in the process of developing rehabilitation plans for this structure. The purpose of this analysis is to provide a recommendation for live load restrictions on this covered bridge following the proposed rehabilitation.

As defined in a scope of services, B&N's responsibilities included the following:

1.) Field Survey – A site visit was conducted to obtain general photographs of the site, to estimate steel section loss in the floor beams and stringers, and to obtain a timber sample in order to determine the species.
2.) Species Identification – The sample obtained during the Field Survey was mailed to a timber specialist for identification. This identification was necessary in an effort to estimate the allowable strength of the existing members. It is our understanding that the rehabilitation will utilize replacement timbers of the same species and grade.
3.) Load Rating Analysis – A load rating analysis was conducted utilizing the Ohio Legal Loads (2F1, 3F1, 4F1, and 5C1), a standard school bus loading, and an H15 loading applied to the rehabilitated truss and floor systems. All truss and floor member dimensions as proposed in the rehabilitation plans were provided to B&N by the Logan County Engineer's office.
4.) Report – This document summarizes the results of the analysis.

Methodology

The floor system was analyzed by hand calculations assuming simply supported floorbeam supports and continuous stringer supports. The stringers span continuously over one floorbeam. The start and end of adjacent stringers are staggered longitudinally such that no two adjacent stringers terminate at the same floorbeam. The existing wood decking is to be replaced during the rehabilitation with either nominal 3"x 4" or nominal 3"x 6" nail laminated Dense Commercial Southern Pine species decking boards. These decking boards will span transversely across the existing steel stringers. The existing stringers and floorbeams will be reused during the rehabilitation. During the "Field Survey" portion of our work, section loss on the floorbeams and stringers was estimated. After measurements were taken, the stringers showed no appreciable section loss. However, the floorbeams had enough section loss to justify a reduction in section properties. Therefore, a revised floorbeam cross section was approximated for use in the floor system load rating.

In order to determine the allowable design values for the truss members, two timber samples were obtained from the forward end and inside face of the right lower chord member on August 6, 2001. These samples were sent to the U.S. Department of Agriculture for testing. Both samples were identified as White Pine. Tabulated values for Select Structural White Pine timber have been multiplied by the applicable adjustment factors to determine the allowable design values (Table 1).

A plane frame analysis was performed on the trusses using the STAAD III design software (Release 22.3W), developed by Research Engineers. The model created within STAAD III is shown in Figure 1. Members 1 through 16 were designated as chord members, which are capable of transferring axial and shear loads as well as moments. Members 17 through 41 were designated as truss members, which are capable of transferring axial loads only. It was our understanding that the rehabilitated structure will maintain existing member continuities (i.e. existing connections will not be altered). Consequently, all diagonal members (Members 19 through 34) were modeled as incapable of transferring tensile forces.

Influence lines were used to determine the maximum live load effect on each truss member. Influence lines were generated for each truss member by determining each member's response to a unit load placed individually at each floorbeam location. The responses were determined utilizing a STAAD III model. Any diagonals that went into tension were removed to allow a redistribution of loads. Additional STAAD III runs were executed to determine floorbeam reactions due to each live load truck moving across the length of the structure. These floorbeam reactions for each position of the given live load truck were then superimposed on each member's influence line to determine the maximum live load effect on each member.

Member forces and moments from the STAAD III analysis output were transferred into summary table spreadsheets (See Tables 2-7) for calculation of member stresses and load rating capacity. The summary table spreadsheets also include calculations of member properties based on field measurements, and allowable stress design values.

The allowable stress values used in this report are in accordance with the *16th edition of the AASHTO Specifications for Highway Bridges* including the *1999 interim*, and *the 1997 Allowable Stress Design (ASD) National Design Specification (NDS) for Wood Construction, with 1999 interim.*

Loading Types

The dead loads for the truss analysis included self-weight of each truss member and point-loads representing the roof, siding, and floor systems. The roof loads included the existing shingles, metal sheeting, and all roof-supporting members. The floor loads assumed either nominal 3"x 4" or nominal 3"x 6" nail laminated decking boards supported on steel stringers and floorbeams.

The dead loads for the floor system analysis only included self-weight. It is our understanding that the rehabilitated structure will not have an asphalt overlay applied.

The truss and floor system live load analyses were based on each of the Ohio Legal Loads (2F1, 3F1, 4F1, and 5C1), a standard school bus loading, and an H15 truck loading (see Figure 2). It was determined that only 67% of a given truck could be transferred into any one given truss plane. The live loads were moved across the structure in two-foot increments with resulting loads applied to the truss through the floorbeams.

Member Capacities

The allowable capacities for the timber members were based on the *1997 ASD NDS for Wood Construction, with 1999 interim.* The allowable capacity of truss and decking members were based on the *NDS* allowable design values for Select Structural White Pine and Dense Commercial Southern Pine respectively multiplied by the appropriate adjustment factors (Floor System Deck Load Rating and Table 1).

The truss chord members are capable of carrying combined axial and bending stresses. Consequently, their capacities are governed by the additional requirements of an interaction equation described in article 3.9 of the *NDS* manual.

The allowable capacities for the steel members that were added during the 1958 bridge strengthening rehabilitation are based on the typical steel yield strength for that time period (33ksi).

Member Stresses

Member stresses were broken down between stresses due to dead loads and stresses due to live loads. Bending and compression (perpendicular to the grain) stresses were computed for the nail laminated decking members. Bending and shear stresses were computed for the stringers and floorbeams. Axial, shear, and bending stresses were calculated for each member of the truss system. These stresses were used to determine each member's load rating as well as the interaction equation for the upper and lower chords. For the interaction equation, where axial and bending stresses were combined, the live load stresses for each position of the truck across the length of the structure were determined and combined individually to determine the most critical load case.

Member Load Ratings

While both operating and inventory ratings were provided for all steel members, operating ratings were only provided for wood members. This was a result of the *NDS* only providing for allowable stress design. Consequently, there is no beta factor to generate a distinction between inventory and operating values for wood members . Therefore, if the timber rating values in this report fall below 100% of the gross vehicle weight (a factor of less than 1.0), the bridge should be posted.

Floor System Summary (refer to Appendix for addition information)

Both 3x4 and 3x6 decking members were load rated. It was determined that 3x4 members were under rated for H15 and 2F1 trucks (0.83 and 0.99 respectively). Consequently, it is our recommendation that 3x6 members be used in the rehabilitation design. Dead loads for all other members were based on 3x6 decking members.

While the stringer bending stress inventory rating for the H15, 2F1, 3F1, 4F1, and 5C1 trucks fall below 100% (0.70, 0.84, 0.75, 0.81, and 0.75 respectively), the stringer operating ratings for these trucks are sufficient (above 100%) and do not require bridge posting for any of the studied loads.

Similarly, while the floorbeam bending stress inventory rating for the H15, 2F1, 3F1, 4F1, and 5C1 trucks fall below 100% (0.88, 0.89, 0.63, 0.56, and 0.65 respectively), the floorbeam operating ratings for all of the trucks except the 4F1 are sufficient (above 100%) and do not require bridge posting. The operating rating for the floorbeams for a 4F1 truck would require a 25 gross ton posting. (Note: this rating is for the floorbeams ONLY. The trusses that support the floorbeams have lower ratings.).

Truss System Summary (refer to Appendix for Tables 2 through 7)

While truck axle spacing and axle load distribution provided a great deal of variation in load rating results, members 27 and 34 (end compression diagonals) proved to control the truss load rating (AND overall bridge rating) for each of the trucks studied. If these members are not further strengthened during a subsequent rehabilitation, the following load restrictions on the structure should be implemented:

Loading Type	Rating Factor	Gross Vehicle Weight Allowed
H15	0.65	9.7 tons
School Bus	0.79	10.3 tons
2F1	0.60	9.0 tons
3F1	0.43	9.9 tons
4F1	0.37	10.0 tons
5C1	0.33	13.2 tons

Furthermore, based on load rating goals of the proposed rehabilitation, Tables 2 through 7 can be used to determine what additional member modifications are required.

It should be noted that the interaction equations exceed the allowable value (greater than 1.0) for the 3F1, 4F1, and 5C1 trucks. However, the amount of overstress in the end two bays of compression diagonals exceeds the amount of overstress due to the interaction equation applied to the upper chord.

JOB NO. 30099 JOB NAME Bickham Covered Bridge

SUBJECT SECTION PROPERTIES PREPARED BY MAK DATE 8/8/01 CHECKED BY TMB DATE 9/3/01

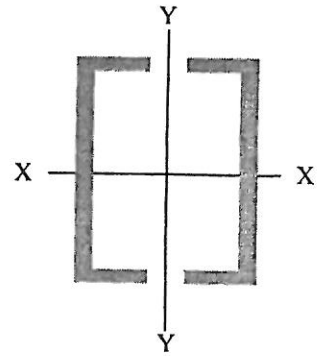
MEMBER: W16x40 Floorbeams SECTION OR LOCATION: Typical

Section Depth = 16.01 Section Width = 6.995

Shaded cells are fields requiring input by preparer.

