Tim Moran
Tomcat USA
5427 N. National Drive
Knoxville, TN 37914

7/25/2018

Structural Analysis for
UMBC 20x60 Grid
Baltimore, Maryland
CRE Project # **18.411.18**

We have completed our analysis for the above referenced project for conformance to the structural provisions of the 2015 International Building Code. The enclosed calculations are a representation of our analysis and results. The engineering seal on this cover letter shall apply to all calculations contained herein.

Table of Contents for Analysis Package

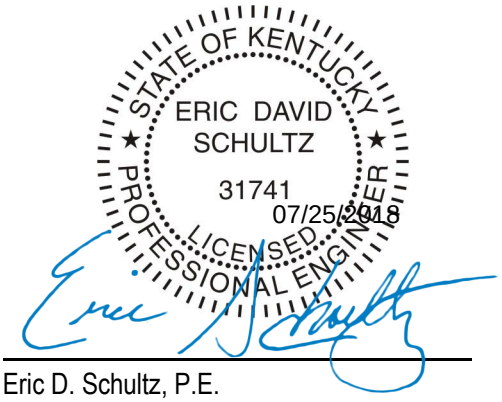
The truss grid has been reviewed according to client design specifications and loads. Design loads are based on the code required forces for a permanent structure. Clark Reder Engineering Inc. should be consulted for applied loads in excess of those stated within the submittal.

We trust this information is suitable for your needs at this time. If you have any questions, please do not hesitate to contact our office.

Regards,
Clark Reder Engineering Inc.

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License # 38421, Expiration Date: 01/29/2020

Jeffrey M. Reder, P.E.
MD Registration #: 38421



Eric D. Schultz, P.E.

GENERAL STRUCTURAL NOTES

CODES AND REFERENCE

1. 2015 INTERNATIONAL BUILDING CODE
2. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
3. ASCE 37-14 DESIGN LOADS ON STRUCTURES UNDER CONSTRUCTION
4. ANSI E1.2-2012 ENTERTAINMENT TECHNOLOGY, "DESIGN, MANUFACTURE AND USE OF ALUMINUM TRUSSES AND TOWERS"
5. ALUMINUM DESIGN MANUAL, 2015 EDITION

DESIGN LOADS

1. DEAD LOAD: SELFWEIGHT OF STRUCTURE
2. RIGGING LOADS: SEE ALLOWABLE LOADING CRITERIA ON REFERENCE DRAWING
   A. THE TRUSS GRID SYSTEM HAS NOT BEEN APPROVED FOR PERFORMER FLYING LOADS. FURTHER ENGINEERING CONSULTATION IS REQUIRED IF PERFORMER FLYING LOADS ARE DESIRED.
3. WIND LOADS ARE NOT APPLICABLE FOR THE DESIGN OF THIS STRUCTURE (FOR INTERIOR USE ONLY).
4. SEISMIC LOADS DO NOT CONTROL THE DESIGN OF THIS STRUCTURE.

