October 28, 2011

Mr. David Lloyd
Christie Lites Vancouver
3686 Bainbridge Avenue
Burnaby, BC V5A 2T4

Project: 12" Type A Truss Analysis, Our File No. 211503.20
Subject: Truss Span Rating

Dear David:

On October 12, 2011, AHBL, Inc. was contracted by Christie Lites Inc to conduct a structural capacity investigation for the Christie Lites 12" Type A Truss System. The scope of our structural services included structural analysis of the complete truss assembly, including the 12" Truss Corners and curved trusses, in order to develop span charts for the trusses. Our analysis was based on member sizes, truss configuration, and material properties that were provided to AHBL by Christie Lites.

The basic 12" Type A truss configuration consists of an 8'-0" long, three dimensional, box shaped truss. Each truss section has four continuous horizontal chords, interconnected with both vertical and diagonal web members. The diagonal web members are located primarily in the vertical plane and span between top and bottom chords. Two additional diagonals are provided at 1/3 points and span across the body of the truss. Crossbeams are provided at 1/4 points and span horizontally between chords. Variations of this basic 12" truss include shorter sections of 1'-0", 2'-0", 3'-0", 4'-0", and 6'-0" long and curved truss sections of approximately 12'-0" and 18'-0" diameter.

Corner blocks are available in 22.5-degree, 30-degree, 45-degree, 90-degree, and 6-way hub units. The corner units are used to join truss sections in horizontal layouts and to provide locations for support, either ground or aerial. The corner blocks are comprised of sections and materials identical to the trusses.

The 12" Type A truss was modeled in RISA-3D in order to determine the elements of the trusses that controlled the truss capacity. A three dimensional model was built for 8', 16', 24', 32', and 40' spans (each truss span over 8' involved bolting 8' sections of truss in series), and analyzed under several loading conditions. The loading conditions included distributed loads, as well as point loads at midspan, third points or quarter points of the truss. For each of these models, the limiting truss element was reviewed, and a maximum allowable load determined based on this element. Depending on the truss span and type of loading, the factor that limited the allowable truss capacity included axial compression of the top chord, axial tension of the bottom chord, axial compression of the diagonal web members, as well as truss

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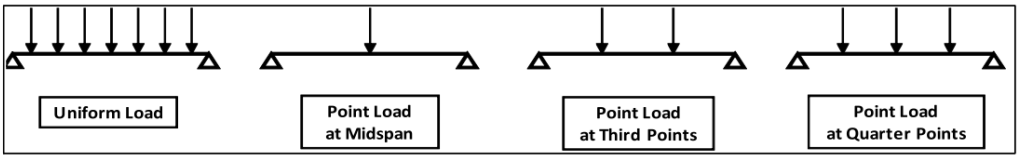
deflection. In addition to these, the truss-to-truss splice connection (using either a corner block or direct bolted connection) was determined to be the limiting element in many instances. This connection was limited by yielding of the aluminum connection plates at the locations of the 5/8"-diameter thru bolts. Based upon our analysis, the span charts that we developed are as follows:

Load Chart One: Allowable loads for Typical Type A Truss sections in series

ALLOWABLE LOAD DATA

CHRISTIE LITES 12" TYPE A TRUSS - STRAIGHT HORIZONTAL SPANS



No. of Sections	Span[1, 8]	Uniform Load[2]			Maximum Allowable Point Loads[3, 4, 6]					
					Center Point		Third Point		Quarter Point	
	(ft)	Load (plf)	Total Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)
1	8	420	3360	0.12	845 [5]	0.04	2 x 500 [5]	0.02	3 x 360 [5]	0.07
2	16	105	1680	0.49	845	0.32	2 x 500	0.10	3 x 360	0.47
3	24	47	1128	0.60	560	0.56	2 x 420	0.54	3 x 240	0.59
4	32	25	800	0.72	420	0.70	2 x 300	0.70	3 x 180	0.67
5	40	12	480	0.80	250	0.90	2 x 150	0.86	3 x 100	0.85

FOOTNOTES

1) Span indicates distance between truss supports.

2) Maximum uniformly distributed load that may be supported by a single horizontal 2" pipe is 270 plf. Uniform load shall be distributed equally to bottom chord and/or top chord members to the greatest extent possible.

3) Maximum single concentrated point load that may be supported by a single horizontal 2" pipe is 500 lbs.

4) Concentrated loads shall be hung from chord members only. Each concentrated load shall have two or four truss support points, equally distributed over both bottom chords.