		Geneneral Object Data			Data for X-X Axis					Data for Y-Y Axis				
	Description	b (in.)	h (in.)	A (in^2)	y (in.)	D=d-y (in)	Ay (in^2)	AD^2 (in^4)	I_{object} (in^4)	x (in.)	D=d-x (in)	Ax (in^2)	AD^2 (in^4)	I_{object} (in^4)
100% Section	A1	6.9950	0.5050	3.532	0.253	7.749	0.892	212.140	0.075	0.000				0.000
	A2	0.3050	15.0000	4.575	8.005	-0.003	36.623	0.000	85.781	0.000				0.000
	A3	6.9950	0.5050	3.532	15.748	-7.746	55.628	211.925	0.075	0.000				0.000
	A4													
	A5													
	A6													
	Totals			11.63995			93.14	424.06	85.93			0.00	0.00	0.00
Areas of Loss	Rectangle 1	3.0000	0.0625	0.188	0.474	7.528	0.089	10.626	0.000	-2.000	2.000	-0.375	0.750	0.141
	Rectangle 2	3.0000	0.0625	0.188	0.474	7.528	0.089	10.626	0.000	2.000	-2.000	0.375	0.750	0.141
	Rectangle 3	3.0000	0.0625	0.188	15.526	-7.524	2.911	10.615	0.000	-2.000	2.000	-0.375	0.750	0.141
	Rectangle 4	3.0000	0.0625	0.188	15.526	-7.524	2.911	10.615	0.000	2.000	-2.000	0.375	0.750	0.141
	Rectangle 5													
	Rectangle 6													
	Rectangle 7													
	Rectangle 8													
	Rectangle 9													
	Rectangle 10													
	Triangle 1													
	Triangle 2													
	Triangle 3													
	Triangle 4													
	Triangle 5													
	Totals			0.750			6.00	42.48	0.00			0.00	3.00	0.56

		100 % Section			Section With Loss		
	Axis:	X-X	Y-Y		X-X	Y-Y	
Bottom or Left Distance to N/A	d = Ay/A =	8.00	0	in	8.00	0.00	in
Top or Right Distance to N/A	d' = Depth - d =	8.01	6.995	in	8.01	7.00	in
Total Moment of Inertia	$I = \Sigma AD^2 + I_{object}$ =	510.00	0.00	in^4	467.51	-3.56	in^4
Radius of Gyration	$r = (I/A)^{1/2}$ =	6.62	0.00	in	6.55	#NUM!	in
Bottom or Left Section Modulus	S = I/d =	63.73	#DIV/0!	in^3	58.42	#DIV/0!	in^3
Top or Right Section Modulus	S' = I/d' =	63.69	0.00	in^3	58.38	-0.51	in^3
Area	A =	11.64		in^2	10.89		in^2
	Selfweight (steel) = A(490 pcf)/(144 si/sf) =	39.61		lb/ft	Percent Loss =	6.4%	



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Bickham Covered Bridge
Floor System Load Rating

Decking

Actual Board Width (in.): 2.5
Span Length 'L' (ft): 2.21
Note: Self weight of decking members was determined to be negligable

	A (in^2)	S (in^3)
3x4 Boards Used:	8.750	5.104
3x6 Boards Used:	13.750	12.604

Stringer Top Flange Width (in.): 6.495

Loading Type	Heavy Axle Load (kips)	Wheel Load (k)	Tire Contact Area (in^2)	Tire Distribution Parallel to Traffic (in.)	Tire Distribution Transverse to Traffic (in.)	Number of Boards Tire Rests on	Effective Wheel Load 'P' per Board (k)	Mmax due to L.L. (k*ft.)	Live Load Bending Stress, fb (psi) (using...) 3x4's	Live Load Bending Stress, fb (psi) (using...) 3x6's	Live Load Compression Stress, fc| (psi) (using...) 3x4's	Live Load Compression Stress, fc| (psi) (using...) 3x6's
H15-44	24	12	120	15.00	17.32	6.00	2.00	0.88	2075	840	123	123
School Bus	15.25	7.625	76.25	15.00	13.81	6.00	1.27	0.56	1318	534	78	78
Ohio 2F1	20	10	100	15.00	15.81	6.00	1.67	0.74	1729	700	103	103
Ohio 3F1	17	8.5	85	15.00	14.58	6.00	1.42	0.63	1470	595	87	87
Ohio 4F1	14	7	70	15.00	13.23	6.00	1.17	0.51	1210	490	72	72
Ohio 5C1	17	8.5	85	15.00	14.58	6.00	1.42	0.63	1470	595	87	87
				AASHTO 3.25 & AASHTO 3.30	AASHTO 3.25 & AASHTO 3.30							

Allowables Assuming Dense Commercial Southern Pine Nail Laminated Decking

	Design Value (psi)	Mulipliers											F' Values (psi)
		Cd	CM	Ct	CL	CF	CV	Cfu	Cr	Cc	Cf	Cb	
Fb'	1650	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00		1716.00
Fc|'	660		1.00	1.00								1.00	660.00

Rating Factors

Loading Type	Bending Stress Rating Factor =(Allowable Stress-DL(negligable))/(Live Load Stress)		Compression Stress Perpendicular to the grain Rating Factor =(Allowable Stress-DL(negligable))/(Live Load Stress)	
	Using 3x4's	Using 3x6's	Using 3x4's	Using 3x6's
H15-44	0.83	2.04	5.36	5.36
School Bus	1.30	3.21	8.43	8.43
Ohio 2F1	0.99	2.45	6.43	6.43
Ohio 3F1	1.17	2.88	7.56	7.56
Ohio 4F1	1.42	3.50	9.19	9.19
Ohio 5C1	1.17	2.88	7.56	7.56

Allowable Gross Vehicle Load (Tons)

Loading Type	Vehicle Gross Load (tons)	Bending Stress Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight		Compression Stress Perpendicular to the grain Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight	
		Using 3x4's	Using 3x6's	Using 3x4's	Using 3x6's
H15-44	15	12.41	30.64	80.38	80.38
School Bus	13	16.92	41.79	109.63	109.63
Ohio 2F1	15	14.89	36.76	96.45	96.45
Ohio 3F1	23	26.86	66.32	173.99	173.99
Ohio 4F1	27	38.28	94.54	248.02	248.02
Ohio 5C1	40	46.71	115.34	302.59	302.59

Bickham Covered Bridge
Floor System Load Rating

Stringers

Stringer Area, A (in^2): 7.08
Stringer Modulus, S (in^3): 20.90
Web Area (in^2): 1.94
Fy (ksi): 33.00 <<------(Steel added in 1957 when allowables were less than 36ksi)

Loading Type	Bending				Shear		
	Mmax due to D.L. (k*ft.)	Mmax due to L.L.+I (k*ft.)	D.L. Bending Stress (psi)	Max. L.L. + I Bending Stress (psi)	D.L. Shear Stress (psi)	Max. L.L. + I Shear force (kip)	Max. L.L. + I Shear Stress (psi)
H15-44	0.53	37.20	304.31	21358.85	211.60	15.20	7835.05
School Bus	0.53	23.60	304.31	13550.24	211.60	9.70	5000.00
Ohio 2F1	0.53	31.00	304.31	17799.04	211.60	13.40	6907.22
Ohio 3F1	0.53	35.00	304.31	20095.69	211.60	18.90	9742.27
Ohio 4F1	0.53	32.40	304.31	18602.87	211.60	18.60	9587.63
Ohio 5C1	0.53	35.00	304.31	20095.69	211.60	18.60	9587.63

Rating Factors

Loading Type	Bending Stress	
	Inventory Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress*1.67)	Operating Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress)
H15-44	0.70	1.17
School Bus	1.11	1.85
Ohio 2F1	0.84	1.41
Ohio 3F1	0.75	1.25
Ohio 4F1	0.81	1.35
Ohio 5C1	0.75	1.25

Loading Type	Shear Stress	
	Inventory Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress*1.67)	Operating Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress)
H15-44	1.92	3.21
School Bus	3.01	5.03
Ohio 2F1	2.18	3.64
Ohio 3F1	1.55	2.58
Ohio 4F1	1.57	2.63
Ohio 5C1	1.57	2.63

Allowable Gross Vehicle Load (Tons)

Loading Type	Vehicle Gross Load (tons)	Bending Stress	
		Inventory Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight	Operating Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight
H15-44	15	10.55	17.61
School Bus	13	14.41	24.06
Ohio 2F1	15	12.66	21.14
Ohio 3F1	23	17.19	28.71
Ohio 4F1	27	21.80	36.40
Ohio 5C1	40	29.89	49.92

Loading Type	Vehicle Gross Load (tons)	Shear Stress	
		Inventory Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight	Operating Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight
H15-44	15	28.86	48.19
School Bus	13	39.19	65.45
Ohio 2F1	15	32.73	54.67
Ohio 3F1	23	35.59	59.43
Ohio 4F1	27	42.45	70.89
Ohio 5C1	40	62.89	105.02

