ADDENDUM NO. I

DATE:	February 9, 2017
TO:	All Proposers
FROM:	Janice McClelland, Assistant Purchasing Agent
SUBJECT:	Addendum No. 1 – Fall Arrest System
PROPOSALS TO BE OPENED:	March 17, 2017, at 11:00:00 a.m.

This addendum becomes a part of the Contract Documents and modifies the original specifications as noted.

Missing Appendix

The Appendix was inadvertently omitted from the solicitation document. It immediately follows this Addendum.

END OF ADDENDUM NO. I

Carpenter Wright Engineers
Structural Consultants

November 30, 2011

Mr. Dale Dunn
City of Knoxville
Knoxville Auditorium-Coliseum
PO Box 2603
Knoxville, TN 37901

Re: Roof Framing Evaluation for Rigging Loads
Knoxville Coliseum Roof Framing Evaluation and Scoreboard Relocation
Knoxville, Tennessee
CWE Project No. 2009145.00

Dear Mr. Dunn,

The purpose of this letter is to convey and summarize the results of our structural evaluation of the roof framing over the coliseum area and to provide you with updated recommendations for the safe application of rigging loads for future events.

CWE conducted an initial walk-thru observation of the coliseum on Monday, June 6, 2011 with a follow-up framing observation on Friday, June 10, 2011 from the boom lift supplied and operated by Doug Simmons, Facility Operations Manager.

During our initial walk-thru, it was noted that the cantilever concrete frames which support the steel arch section of the roof had visible cracking as seen in photos 1 and 2. The exact extent of the cracking was partially masked by the painting conducted a few years ago. These cracks appear to have been present for a relatively long period of time. Coliseum personnel were not aware of their existence, and painting contractors had not brought it to their attention. These cracks appear to be fairly tight with no evidence of recent significant movement. However, given their critical location within primary framing members that possess no redundancy, we recommend that these cracks be closely monitored. We are available to assist in the development of a system and schedule for the monitoring and recording of any movements. We recommend cracks be monitored for a minimum period of a year. Readings should be recorded on a monthly cycle, after the application of rigging loads from each significant event/show, and during each significant snow occurrence. If significant movement occurs, these cracks should be further evaluated. Alternatively, CWE can provide the monitoring of cracks on an hourly rate or negotiated basis.

During our observation, we did not find any signs of steel corrosion or any permanent deformation/damage of individual structural steel framing members or connections. The recent "black-out" painting of the steel framed portion of the roof may have masked/covered-up any mild corrosion. The focus of our observation was on the primary W24x76 steel arches, the conventional steel trusses which span between the arches, and the underside of the bulb-tee purlins spanning between the trusses. During the observation, steel member sizes and orientations

were randomly verified with that shown on the original structural construction drawings. A significant deviation in the web member layout of the conventional steel trusses was observed and noted. Refer to the attached Intermediate Truss Profile sketch depicting the observed deviation. Our computer analysis model was adjusted accordingly, and based on our results, it is our opinion that the actual layout does not adversely affect the intended structural performance of these trusses.

As previously noted, a computer model of the steel framing system was generated to aid in the analysis of multiple scenarios for applied rigging loads and their effects on the structural system. A few screenshots of the analytical computer model have been included for your reference. During our review of the structural construction documents, we were unable to confirm the required material specification used for the design and construction of the steel portion of the roof framing system. Therefore, in our analysis model we have assumed the ultimate and yield strengths of the steel members to be 60,000 psi and 33,000 psi, respectively. This assumption was based on the wide use of material specification ASTM A7 for structural steel buildings from the late 1930's until the early 1960's. We also conducted a quick review of the critical section of the concrete frames, located in the cantilever roof beam at the face of the concrete column, supporting each side of the arches.

It is our opinion that the 4" diameter steel pin connections at each end of the steel arches are the limiting component for the entire system. Using the steel strength assumption, it appears these pins do not have significant reserve capacity beyond what is required to safely support the required load combinations of dead loads, roof live loads, wind loads, and snow loads. Therefore, we concur with the general rigging load restriction shown on the previous long used rigging guidelines (Refer to Attachment #1). This general restriction stated that suspended rigging loads from the roof structure shall not be concurrent with snow, heavy rain, or high wind events which may produce additional loads on the roof framing system.