5) Allowable concentrated point loads for 8'-0" span truss may be doubled provided the load is hung from 4 unique support points equally distributed over both bottom chords.

6) For point loads at intervals not indicated, use equivalent uniform load to determine capacity.

7) Truss sections shall be spliced together using (4) 5/8" diameter grade 8 thru bolts or a Truss Corner Block with (8) 5/8" diameter grade 8 thru bolts. The 22.5-degree, 30-degree, and 45-degree truss corner blocks shall be located no more than 8'-0" from a support point on both sides.

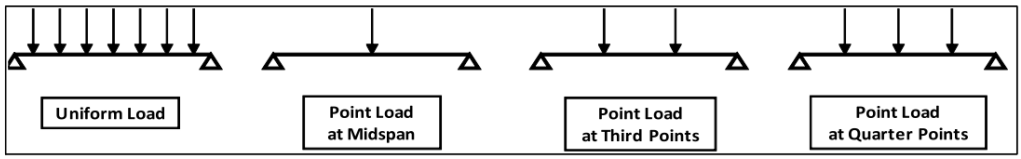
8) Truss lengths of 1'-0", 2'-0", 3'-0", 4'-0" and 6'-0" have a load rating equal to the 8'-0" truss span, and are subject to the uniform and concentrated loading restrictions of footnotes 2, 3, 4 and 5.

9) Capacity of additional support structures, components or connections are outside the scope of this analysis.

Load Chart Two: Allowable loads for Type A Curved Truss – 12'-0-3/4" Diameter

ALLOWABLE LOAD DATA

CHRISTIE LITES 12" CURVED TYPE A TRUSS - 12'-0 3/4" DIAMETER



No. of Sections	Span[2]	Uniform Load[3]			Maximum Allowable Concentrated Loads[4, 5, 6]					
					Center Point		Third Point		Quarter Point	
	(ft)	Load (plf)	Total Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)
4 total	12.6	135	1701	0.19	800	0.16	2 x 400	0.08	3 x 300	0.15

FOOTNOTES

1) Curved trusses shall be used in the horizontal position only.

2) Span indicates distance between truss supports - completed 12'-0 3/4" curved truss assembly shall be supported at 1/3 points minimum.

3) Maximum uniformly distributed load that may be supported by a single horizontal 2" pipe is 135 plf. Uniform load shall be distributed equally to bottom chord and/or top chord members to the greatest extent possible.

4) Maximum single concentrated point load that may be supported by a single horizontal 2" pipe is 400 lbs.

5) For concentrated loads at intervals not indicated, use equivalent uniform load to determine capacity.

6) Concentrated loads shall be hung from chord members only. Each concentrated load shall have two or four truss support points, equally distributed between both bottom chords.

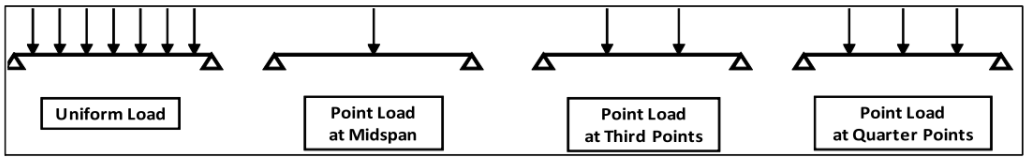
7) Truss sections shall be spliced together using (4) - 5/8" diameter grade 8 thru bolts.

8) Capacity of additional support structures, components or connections are outside the scope of this analysis.

Load Chart Three: Allowable loads for Type A Curved Truss – 18'-0-3/4" Diameter

ALLOWABLE LOAD DATA

CHRISTIE LITES 12" CURVED TYPE A TRUSS - 18'-0 3/4" DIAMETER



No. of Sections	Span[2]	Uniform Load[3]			Maximum Allowable Concentrated Loads[4, 5, 6]					
					Center Point		Third Point		Quarter Point	
	(ft)	Load (plf)	Total Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)	Load (lbs)	Deflection (in)
1	7.1	270	1917	0.06	800	0.04	2 x 400	0.02	3 x 300	0.07
2	14.2	130	1846	0.48	600	0.32	2 x 250	0.10	3 x 250	0.47

FOOTNOTES

1) Curved trusses shall be used in the horizontal position only.

2) Span indicates distance between truss supports - completed 18'-0 3/4" curved truss assemblies shall be supported at quarter points minimum.