Bickham Covered Bridge
Floor System Load Rating

Floorbeams

Stringer Reactions

Loading Type	Control	Max. LL+I Stringer Reactions (k.)	Stringer Reaction (k.)					
			R1	R2	R3	R4	R5	R6
H15-44	Bending	15.60	0.00	9.20	6.40	6.40	9.20	0.00
	Shear		15.60	0.00	12.79	2.81	0.00	0.00
School Bus	Bending	9.90	0.00	5.84	4.06	4.06	5.84	0.00
	Shear		9.90	0.00	8.12	1.78	0.00	0.00
Ohio 2F1	Bending	15.40	0.00	9.09	6.31	6.31	9.09	0.00
	Shear		15.40	0.00	12.63	2.77	0.00	0.00
Ohio 3F1	Bending	21.90	0.00	12.92	8.98	8.98	12.92	0.00
	Shear		21.90	0.00	17.96	3.94	0.00	0.00
Ohio 4F1	Bending	24.40	0.00	14.40	10.00	10.00	14.40	0.00
	Shear		24.40	0.00	20.01	4.39	0.00	0.00
Ohio 5C1	Bending	21.20	0.00	12.51	8.69	8.69	12.51	0.00
	Shear		21.20	0.00	17.38	3.82	0.00	0.00

Floorbeam Area, A (in^2): 10.89
Floorbeam Modulus, S (in^3): 58.38

Fy (ksi): 33.00 <<------(Steel added in 1957 when allowables were less than 36ksi)

Loading Type	Bending				Shear			
	Mmax due to D.L. (k*ft.)	Mmax due to L.L. (k*ft.)	D.L. Bending Stress (psi)	Max. L.L. Bending Stress (psi)	D.L. Shear Force (kips)	Max. L.L. Shear Force (kips)	D.L. Shear Stress (psi)	Max. L.L. Shear Stress (psi)
H15-44	8.84	78.05	1817.06	16043.17	2.27	23.16	312.67	3190.08
School Bus	8.84	49.53	1817.06	10180.88	2.27	14.70	312.67	2024.79
Ohio 2F1	8.84	77.03	1817.06	15833.50	2.27	22.86	312.67	3148.76
Ohio 3F1	8.84	109.56	1817.06	22520.04	2.27	32.52	312.67	4479.34
Ohio 4F1	8.84	122.05	1817.06	25087.36	2.27	36.23	312.67	4990.36
Ohio 5C1	8.84	106.05	1817.06	21798.56	2.27	31.47	312.67	4334.71

Rating Factors

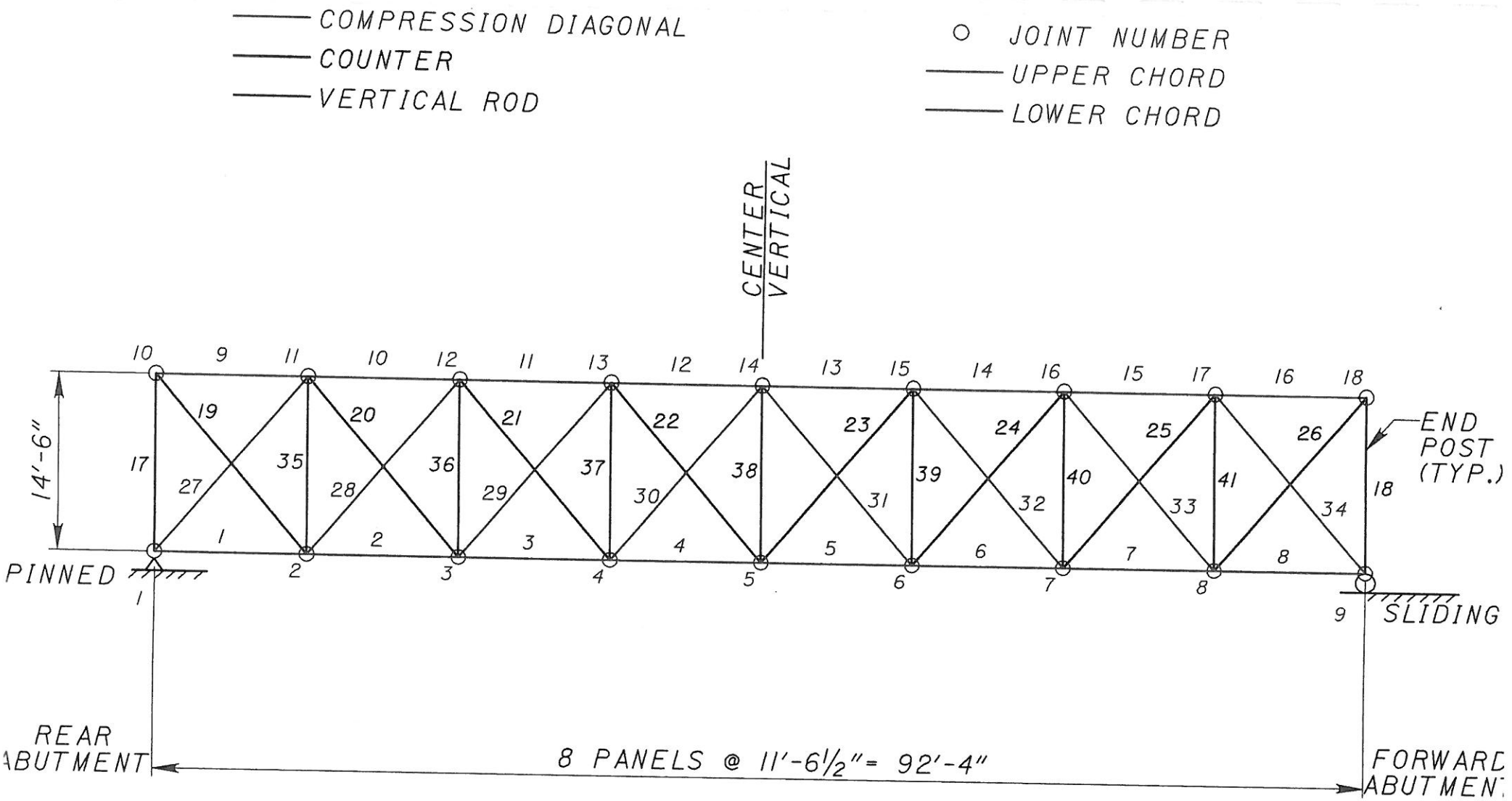
Loading Type	Bending Stress	
	Inventory Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress*1.67)	Operating Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress)
H15-44	0.88	1.47
School Bus	1.39	2.31
Ohio 2F1	0.89	1.49
Ohio 3F1	0.63	1.05
Ohio 4F1	0.56	0.94
Ohio 5C1	0.65	1.08

Loading Type	Shear Stress	
	Inventory Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress*1.67)	Operating Rating Factor =(Allowable Stress/1.3-D.L. Stress)/(Live Load Stress)
H15-44	4.71	7.86
School Bus	7.41	12.38
Ohio 2F1	4.77	7.96
Ohio 3F1	3.35	5.60
Ohio 4F1	3.01	5.02
Ohio 5C1	3.46	5.78

Allowable Gross Vehicle Load (Tons)

Loading Type	Vehicle Gross Load (tons)	Bending Stress	
		Inventory Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight	Operating Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight
H15-44	15	13.19	22.04
School Bus	13	18.02	30.09
Ohio 2F1	15	13.37	22.33
Ohio 3F1	23	14.41	24.07
Ohio 4F1	27	15.19	25.36
Ohio 5C1	40	25.90	43.25

Loading Type	Vehicle Gross Load (tons)	Shear Stress	
		Inventory Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight	Operating Allowable Gross Load (tons) =Rating Factor * Gross Vehicle Weight
H15-44	15	70.59	117.89
School Bus	13	96.39	160.97
Ohio 2F1	15	71.52	119.44
Ohio 3F1	23	77.09	128.74
Ohio 4F1	27	81.23	135.65
Ohio 5C1	40	138.54	231.36