As a starting point for our rigging load evaluation, we used information provided by a rigging contractor commonly used by the facility and Attachment #1. Based on multiple trial analyses using different rigging load configurations, we have provided updated guidelines for the safe application of rigging loads. Please refer to the Arch Loading Profiles noted for a depiction of these guidelines.

- A single suspended load of up to 2500lb applied directly to the arch at one small truss location.
    - "Arch Loading Profile – A".
- Four or five suspended loads of no more than 1500lb applied directly to the arch at every fourth small truss location.
    - "Arch Loading Profile – B" OR
    - "Arch Loading Profile – C".
- Multiple suspended loads of no more than 800lb applied directly to the arch at every other small truss location.
    - "Arch Loading Profile – D"

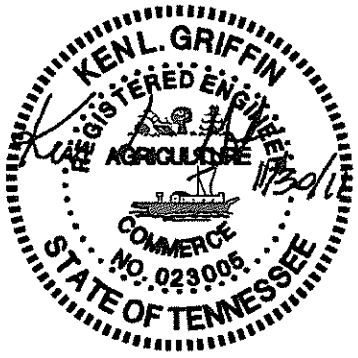
- Multiple suspended loads of no more than 400lb applied directly to the arch at every small truss location.
    - "Arch Loading Profile – E"

For the typical roof trusses, a maximum single load of 500 lb may be applied at any panel point. Do not hang loads greater than 6" away from panel points that would produce bending in the bottom chords. Refer to Roof Truss Loading Profile - F attached.

We are available for any discussion regarding these findings.

Sincerely,
CARPENTER WRIGHT ENGINEERS, P.L.L.C.

Michael R .Radcliffe, P.E.



Ken L. Griffin, P.E.
Principal

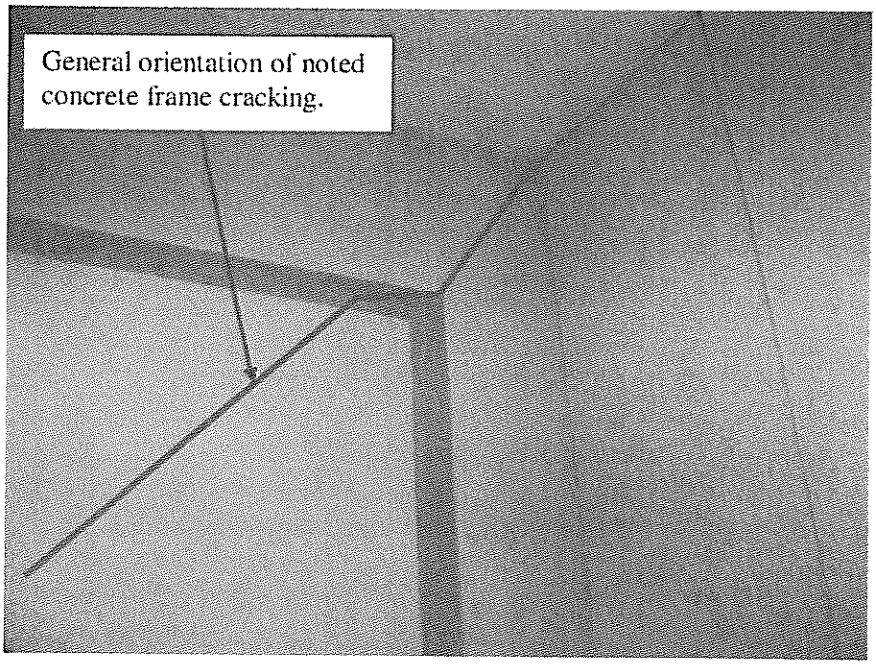


Photo 1 – Sample Sketch of Concrete Frame Cracking at Fixed end of Cantilever (actual cracks have been painted over and are not visible in this photo)