CONSTRUCTION AND SAFETY

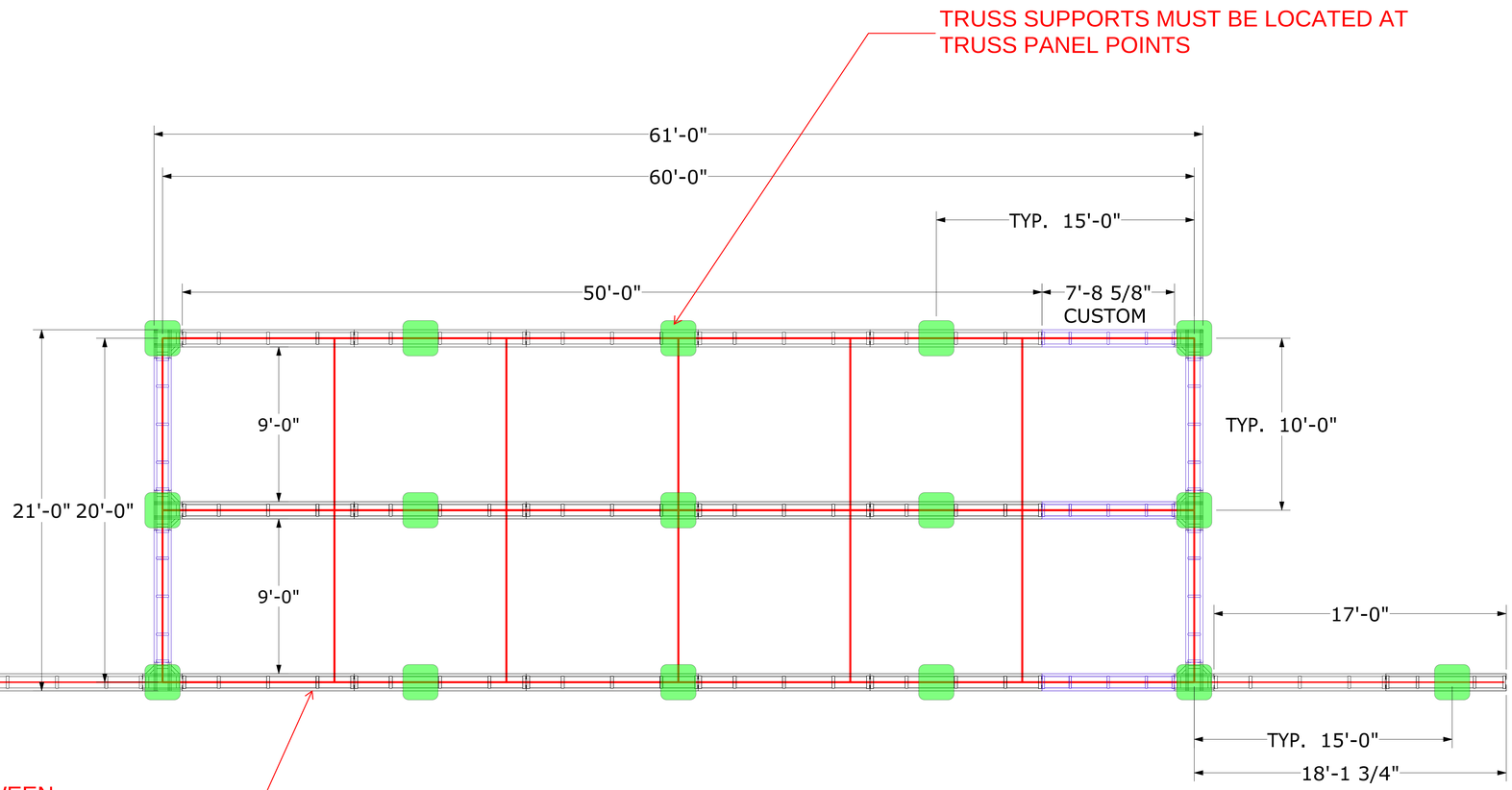
1. ENGINEER SHALL NOT BE RESPONSIBLE FOR MEANS, METHODS, OR SEQUENCE OF CONSTRUCTION UNLESS SPECIFICALLY STATED ON THE DRAWINGS.
2. ENGINEER HAS DESIGNED THE STRUCTURES FOR THEIR FINAL AS-BUILT CONDITION. ENGINEER IS NOT RESPONSIBLE FOR TEMPORARY STABILITY OF STRUCTURES DURING ERECTION UNLESS SPECIFICALLY STATED ON THE DRAWINGS.
3. BUILDING ENGINEER OF RECORD OR A HIRED ENGINEER SHALL REVIEW DESIRED LOADING CRITERIA AND APPROVE BUILDING'S SUPPORT FRAMING PRIOR TO INSTALLATION.

RIGGING

1. ALL POINTS SHALL BE DEAD HUNG POINTS. NO PERFORMER FLYING LOADS PERMITTED.
2. ALL RIGGING SHALL BE HUNG FROM PANEL POINTS (LOCATIONS ON THE TRUSS CHORDS BRACED BOTH VERTICALLY AND HORIZONTALLY) UNLESS SPECIFICALLY APPROVED BY THE ENGINEER OF RECORD.
3. BRIDLES SHALL NOT BE USED UNLESS SPECIFICALLY ALLOWED BY THE ENGINEER OF RECORD.

ALUMINUM

1. ALL DETAILING, FABRICATION AND ERECTION SHALL CONFORM TO THE ALUMINUM ASSOCIATION ALUMINUM DESIGN MANUAL, CURRENT EDITION.
2. WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY LATEST EDITION.
3. ALUMINUM TRUSS TO ALUMINUM TRUSS CONNECTION BOLTS: 5/8" DIAMETER GRADE 8 BOLTS; OR PER TRUSS MANUFACTURER SPECIFICATIONS.