BRIDGE 38-0.20

FIGURE 1 (TRUSS MODEL)
BICKHAM COVERED BRIDGE OVER
THE SOUTH FORK OF THE MIAMI RIVER

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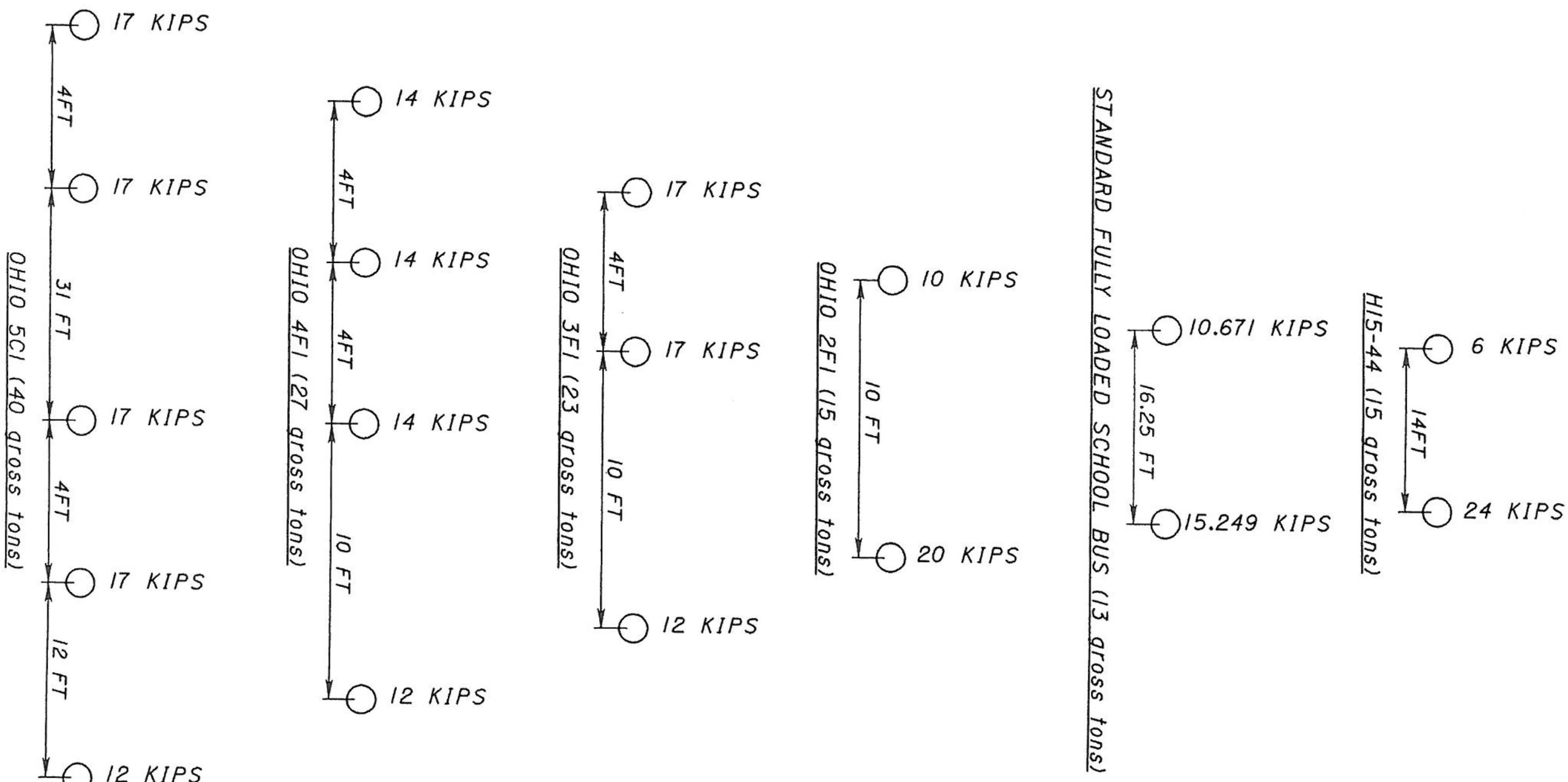

BRIDGE 38-0.20

FIGURE 2 (TRUCK TYPES)

BICKHAM COVERED BRIDGE OVER

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Allowable Member Stresses (psi)
Eastern White Pine Sawn Lumber (1.)

Sep-01

					Adjustment Factors																
		AASHTO Reference			13.5.5.2 T 13.5.5A	13.5.5.1 T 13.5.1A		13.6.4.4	13.6.4.2 T 13.5.1A	13.6.4.3	T 13.5.1A		T 13.5.1A		13.6.4.5	13.7.3.3	T 13.5.1A		13.6.6.3		
		NDS Reference			2.3.2 Append B	2.3.3 Table 4D	2.3.4 Append C	2.3.7 3.3.3	4.3.2 Table 4D	5.3.2	4.3.3, 5.3.3	2.3.11	4.3.4	5.3.4	2.3.8	2.3.9 3.7.1	Table 4D	4.4.3	2.3.10		
			Tabulated design	x	Load Duration	Wet Service	Temper-ature	Beam Stability	Size	Volume	Flat Use	Incising	Repetitive Member	Curvature	Form	Column Stability	Shear Stress	Buckling Stiffness	Bearing Area	=	Allowable
Loading	Member		Value (psi)	White Pine Table 4D		CD	CM	Ct	CL	CF	CV	Cfu	Ci	Cr	Cc	Cf	CP	CH	CT	Cb		Value	(psi.)
Dead Load	Beams & Stringers (Chords)	Fb	1,050		x	0.90	1.00	1.00	1.00	1.00											=	Fb'	945
		Ft	700		x	0.90	1.00	1.00		1.00											=	Ft'	630
		Fv	65		x	0.90	1.00	1.00										1.00			=	Fv'	59
		Fc⊥	350		x		0.67	1.00												1.00	=	Fc⊥'	235
		Fc	675		x	0.90	0.91	1.00		1.00							1.00				=	Fc'	553
		E	1,100,000		x		1.00	1.00													=	E'	1,100,000
		Fg	880		x	0.90		1.00													=	Fg'	792
	Posts & Timbers (Vert. End Posts and Diagonals)	Fb	1,050		x	0.90	1.00	1.00	1.00	1.00											=	Fb'	945
		Ft	700		x	0.90	1.00	1.00		1.00											=	Ft'	630
		Fv	65		x	0.90	1.00	1.00										1.00			=	Fv'	59
		Fc⊥	350		x		0.67	1.00												1.00	=	Fc⊥'	235
		Fc	675		x	0.90	1.00	1.00		1.00							1.00				=	Fc'	608
		E	1,100,000		x		1.00	1.00													=	E'	1,100,000
		Fg	880		x	0.90		1.00													=	Fg'	792
Foot Notes										2	3	4	11	4	3	5	6		4				
Live Load	Beams & Stringers (Chords)	Fb	1,050		x	1.00	1.00	1.00	1.00	1.00											=	Fb'	1,050
		Ft	700		x	1.00	1.00	1.00		1.00											=	Ft'	700
		Fv	65		x	1.00	1.00	1.00										1.00			=	Fv'	65
		Fc⊥	350		x		0.67	1.00												1.00	=	Fc⊥'	235
		Fc	675		x	1.00	0.91	1.00		1.00							1.00				=	Fc'	614
		E	1,100,000		x		1.00	1.00													=	E'	1,100,000
		Fg	880		x	1.00		1.00													=	Fg'	880
	Posts & Timbers (Vert. End Posts and Diagonals)	Fb	1,050		x	1.00	1.00	1.00	1.00	1.00											=	Fb'	1,050
		Ft	700		x	1.00	1.00	1.00		1.00											=	Ft'	700
		Fv	65		x	1.00	1.00	1.00										1.00			=	Fv'	65
		Fc⊥	350		x		0.67	1.00												1.00	=	Fc⊥'	235
		Fc	675		x	1.00	1.00	1.00		1.00							1.00				=	Fc'	675
		E	1,100,000		x		1.00	1.00													=	E'	1,100,000
		Fg	880		x	1.00		1.00													=	Fg'	880
Foot Notes						7				2	3	4	9	4	3	5	8		4				

1. White Pine for truss members is Select Structural
2. (For d> 12") CF = (12/d)^(1/9) = 1.0 (not applicable to Bickham, because d<12")
3. Applies to glued laminated members, not sawn lumber
4. Not applicable to timbers
5. For circular or diamond sections
6. Factors for CP (dead load) = Bickham U.C. 0.96
   Bickham Diag. 0.80
7. Based on a permanent D.L. and a ten year cummulative L.L. duration
8. Factors for CP (live load) = Bickham U.C. 0.96
   Bickham Diag. 0.77
9. Members are not incised
10. Allowable stress for wrought iron = 20,000 psi (per AASHTO)

Table 1

BICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (H15 TRUCK)

LOGAN COUNTY, OHIO

MEMBER PROPERTIES, FORCES, STRESSES AND RATING

By: M. Killian / T. Butz (Burgess & Niple)