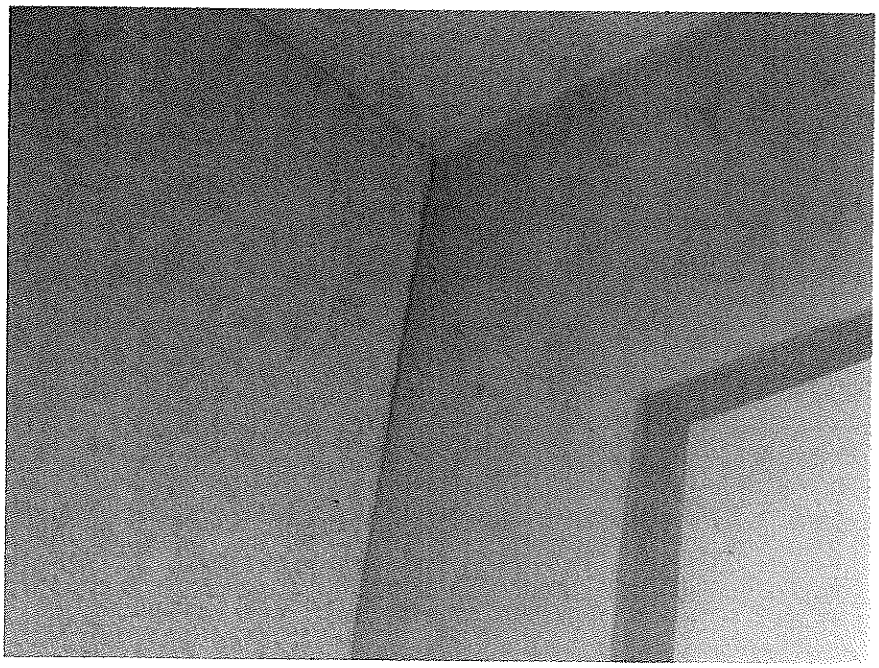
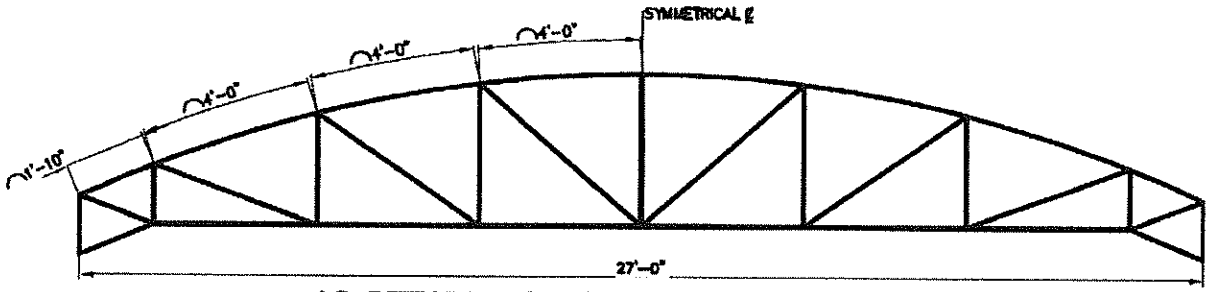
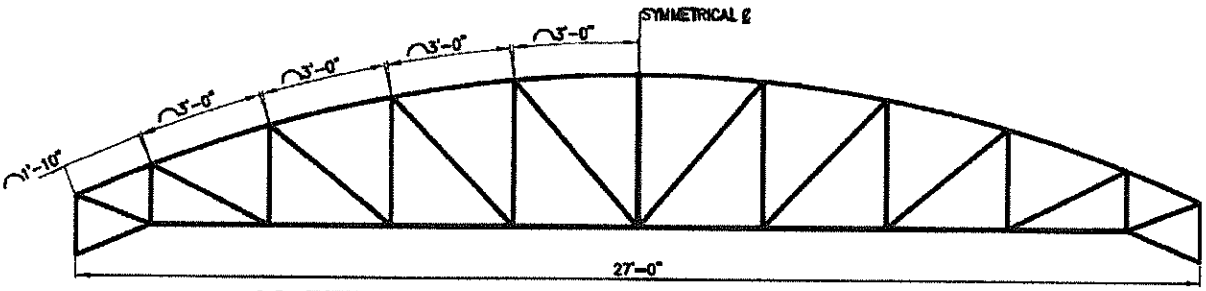