MAXIMUM RIGGING LOAD BETWEEN MOTORS SHALL NOT EXCEED 250 POUNDS PER LINEAR FOOT, NOR A SINGLE POINT LOAD HUNG FROM THE TRUSS SHALL EXCEED 2,000 POUNDS. LOAD SUPPORTED BY TRUSS SHALL BE LOCATED AT TRUSS PANEL POINTS, AND TRUSSES INSTALLED PER MANUFACTURER SPECIFICATIONS.

THE CAPACITY OF ANY SUPPORT MOTOR SHALL NEVER BE EXCEEDED BY THE TOTAL LOAD OF THE GRID SELFWEIGHT PLUS IMPOSED RIGGING LOAD(S).

TOMCAT LIGHT DUTY TRUSS 12 X 12 SPIGOTED
- (17) @ 10'
- (2) @ 7'
- (7) @ CUSTOM LENGHT APPROX. 7'-8 5/8"
- (4) @ 2 WAY CORNER BLOCK
- (2) @ 3 WAY CORNER BLOCK

CM NEXT GEN LOADSTAR MODEL RRS, 2 TON
- (17)

SAPSIS RIGGING INC
3883 Ridge Avenue
Philadelphia, PA 19132
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215-228-1786 fax
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Client

SAPSIS RIGGING INC.

Project Manager

Michael J. Sapsis

Job #

Drawing Title

20' x 60' SPIGOTED GRID

Venue

Revision

#	Description	Date

Drawing #

S -100

Scale: 1/4" = 1'

Date 6/15/18

Drawn by GHS

Clark-Reder Engineering, Inc
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www.clarkreder.com

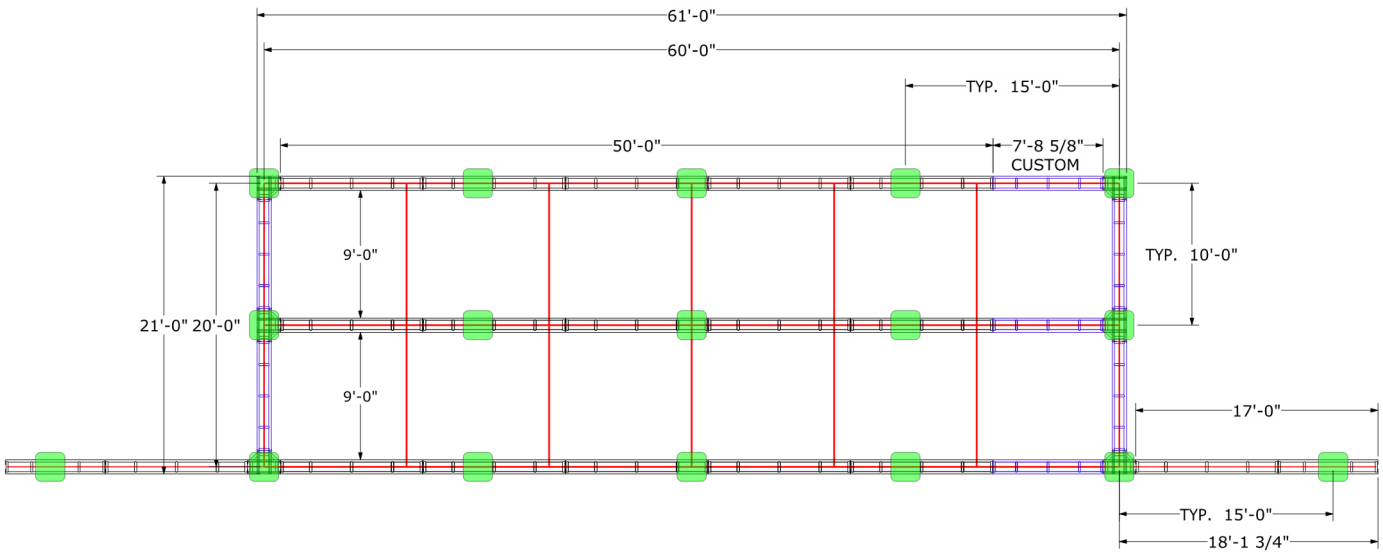
UMBC 20x60 Grid (Tomcat)