September-01

FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS

STAAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSSH15 and TRUSSDL1

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage							
		DIMENSIONS (inches)									PROPERTIES				FORCES (Lbs. & Inches)															RATING (H15) (TONS)				NDS REQUIREMENTS		COMMENTS	FINAL RATING (GROSS VEHICLE TONS)
		outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct	joint	DEAD LOAD				H15 LIVE LOAD				ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)			LIVE LOAD STRESSES (PSI)						Gross Tonnage: 15				MZ &FX			
Member Description	Member No.	width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)	width (in.) (If any)?	area (in**2)	FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Ft' / Fc'	Fv'	Fb'	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	AXIAL FX	L. SHEAR VL	BENDING MAX.	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	Member No.	Member Description	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	3.9.1 (Ft) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	13171	T	631	87359	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	92.9	T	6.7	352.2	1		96.4	T	142.2	44.4	0.61	—		44.4
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	22822	T	1210	91343	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	161.0	T	12.8	368.2	2		48.9	T	73.8	42.1	0.77	—		42.1
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	28300	T	748	82545	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	199.6	T	7.9	332.8	3		36.1	T	119.8	46.6	0.81	—		36.1
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	30959	T	406	41908	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	218.4	T	4.3	168.9	4		32.1	T	219.5	90.7	0.83	—		32.1
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	30959	T	406	41908	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	218.4	T	4.3	168.9	5		32.1	T	219.5	90.7	0.83	—		32.1
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	28300	T	748	82545	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	199.6	T	7.9	332.8	6		36.1	T	119.8	46.6	0.81	—		36.1
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	22822	T	1210	91343	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	161.0	T	12.8	368.2	7		48.9	T	73.8	42.1	0.77	—		42.1
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	13171	T	631	87359	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	92.9	T	6.7	352.2	8		96.4	T	142.2	44.4	0.61	—		44.4
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	434	60089	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	5.1	295.9	9		NO LOAD	C	186.4	52.1	0.30	—	Does not carry load	52.1
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	13171	C	835	61926	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	102.7	C	9.8	305.0	10		69.5	C	96.6	50.5	0.67	—		50.5
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	20484	C	509	56812	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	159.7	C	6.0	279.8	11		37.2	C	159.7	55.9	0.77	—		37.2
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	24331	C	225	24138	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	189.7	C	2.6	118.9	12		27.5	C	360.7	129.9	0.87	—		27.5
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	24331	C	225	24138	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	189.7	C	2.6	118.9	13		27.5	C	360.7	129.9	0.87	—		27.5
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	20484	C	509	56812	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	159.7	C	6.0	279.8	14		37.2	C	159.7	55.9	0.77	—		37.2
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	13171	C	835	61926	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	102.7	C	9.8	305.0	15		69.5	C	96.6	50.5	0.67	—		50.5
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	434	60089	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	5.1	295.9	16		NO LOAD	C	186.4	52.1	0.30	—	Does not carry load	52.1
End Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	439	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	7.5	C	0.0	0.0	17	End Posts	1,326.9	C	—	—				1326.9
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	439	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	7.5	C	0.0	0.0	18		1,326.9	C	—	—				1326.9
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—			Always in tension & removed	—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		5755	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	232.5	C	0.0	0.0	21		33.5	C	—	—				33.5
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8437	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	340.9	C	0.0	0.0	22		22.9	C	—	—				22.9
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8437	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	340.9	C	0.0	0.0	23		22.9	C	—	—				22.9
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		5755	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	232.5	C	0.0	0.0	24		33.5	C	—	—				33.5
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	21148	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	295.8	C	0.0	0.0	27	Compression Diagonals	9.7	C	—	—			Controls truss rating	9.7
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	18824	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	311.1	C	0.0	0.0	28		11.9	C	—	—				11.9
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	15413	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	254.8	C	0.0	0.0	29		20.8	C	—	—				20.8
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	11913	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	240.7	C	0.0	0.0	30		28.3	C	—	—				28.3
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	11913	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	240.7	C	0.0	0.0	31		28.3	C	—	—				28.3
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	15413	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	254.8	C	0.0	0.0	32		20.8	C	—	—				20.8
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	18824	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	311.1	C	0.0	0.0	33		11.9	C	—	—				11.9
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	21148	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	295.8	C	0.0	0.0	34		9.7	C	—	—			Controls truss rating	9.7
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	17544	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	4964.0	T	0.0	0.0	35	Vertical Rods	40.4	T	—	—				40.4
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	17986	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	7328.1	T	0.0	0.0	36		27.4	T	—	—				27.4
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	17167	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	6994.3	T	0.0	0.0	37		33.2	T	—	—				33.2
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	16575	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	10552.1	T	0.0	0.0	38		22.3	T	—	—				22.3
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	17167	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	6994.3	T	0.0	0.0	39		33.2	T	—	—				33.2
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	17986	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	7328.1	T	0.0	0.0	40		27.4	T	—	—				27.4
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	17544	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	4964.0	T	0.0	0.0	41		40.4	T	—	—				40.4
																																		CONTROLLING RATING:							9.7

Table 2

ICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (BUS TRUCK)

)GAN COUNTY, OHIO

MEMBER PROPERTIES, FORCES, STRESSES AND RATING

By: M. Killian / T. Butz (Burgess & Niple)

September-01

FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS

**AAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSSBus and trussdl2

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage						
		DIMENSIONS (inches)								PROPERTIES					FORCES (Lbs. & Inches)							ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)			LIVE LOAD STRESSES (PSI)					RATING (Bus) (TONS)				NDS REQUIREMENTS		COMMENTS	FINAL RATING (GROSS VEHICLE TONS)
Member Description	Member No.	outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct width (in.) (if any)?	joint area (in**2)	DEAD LOAD				Bus LIVE LOAD															Gross Tonnage: 13				MZ &FX			
		width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)			FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Ft' / Fc'	Fv'	Fb'	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	AXIAL FX	L. SHEAR VL	BENDING MAX.	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	3.9.1 (Ft) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	10757	T	398	55080	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	75.9	T	4.2	222.0	1	Lower Chord	102.3	T	195.5	61.0	0.46	—		61.0
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	18444	T	782	60752	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	130.1	T	8.3	244.9	2		52.4	T	99.0	54.9	0.65	—		52.4
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	23045	T	535	59400	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	162.6	T	5.7	239.5	3		38.5	T	145.0	56.1	0.73	—		38.5
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	25553	T	300	31063	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	180.3	T	3.2	125.2	4		33.7	T	257.6	106.1	0.74	—		33.7
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	25553	T	300	31063	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	180.3	T	3.2	125.2	5		33.7	T	257.6	106.1	0.74	—		33.7
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	23045	T	535	59400	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	162.6	T	5.7	239.5	6		38.5	T	145.0	56.1	0.73	—		38.5
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	18444	T	782	60752	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	130.1	T	8.3	244.9	7		52.4	T	99.0	54.9	0.65	—		52.4
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	10757	T	398	55080	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	75.9	T	4.2	222.0	8		102.3	T	195.5	61.0	0.46	—		61.0
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	274	37953	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	3.2	186.9	9	Upper Chord	NO LOAD	C	255.7	71.5	0.20	—	Does not carry load	71.5
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	10757	C	530	40502	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	83.9	C	6.2	199.5	10		73.8	C	132.0	67.0	0.54	—		67.0
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	16879	C	353	40162	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	131.6	C	4.1	197.8	11		39.1	C	199.5	68.5	0.70	—		39.1
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	20047	C	167	17946	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	156.3	C	2.0	88.4	12		28.9	C	420.1	151.4	0.78	—		28.9
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	20047	C	167	17946	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	156.3	C	2.0	88.4	13		28.9	C	420.1	151.4	0.78	—		28.9
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	16879	C	353	40162	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	131.6	C	4.1	197.8	14		39.1	C	199.5	68.5	0.70	—		39.1
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	10757	C	530	40502	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	83.9	C	6.2	199.5	15		73.8	C	132.0	67.0	0.54	—		67.0
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	274	37953	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	3.2	186.9	16		NO LOAD	C	255.7	71.5	0.20	—	Does not carry load	71.5
End Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	278	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	4.7	C	0.0	0.0	17	End Posts	1,817.5	C	—	—				1817.5
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	278	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	4.7	C	0.0	0.0	18		1,817.5	C	—	—				1817.5
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—			Always in tension & removed	—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		4107	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	165.9	C	0.0	0.0	21		40.7	C	—	—				40.7
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		6216	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	251.2	C	0.0	0.0	22		26.9	C	—	—				26.9
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		6216	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	251.2	C	0.0	0.0	23		26.9	C	—	—				26.9
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		4107	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	165.9	C	0.0	0.0	24		40.7	C	—	—				40.7
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	17273	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	241.6	C	0.0	0.0	27	Compression Diagonals	10.3	C	—	—			Controls truss rating	10.3
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	14972	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	247.5	C	0.0	0.0	28		12.9	C	—	—				12.9
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	12109	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	200.1	C	0.0	0.0	29		23.0	C	—	—				23.0
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	9236	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	186.6	C	0.0	0.0	30		31.6	C	—	—				31.6
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	9236	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	186.6	C	0.0	0.0	31		31.6	C	—	—				31.6
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	12109	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	200.1	C	0.0	0.0	32		23.0	C	—	—				23.0
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	14972	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	247.5	C	0.0	0.0	33		12.9	C	—	—				12.9
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	17273	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	241.6	C	0.0	0.0	34		10.3	C	—	—			Controls truss rating	10.3
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	14093	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	3987.5	T	0.0	0.0	35	Vertical Rods	43.5	T	—	—				43.5
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	13738	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	5597.4	T	0.0	0.0	36		31.1	T	—	—				31.1
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	12619	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	5141.4	T	0.0	0.0	37		39.2	T	—	—				39.2
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	11579	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	7371.6	T	0.0	0.0	38		27.7	T	—	—				27.7
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	12619	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	5141.4	T	0.0	0.0	39		39.2	T	—	—				39.2
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	13738	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	5597.4	T	0.0	0.0	40		31.1	T	—	—				31.1
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	14093	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	3987.5	T	0.0	0.0	41		43.5	T	—	—				43.5
																																								CONTROLLING RATING:			10.3

Table 3

ICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (2F1 TRUCK)

'GAN COUNTY, OHIO

By: M. Killian / T. Butz (Burgess & Niple)