Photo 2 – Sample of Concrete Frame Cracking at Fixed end of Cantilever

INTERMEDIATE TRUSS PROFILE

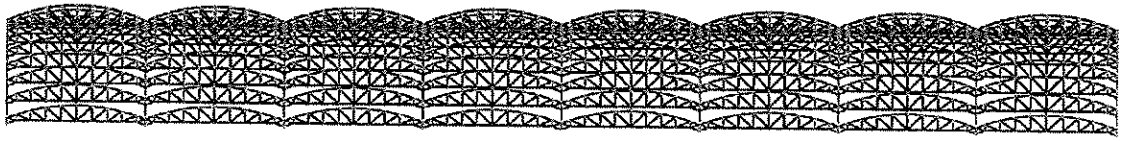


AS DETAILED ON CONSTRUCTION DRAWINGS



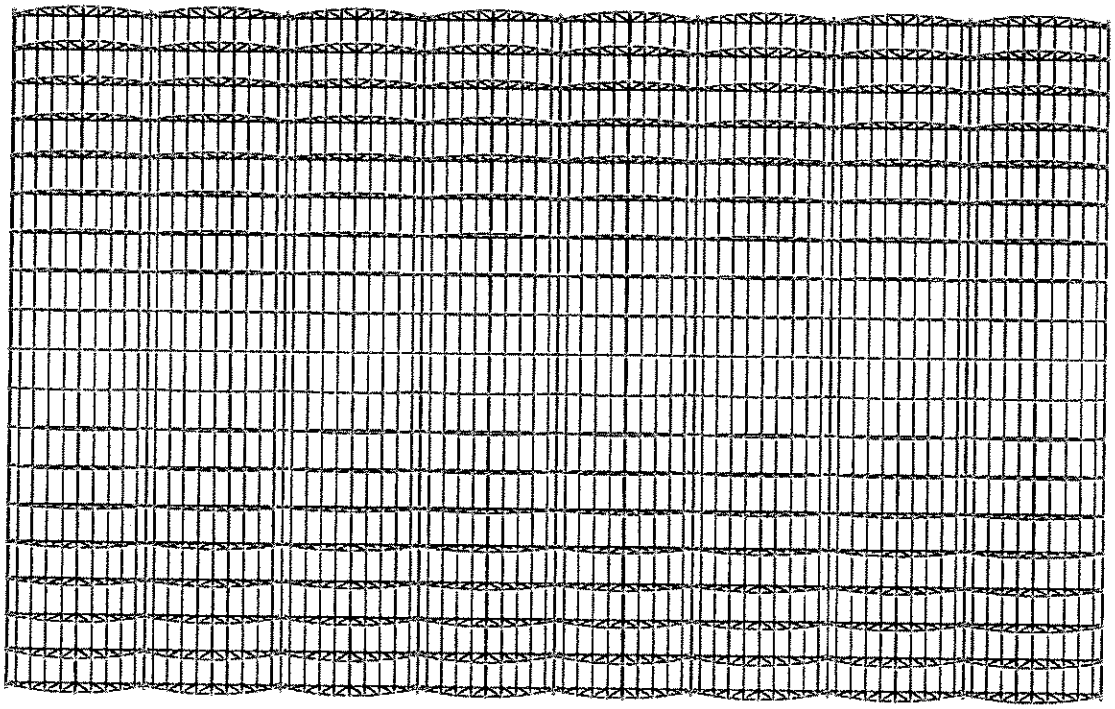
AS DETERMINED FROM ACTUAL FIELD OBSERVATION