Event Date & Location: Maryland

Codes and Referenced Standards

- 2015 International Building Code
- Aluminum Design Manual, 2010 ed.
- American Institute of Steel Construction, Steel Construction Manual 14th Edition
- American Society of Civil Engineers 7-10 (ASCE 7-10) *"Minimum Design Loads for Buildings and Other Structures"*
- American Society of Civil Engineers 37-14 (ASCE 37-14) *"Design Loads on Structures During Construction"*
- ANSI E 1.21-2013 *"Temporary Structures Used for Technical Production of Outdoor Entertainment Events"*
- ANSI E 1.2-2012 *"Manufacture and Use of Aluminum Trusses and Towers"*

Project Description



TOMCAT LIGHT DUTY TRUSS 12 X 12 SPIGOTED
- (17) @ 10'
- (2) @ 7'
- (7) @ CUSTOM LENGHT APPROX. 7'-8 5/8"
- (4) @ 2 WAY CORNER BLOCK
- (2) @ 3 WAY CORNER BLOCK

CM NEXT GEN LOADSTAR MODEL RRS, 2 TON
- (17)

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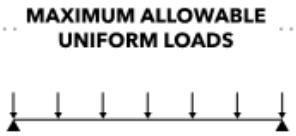
Tomcat 12"x12" Aluminum Light Duty Box Truss, Spigoted:

Note: Allowable strengths will be determined from load tables provided by client.



		MAXIMUM ALLOWABLE UNIFORM LOADS			MAXIMUM ALLOWABLE POINT LOADS					
NO. OF SECTS.	SPAN FT (MTRS)	LOAD LBS/FT	LOAD LBS (KGS)	MAX DEFL. IN.	LOAD LBS (KGS)	MAX DEFL. IN.	LOAD LBS (KGS)	MAX DEFL. IN.	LOAD LBS (KGS)	MAX DEFL. IN.
1	10 (3.05)	1148	11480 (5207)	0.24	7785 (3531)	0.26	5742 (2604)	0.32	3828 (1736)	0.30
2	20 (6.09)	309	6180 (2803)	1.04	3099 (1405)	0.84	2324 (1054)	1.07	1549 (702)	1.00
3	30 (9.14)	111	3330 (1510)	2.00	2089 (947)	2.00	1226 (556)	2.00	879 (398)	2.00
4	40 (12.21)	41	1640 (743)	2.62	824 (373)	2.20	614 (278)	2.67	412 (186)	2.52

Spigots Only

Tomcat Tables

Note: Maximum moment and shear on truss will be extracted from table.

Bending Moment Capacity:

Uniform Loads:

$$w_{uniform} := \begin{pmatrix} 1148 \\ 309 \\ 111 \\ 41 \end{pmatrix} plf$$

Point Loads:

$$P_{point\_load} := \begin{pmatrix} 7785 \\ 3099 \\ 2089 \\ 824 \end{pmatrix} \cdot lbf$$

$$l_{truss} := \begin{pmatrix} 10 \\ 20 \\ 30 \\ 40 \end{pmatrix} ft \qquad i := 1 .. 4$$

Maxmimum Allowable Moment:

$$M_{max\_uniform_i} := \frac{w_{uniform_i} \cdot \left(l_{truss_i}\right)^2}{8}$$

$$M_{max\_point\_load_i} := \frac{P_{point\_load_i} \cdot l_{truss_i}}{4}$$

$$M_{max\_uniform} = \begin{pmatrix} 14.35 \\ 15.45 \\ 12.49 \\ 8.20 \end{pmatrix} \cdot ft \cdot kip$$

$$M_{max\_point\_load} = \begin{pmatrix} 19.46 \\ 15.49 \\ 15.67 \\ 8.24 \end{pmatrix} \cdot ft \cdot kip$$

Allowable Maximum Moment (Design):

$$M_{max.design} := 15.49 kip \cdot ft$$

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Typical truss span,

$$L_{truss} := 15ft$$

Allowable uniform load on any truss span,

$$w_{a\_truss} := \min\left[\frac{M_{max.design}\cdot 8}{L_{truss}^{2}}, \frac{2\cdot(2000lbf)}{L_{truss}}\right]$$

$$w_{a\_truss} = 266.67\,plf$$

Allowable point load on truss,

$$P_{a\_truss} := \min\left[\frac{M_{max.design}\cdot 4}{L_{truss}}, 2\cdot(2000lbf)\right]$$

$$P_{a\_truss} = 4000.00\,lbf$$