MEMBER PROPERTIES, FORCES, STRESSES AND RATING

September-01

FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS

AAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS2F1 and trussdl3

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage							
		DIMENSIONS (inches)								PROPERTIES					FORCES (Lbs. & Inches)															RATING (2F1) (TONS)				NDS REQUIREMENTS			
		outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct	joint	DEAD LOAD				2F1 LIVE LOAD				ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)				LIVE LOAD STRESSES (PSI)				Gross Tonnage: 15				MZ &FX			
Member Description	Member No.	width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)	width (in.) (If any)?	area (in**2)	FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Ft' / Fc'	Fv'	Fb'	AXIAL	L. SHEAR	BENDING	AXIAL	L. SHEAR	BENDING	AXIAL	L. SHEAR	BENDING	AXIAL	C/T	L. SHEAR	BENDING	AXIAL	C/T	L. SHEAR	BENDING	3.9.1 (Fv) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		FINAL RATING (GROSS VEHICLE TONS)
																										FT	VL	MAX.	FX	VL	MAX.	FX	VL	MAX.											
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	14182	T	622	86118	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	100.0	T	6.6	347.2	1	Lower Chord	89.5	T	144.3	45.0	0.61	—		45.0
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	22709	T	1215	92431	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	160.2	T	12.9	372.6	2		49.1	T	73.5	41.6	0.80	—		41.6
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	28412	T	739	81318	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	200.4	T	7.8	327.8	3		36.0	T	121.2	47.3	0.82	—		36.0
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	31317	T	417	43025	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	220.9	T	4.4	173.4	4		31.7	T	213.7	88.4	0.84	—		31.7
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	31317	T	417	43025	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	220.9	T	4.4	173.4	5		31.7	T	213.7	88.4	0.84	—		31.7
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	28412	T	739	81318	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	200.4	T	7.8	327.8	6		36.0	T	121.2	47.3	0.82	—		36.0
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	22709	T	1215	92431	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	160.2	T	12.9	372.6	7		49.1	T	73.5	41.6	0.80	—		41.6
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	14182	T	622	86118	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	100.0	T	6.6	347.2	8		89.5	T	144.3	45.0	0.61	—		45.0
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	427	59156	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	5.0	291.3	9	Upper Chord	NO LOAD	C	189.3	52.9	0.30	—	Does not carry load	52.9
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	14182	C	834	62357	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	110.6	C	9.8	307.1	10		64.6	C	96.8	50.2	0.69	—		50.2
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	20560	C	499	55736	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	160.3	C	5.8	274.5	11		37.0	C	162.8	56.9	0.79	—		37.0
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	24570	C	221	24067	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	191.6	C	2.6	118.5	12		27.2	C	365.9	130.2	0.87	—		27.2
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	24570	C	221	24067	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	191.6	C	2.6	118.5	13		27.2	C	365.9	130.2	0.87	—		27.2
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	20560	C	499	55736	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	160.3	C	5.8	274.5	14		37.0	C	162.8	56.9	0.79	—		37.0
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	14182	C	834	62357	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	110.6	C	9.8	307.1	15		64.6	C	96.8	50.2	0.69	—		50.2
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	427	59156	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	5.0	291.3	16		NO LOAD	C	189.3	52.9	0.30	—	Does not carry load	52.9
Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	414	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	7.1	C	0.0	0.0	17	End Posts	1,408.2	C	—	—				1408.2
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	414	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	7.1	C	0.0	0.0	18		1,408.2	C	—	—				1408.2
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—			Always in tension & removed	—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		6516	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	263.3	C	0.0	0.0	21		29.6	C	—	—				29.6
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		7964	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	321.8	C	0.0	0.0	22		24.2	C	—	—				24.2
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		7964	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	321.8	C	0.0	0.0	23		24.2	C	—	—				24.2
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		6516	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	263.3	C	0.0	0.0	24		29.6	C	—	—				29.6
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	22772	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	318.5	C	0.0	0.0	27	Compression Diagonals	9.0	C	—	—			Controls truss rating	9.0
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	18458	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	305.1	C	0.0	0.0	28		12.1	C	—	—				12.1
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	15203	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	251.3	C	0.0	0.0	29		21.1	C	—	—				21.1
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	11727	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	236.9	C	0.0	0.0	30		28.7	C	—	—				28.7
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	11727	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	236.9	C	0.0	0.0	31		28.7	C	—	—				28.7
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	15203	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	251.3	C	0.0	0.0	32		21.1	C	—	—				21.1
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	18458	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	305.1	C	0.0	0.0	33		12.1	C	—	—				12.1
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	22772	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	318.5	C	0.0	0.0	34		9.0	C	—	—			Controls truss rating	9.0
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	18682	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	5285.8	T	0.0	0.0	35	Vertical Rods	37.9	T	—	—				37.9
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	17444	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	7107.5	T	0.0	0.0	36		28.2	T	—	—				28.2
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	16795	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	6842.9	T	0.0	0.0	37		33.9	T	—	—				33.9
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	16302	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	10378.1	T	0.0	0.0	38		22.7	T	—	—				22.7
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	16795	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	6842.9	T	0.0	0.0	39		33.9	T	—	—				33.9
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	17444	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	7107.5	T	0.0	0.0	40		28.2	T	—	—				28.2
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	18682	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	5285.8	T	0.0	0.0	41		37.9	T	—	—				37.9
																																		CONTROLLING RATING:								9.0

Table 4

BICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (3F1 TRUCK)

LOGAN COUNTY, OHIO
MEMBER PROPERTIES, FORCES, STRESSES AND RATING
FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS
STAAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS3F1 and trussdl4

By: M. Killian / T. Butz (Burgess & Niple)
September-01

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage							
Member Description	Member No.	DIMENSIONS (inches)								PROPERTIES					FORCES (Lbs. & Inches)								ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)			LIVE LOAD STRESSES (PSI)				Member No.	Member Description	RATING (3F1) (TONS)					NDS REQUIREMENTS		COMMENTS	FINAL RATING (GROSS VEHICLE TONS)
		outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct width (in.) (If any)?	joint	DEAD LOAD				3F1 LIVE LOAD							AXIAL		L. SHEAR	BENDING	AXIAL	L. SHEAR	BENDING	AXIAL		L. SHEAR	BENDING			Gross Tonnage: 23				MZ &FX			
		width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)		area (in**2)	FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Fb' / Fc'	Fv'	Fb'	FX	C/T	VL	MAX.	FX	VL	MAX.	FX	C/T	VL	MAX.			AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	3.9.1 (Ft) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	19826	T	899	124512	700	65	1.050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	139.9	T	9.5	501.9	1	Lower Chord	98.2	T	153.0	47.7	0.82	—		47.7
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	34474	T	1750	132527	700	65	1.050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	243.2	T	18.5	534.2	2		49.6	T	78.2	44.5	1.02	22.3	Interaction greater than 1.0	22.3
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	43139	T	1067	117678	700	65	1.050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	304.3	T	11.3	474.4	3		36.3	T	128.6	50.1	1.04	21.9	Interaction greater than 1.0	21.9
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	47372	T	618	63701	700	65	1.050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	334.2	T	6.5	256.8	4		32.1	T	221.4	91.5	1.08	20.7	Interaction greater than 1.0	20.7
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	47372	T	618	63701	700	65	1.050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	334.2	T	6.5	256.8	5		32.1	T	221.4	91.5	1.08	20.7	Interaction greater than 1.0	20.7
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	43139	T	1067	117678	700	65	1.050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	304.3	T	11.3	474.4	6		36.3	T	128.6	50.1	1.04	21.9	Interaction greater than 1.0	21.9
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	34474	T	1750	132527	700	65	1.050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	243.2	T	18.5	534.2	7		49.6	T	78.2	44.5	1.02	22.3	Interaction greater than 1.0	22.3
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	19826	T	899	124512	700	65	1.050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	139.9	T	9.5	501.9	8		98.2	T	153.0	47.7	0.82	—		47.7
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	618	85544	590	65	1.050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.2	421.3	9	Upper Chord	NO LOAD	C	200.7	56.1	0.42	—	Does not carry load	56.1
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	19826	C	1203	89785	590	65	1.050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	154.6	C	14.1	442.2	10		70.8	C	102.9	53.4	0.88	—		53.4
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	31212	C	725	80854	590	65	1.050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	243.4	C	8.5	398.2	11		37.4	C	172.0	60.2	0.98	—		37.4
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	37217	C	330	35826	590	65	1.050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	290.2	C	3.9	176.4	12		27.5	C	376.8	134.2	1.09	19.8	Interaction greater than 1.0	19.8
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	37217	C	330	35826	590	65	1.050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	290.2	C	3.9	176.4	13		27.5	C	376.8	134.2	1.09	19.8	Interaction greater than 1.0	19.8
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	31212	C	725	80854	590	65	1.050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	243.4	C	8.5	398.2	14		37.4	C	172.0	60.2	0.98	—		37.4
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	19826	C	1203	89785	590	65	1.050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	154.6	C	14.1	442.2	15		70.8	C	102.9	53.4	0.88	—		53.4
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	618	85544	590	65	1.050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.2	421.3	16		NO LOAD	C	200.7	56.1	0.42	—	Does not carry load	56.1
End Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	590	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	10.1	C	0.0	0.0	17	End Posts	1,513.5	C	—	—				1513.5
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	590	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	10.1	C	0.0	0.0	18		1,513.5	C	—	—				1513.5
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—			Always in tension & removed	—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8679	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	350.7	C	0.0	0.0	21		34.1	C	—	—				34.1
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		12486	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	504.5	C	0.0	0.0	22		23.7	C	—	—				23.7
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		12486	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	504.5	C	0.0	0.0	23		23.7	C	—	—				23.7
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8679	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	350.7	C	0.0	0.0	24		34.1	C	—	—				34.1
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	31835	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	445.2	C	0.0	0.0	27	Compression Diagonals	9.9	C	—	—			Controls truss rating	9.9
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	28039	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	463.5	C	0.0	0.0	28		12.2	C	—	—				12.2
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	22940	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	379.2	C	0.0	0.0	29		21.5	C	—	—				21.5
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	17703	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	357.6	C	0.0	0.0	30		29.2	C	—	—				29.2
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	17703	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	357.6	C	0.0	0.0	31		29.2	C	—	—				29.2
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	22940	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	379.2	C	0.0	0.0	32		21.5	C	—	—				21.5
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	28039	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	463.5	C	0.0	0.0	33		12.2	C	—	—				12.2
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	31835	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	445.2	C	0.0	0.0	34		9.9	C	—	—			Controls truss rating	9.9
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	26194	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	7411.5	T	0.0	0.0	35	Vertical Rods	41.5	T	—	—				41.5
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	26316	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	10722.0	T	0.0	0.0	36		28.7	T	—	—				28.7
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	25014	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	10191.5	T	0.0	0.0	37		34.9	T	—	—				34.9
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	24048	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	15309.2	T	0.0	0.0	38		23.6	T	—	—				23.6
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	25014	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	10191.5	T	0.0	0.0	39		34.9	T	—	—				34.9
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	26316	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	10722.0	T	0.0	0.0	40		28.7	T	—	—				28.7
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	26194	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	7411.5	T	0.0	0.0	41		41.5	T	—	—				41.5
																																										CONTROLLING RATING:			9.9