3) Maximum uniformly distributed load that may be supported by a single horizontal 2" pipe is 190 plf. Uniform load shall be distributed equally to bottom chord and/or top chord members to the greatest extent possible.

4) Maximum single concentrated point load that may be supported by a single horizontal 2" pipe is 400 lbs.

5) For point loads at intervals not indicated, use equivalent uniform load to determine capacity.

6) Concentrated loads shall be hung from chord members only. Each concentrated load shall have two or four truss support points, equally distributed between both bottom chords.

7) Truss sections shall be spliced together using (4) - 5/8" diameter grade 8 thru bolts.

8) Capacity of additional support structures, components or connections are outside the scope of this analysis.

Load Chart Four: Acceptable Uses of Corner Blocks

ALLOWABLE LOAD DATA

CHRISTIE LITES 12" TYPE A TRUSS CORNER BLOCKS

Type of Corner	Acceptable Usage Type		
	Typical Splice Block[1]	Ground Support[2]	Multi-Truss Splice Block [5, 6]
 22.5° Corner[3]	Acceptable	Not Applicable	Not Applicable
 30° Corner[3]	Acceptable	Not Applicable	Not Applicable
 45° Corner[3]	Acceptable	Not Applicable	Not Applicable
 90° Corner[4, 5]	Acceptable	Acceptable	Acceptable Use 1/2 the allowable truss load value when joining 4 sections
 6-Way Hub[6]	Acceptable	Not Applicable	Acceptable Use 1/2 the allowable truss load value when joining 4 sections Use 1/3 the allowable truss load value when joining 6 sections

USAGE DEFINITIONS

Typical Splice Block: Corner block installed between **two** truss sections in a series. For connections of more than two truss sections, reference Multi-Truss Splice Block.

Ground Support: Corner block installed at end of truss section to connect to ground supported leg.

Multi-Truss Splice Block: Corner block used to join more than two truss sections.

NOTES

1) Typical Splice Block capacity is governed by allowable capacity of truss sections. Reference truss load tables for loading information.

2) Ground Support capacity is governed by allowable capacity of truss sections. Reference truss load tables for loading information.

3) When joing two truss sections using the 22.5-degree, 30-degree, or 45-degree corner block, the corner block must be located within 8'-0" of a support on both sides.

4) When using the 90-degree corner block to create box trusses, the box truss structure must be supported at every corner.

5) Use 1/2 the allowable load from the truss tables when joining four truss sections using a 90-degree corner at the center position when the corner is not supported.

6) Use 1/2 the allowable load from the truss tables when joining four truss sections using a 6-Way Hub at the center position when the hub is not supported. Use 1/3 the allowable load from the truss tables when joining six truss sections using a 6-Way Hub at the center position when the hub is not supported.

Three dimensional drawings of the 12" Type A trusses and corner blocks were provided by Christie Lites for our analysis. In addition, detailed member information was provided to AHBL by Christie Lites for the purposes of building the computer model used for analysis. The approximate truss dimensions and member information is as follows:

Truss Width: 1'-0" (outside to outside dimensions)
Truss Depth: 1'-0" (outside to outside dimensions)
Truss Span: 8'-0" for each truss unit

Truss Material: 6061 T6 Aluminum unless noted otherwise
Truss Top Chord: 2" diameter x 0.125"
Truss Bottom Chord: 2" diameter x 0.125"
Truss Diagonal Webs: 1" diameter x 0.125"
Truss Vertical Webs (midspan): 1" diameter x 0.125"
Truss Diagonal Cross Members: 1" diameter x 0.125"
Truss Vertical Webs (endspan): 1" x 2" x 0.125" rectangular tubes
Truss Horizontal Cross Members (endspan): 1" x 2" x 0.125" rectangular tubes
Truss Horizontal Cross Members (midspan): 2" diameter x 0.125"
End Connections Plates: 13/32"

Truss Splice Bolts: 5/8" diameter grade 8 bolts

This concludes our summary of the 12" Type A Truss analysis. RISA-3D truss models of the various span conditions may be made available on request. If you wish for us to be involved in additional review or design of the 12" Type A trusses, please let us know, and we will be glad to assist you. Otherwise, if you have any questions, or require further explanation, please feel free to call Tom Hicks, PE, SE, or me at (206) 267-2425.
Sincerely,

Andrea M. Sauter, PE, SE
Project Engineer

AMS/el

c: Drew McEachern, AHBL

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