Table 5

BICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (4F1 TRUCK)

LOGAN COUNTY, OHIO
MEMBER PROPERTIES, FORCES, STRESSES AND RATING
FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS
STAAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS4F1 and trussdl5

By: M. Killian / T. Butz (Burgess & Niple)
September-01

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage							
Member Description	Member No.	DIMENSIONS (inches)								PROPERTIES					FORCES (Lbs. & Inches)																RATING (4F1) (TONS)				NDS REQUIREMENTS		COMMENTS	FINAL RATING (GROSS VEHICLE TONS)
		outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct width (in.) (If any)?	joint area	DEAD LOAD				4F1 LIVE LOAD				ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)			LIVE LOAD STRESSES (PSI)						Gross Tonnage: 27				MZ &FX			
		width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)		area (in**2)	FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Ft' / Fc'	Fv'	Fb'	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	AXIAL FX	L. SHEAR VL	BENDING MAX.	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.			AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	3.9.1 (Ft) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	22909	T	980	135760	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	161.6	T	10.4	547.3	1	Lower Chord	99.8	T	164.7	51.4	0.89	—		51.4
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	39759	T	1915	146101	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	280.5	T	20.3	589.0	2		50.5	T	83.9	47.4	1.12	23.2	Interaction greater than 1.0	23.2
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	49881	T	1203	132773	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	351.9	T	12.7	535.2	3		36.9	T	134.0	52.2	1.15	21.9	Interaction greater than 1.0	21.9
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	54847	T	695	71731	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	386.9	T	7.4	289.2	4		32.6	T	231.1	95.4	1.19	20.8	Interaction greater than 1.0	20.8
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	54847	T	695	71731	700	65	1,050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	386.9	T	7.4	289.2	5		32.6	T	231.1	95.4	1.19	20.8	Interaction greater than 1.0	20.8
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	49881	T	1203	132773	700	65	1,050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	351.9	T	12.7	535.2	6		36.9	T	134.0	52.2	1.15	21.9	Interaction greater than 1.0	21.9
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	39759	T	1915	146101	700	65	1,050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	280.5	T	20.3	589.0	7		50.5	T	83.9	47.4	1.12	23.2	Interaction greater than 1.0	23.2
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	22909	T	980	135760	700	65	1,050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	161.6	T	10.4	547.3	8		99.8	T	164.7	51.4	0.89	—		51.4
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	673	93225	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.9	459.1	9		NO LOAD	C	216.2	60.4	0.46	—	Does not carry load	60.4
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	22909	C	1314	98341	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	178.6	C	15.4	484.3	10		71.9	C	110.5	57.3	0.96	—		57.3
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	36149	C	804	90430	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	281.9	C	9.4	445.3	11		37.9	C	181.9	63.2	1.08	24.3	Interaction greater than 1.0	24.3
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	43081	C	372	40392	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	335.9	C	4.3	198.9	12		27.9	C	392.4	139.7	1.19	20.0	Interaction greater than 1.0	20.0
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	43081	C	372	40392	590	65	1,050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	335.9	C	4.3	198.9	13		27.9	C	392.4	139.7	1.19	20.0	Interaction greater than 1.0	20.0
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	36149	C	804	90430	590	65	1,050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	281.9	C	9.4	445.3	14		37.9	C	181.9	63.2	1.08	24.3	Interaction greater than 1.0	24.3
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	22909	C	1314	98341	590	65	1,050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	178.6	C	15.4	484.3	15		71.9	C	110.5	57.3	0.96	—		57.3
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	673	93225	590	65	1,050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.9	459.1	16		NO LOAD	C	216.2	60.4	0.46	—	Does not carry load	60.4
End Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	670	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	11.4	C	0.0	0.0	17	End Posts	1,566.4	C	—	—				1566.4
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	670	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	11.4	C	0.0	0.0	18		1,566.4	C	—	—				1566.4
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—			Always in tension & removed	—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		9661	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	390.4	C	0.0	0.0	21		36.0	C	—	—				36.0
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		14034	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	567.0	C	0.0	0.0	22		24.7	C	—	—				24.7
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		14034	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	567.0	C	0.0	0.0	23		24.7	C	—	—				24.7
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		9661	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	390.4	C	0.0	0.0	24		36.0	C	—	—				36.0
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	36786	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	514.5	C	0.0	0.0	27	Compression Diagonals	10.0	C	—	—			Controls truss rating	10.0
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	31991	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	528.8	C	0.0	0.0	28		12.6	C	—	—				12.6
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	26180	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	432.7	C	0.0	0.0	29		22.1	C	—	—				22.1
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	20164	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	407.3	C	0.0	0.0	30		30.1	C	—	—				30.1
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	20164	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	407.3	C	0.0	0.0	31		30.1	C	—	—				30.1
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	26180	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	432.7	C	0.0	0.0	32		22.1	C	—	—				22.1
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	31991	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	528.8	C	0.0	0.0	33		12.6	C	—	—				12.6
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	36786	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	514.5	C	0.0	0.0	34		10.0	C	—	—			Controls truss rating	10.0
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	30030	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	8496.9	T	0.0	0.0	35	Vertical Rods	42.4	T	—	—				42.4
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	29793	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	12138.8	T	0.0	0.0	36		29.8	T	—	—				29.8
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	28274	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	11519.7	T	0.0	0.0	37		36.3	T	—	—				36.3
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	27016	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	17199.0	T	0.0	0.0	38		24.7	T	—	—				24.7
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	28274	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	11519.7	T	0.0	0.0	39		36.3	T	—	—				36.3
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	29793	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	12138.8	T	0.0	0.0	40		29.8	T	—	—				29.8
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	30030	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	8496.9	T	0.0	0.0	41		42.4	T	—	—				42.4

CONTROLLING RATING: 10.0

Table 6

BICKHAM COVERED BRIDGE TRUSS LOAD RATING ANALYSIS (5C1 TRUCK)

LOGAN COUNTY, OHIO
MEMBER PROPERTIES, FORCES, STRESSES AND RATING
FILE: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS.XLS
STAAD FILES: PR30099\ETC\ANALYSIS SUMMARY\STAAD\TRUSS5C1 and trussdl6

By: M. Killian / T. Butz (Burgess & Niple)
September-01

		A	B				C				D			E				F=D-E				G=C/A					H=[F/G]*Gross Tonnage							
Member Description	Member No.	DIMENSIONS (inches)								PROPERTIES					FORCES (Lbs. & Inches)								ALLOWABLE STRESS (PSI)			DEAD LOAD STRESS (PSI)				REMAINING STRENGTH (PSI)				LIVE LOAD STRESSES (PSI)				Member No.	Member Description	RATING (5C1) (TONS)				NDS REQUIREMENTS		COMMENTS	FINAL RATING (GROSS VEHICLE TONS)
		outside member		outside rod	middle member		inside rod	inside member		full member			Joint deduct width (in.) (If any)?	Joint area	DEAD LOAD				5C1 LIVE LOAD																			Gross Tonnage: 40				MZ &FX			
		width (w)	height (h)	diameter (d)	width (w)	height (h)	diameter (d)	width (w)	height (h)	area (in**2)	I (in**4)	weight (lb/inch)		(in**2)	FX	C/T	FY	MZ	MAX FX	C/T	MAX FY	MAX MZ	Ft' / Fc'	Fv'	Fb'	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	AXIAL FX	L. SHEAR VL	BENDING MAX.	AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.			AXIAL FX	C/T	L. SHEAR VL	BENDING MAX.	3.9.1 (Ft) or 3.9.2 (Fc) (<1)	Interaction Rating (tons)		
Lower Chord	1	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	25818	T	874	121046	700	65	1.050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	182.1	T	9.2	488.0	1	Lower Chord	131.1	T	273.7	85.4	0.88	—		85.4
	2	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	44417	T	1681	127145	700	65	1.050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	313.4	T	17.8	512.6	2		67.0	T	141.6	80.7	1.13	34.4	Interaction greater than 1.0	34.4
	3	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	55585	T	1129	122928	700	65	1.050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	392.1	T	11.9	495.6	3		49.1	T	211.5	83.5	1.29	27.6	Interaction greater than 1.0	27.6
	4	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	58883	T	776	81676	700	65	1.050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	415.4	T	8.2	329.3	4		45.0	T	306.4	124.1	1.22	29.6	Interaction greater than 1.0	29.6
	5	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	33038	T	195	6987	58883	T	776	81676	700	65	1.050	233.1	T	2.1	28.2	466.9	62.9	1,021.8	415.4	T	8.2	329.3	5		45.0	T	306.4	124.1	1.22	29.6	Interaction greater than 1.0	29.6
	6	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	31051	T	173	3999	55585	T	1129	122928	700	65	1.050	219.1	T	1.8	16.1	480.9	63.2	1,033.9	392.1	T	11.9	495.6	6		49.1	T	211.5	83.5	1.29	27.6	Interaction greater than 1.0	27.6
	7	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	24844	T	191	3999	44417	T	1681	127145	700	65	1.050	175.3	T	2.0	16.1	524.7	63.0	1,033.9	313.4	T	17.8	512.6	7		67.0	T	141.6	80.7	1.13	34.4	Interaction greater than 1.0	34.4
	8	4.50	10.50	0.00	4.50	10.50	0.00	4.50	10.50	141.75	1,302.33	3.94	0.00	141.75	14582	T	162	2061	25818	T	874	121046	700	65	1.050	102.9	T	1.7	8.3	597.1	63.3	1,041.7	182.1	T	9.2	488.0	8		131.1	T	273.7	85.4	0.88	—		85.4
Upper Chord	9	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	606	83916	590	65	1.050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.1	413.3	9	Upper Chord	NO LOAD	C	355.9	99.4	0.42	—	Does not carry load	99.4
	10	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	25818	C	1153	86015	590	65	1.050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	201.3	C	13.5	423.6	10		94.6	C	186.5	97.0	0.95	—		94.6
	11	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	40325	C	727	79176	590	65	1.050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	314.4	C	8.5	389.9	11		50.4	C	298.1	106.9	1.15	32.4	Interaction greater than 1.0	32.4
	12	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	46392	C	437	47964	590	65	1.050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	361.7	C	5.1	236.2	12		38.4	C	494.3	174.3	1.21	29.6	Interaction greater than 1.0	29.6
	13	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	31051	C	157	4238	46392	C	437	47964	590	65	1.050	242.1	C	1.8	20.9	347.6	63.2	1,029.1	361.7	C	5.1	236.2	13		38.4	C	494.3	174.3	1.21	29.6	Interaction greater than 1.0	29.6
	14	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	24844	C	139	1681	40325	C	727	79176	590	65	1.050	193.7	C	1.6	8.3	396.0	63.4	1,041.7	314.4	C	8.5	389.9	14		50.4	C	298.1	106.9	1.15	32.4	Interaction greater than 1.0	32.4
	15	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	14582	C	178	4580	25818	C	1153	86015	590	65	1.050	113.7	C	2.1	22.6	476.0	62.9	1,027.4	201.3	C	13.5	423.6	15		94.6	C	186.5	97.0	0.95	—		94.6
	16	4.50	9.50	0.00	4.50	9.50	0.00	4.50	9.50	128.25	964.55	3.56	0.00	128.25	0	C	166	4580	0	C	606	83916	590	65	1.050	0.0	C	1.9	22.6	589.7	63.1	1,027.4	0.0	C	7.1	413.3	16		NO LOAD	C	355.9	99.4	0.42	—	Does not carry load	99.4
End Posts	17	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	586	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	10.0	C	0.0	0.0	17	End Posts	2,651.5	C	—	—				2651.5
	18	4.50	6.50	0.00	0.00	0.00	0.00	4.50	6.50	58.50	205.97	1.63	0.00	58.50	644	C	0	0	586	C			675	65		11.0	C	0.0	0.0	664.0	65.0	0.0	10.0	C	0.0	0.0	18		2,651.5	C	—	—				2651.5
Counter Diagonals	19	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	19	Counter Diagonals	NO LOAD	C	—	—				—
	20	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	20		NO LOAD	C	—	—			Always in tension & removed	—
	21	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8410	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	339.8	C	0.0	0.0	21		61.2	C	—	—			Always in tension & removed	—
	22	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		12304	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	497.1	C	0.0	0.0	22		41.8	C	—	—				61.2
	23	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		12304	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	497.1	C	0.0	0.0	23		41.8	C	—	—				41.8
	24	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		8410	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	339.8	C	0.0	0.0	24		61.2	C	—	—				61.2
	25	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	0.00	24.75	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	25		NO LOAD	C	—	—			Always in tension & removed	—
	26	0.00	0.00	0.00	4.50	5.50	0.00	0.00	0.00	24.75	62.39	0.69	1.00	19.25	0	T	0		0	C			520	65		0.0	T	0.0	0.0	519.8	65.0	0.0	0.0	C	0.0	0.0	26		NO LOAD	C	—	—			Always in tension & removed	—
Compression Diagonals	27	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	41456	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	579.8	C	0.0	0.0	27	Compression Diagonals	13.2	C	—	—			Controls truss rating	13.2
	28	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	34023	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	562.4	C	0.0	0.0	28		17.5	C	—	—				17.5
	29	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	25270	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	417.7	C	0.0	0.0	29		33.9	C	—	—				33.9
	30	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	17658	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	356.7	C	0.0	0.0	30		50.9	C	—	—				50.9
	31	4.50	5.50	0.00	0.00	0.00	0.00	4.50	5.50	49.50	124.78	1.38	0.00	49.50	3256	C	51	0	17658	C			520	65		65.8	C	1.6	0.0	454.0	63.4	0.0	356.7	C	0.0	0.0	31		50.9	C	—	—				50.9
	32	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	10045	C	63	0	25270	C			520	65		166.0	C	1.6	0.0	353.7	63.4	0.0	417.7	C	0.0	0.0	32		33.9	C	—	—				33.9
	33	5.50	5.50	0.00	0.00	0.00	0.00	5.50	5.50	60.50	152.51	1.68	0.00	60.50	16558	C	63	0	34023	C			520	65		273.7	C	1.6	0.0	246.1	63.4	0.0	562.4	C	0.0	0.0	33		17.5	C	—	—				17.5
	34	5.50	6.50	0.00	0.00	0.00	0.00	5.50	6.50	71.50	251.74	1.99	0.00	71.50	23507	C	74	0	41456	C			520	65		328.8	C	1.6	0.0	191.0	63.4	0.0	579.8	C	0.0	0.0	34		13.2	C	—	—			Controls truss rating	13.2
Vertical Rods	35	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	33943	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	9603.9	T	0.0	0.0	35	Vertical Rods	55.6	T	—	—				55.6
	36	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	31438	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	12808.8	T	0.0	0.0	36		41.8	T	—	—				41.8
	37	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	28159	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	11473.1	T	0.0	0.0	37		54.0	T	—	—				54.0
	38	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.57	0.10	0.45	0.00	1.57	3832	T	0	0	25992	T			18,150			2439.4	T	0.0	0.0	15710.6	0.0	0.0	16546.7	T	0.0	0.0	38		38.0	T	—	—				38.0
	39	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	6539	T	0	0	28159	T			18,150			2664.1	T	0.0	0.0	15485.9	0.0	0.0	11473.1	T	0.0	0.0	39		54.0	T	—	—				54.0
	40	0.00	0.00	1.25	0.00	0.00	1.25	0.00	0.00	2.45	0.24	0.70	0.00	2.45	11714	T	0	0	31438	T			18,150			4772.9	T	0.0	0.0	13377.1	0.0	0.0	12808.8	T	0.0	0.0	40		41.8	T	—	—				41.8
	41	0.00	0.00	1.50	0.00	0.00	1.50	0.00	0.00	3.53	0.50	1.00	0.00	3.53	16939	T	0	0	33943	T			18,150			4792.7	T	0.0	0.0	13357.3	0.0	0.0	9603.9	T	0.0	0.0	41		55.6	T	—	—				55.6
																																										CONTROLLING RATING:			13.2

Table 7