SCREENSHOTS OF ANALYTICAL COMPUTER MODEL

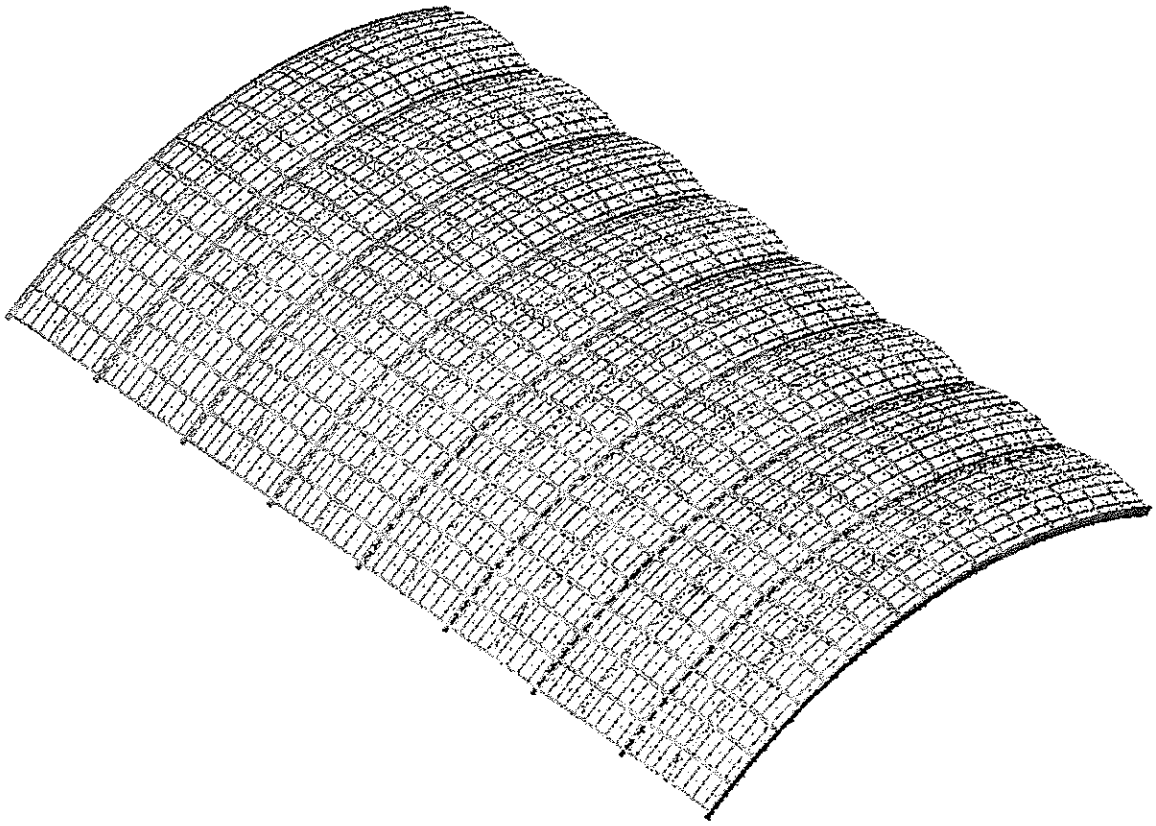


Side View of Computer Model

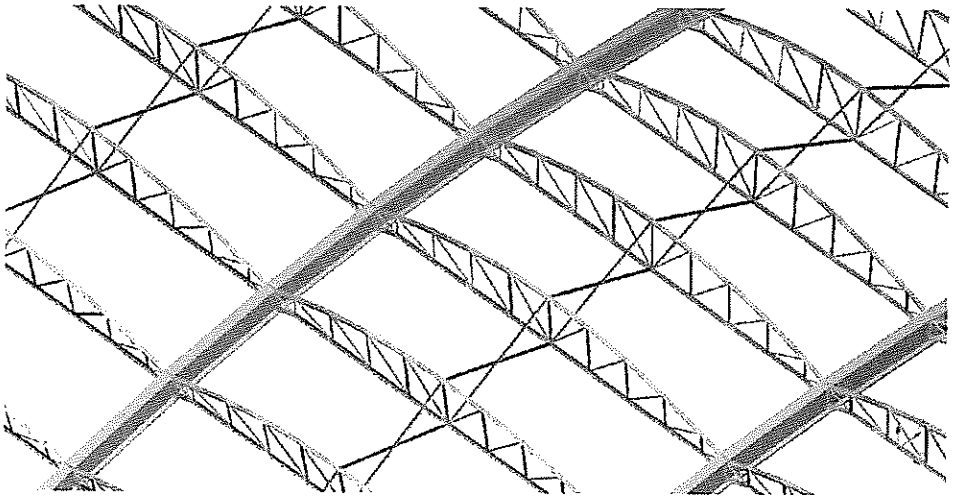
End View of Computer Model



Top View of Computer Model

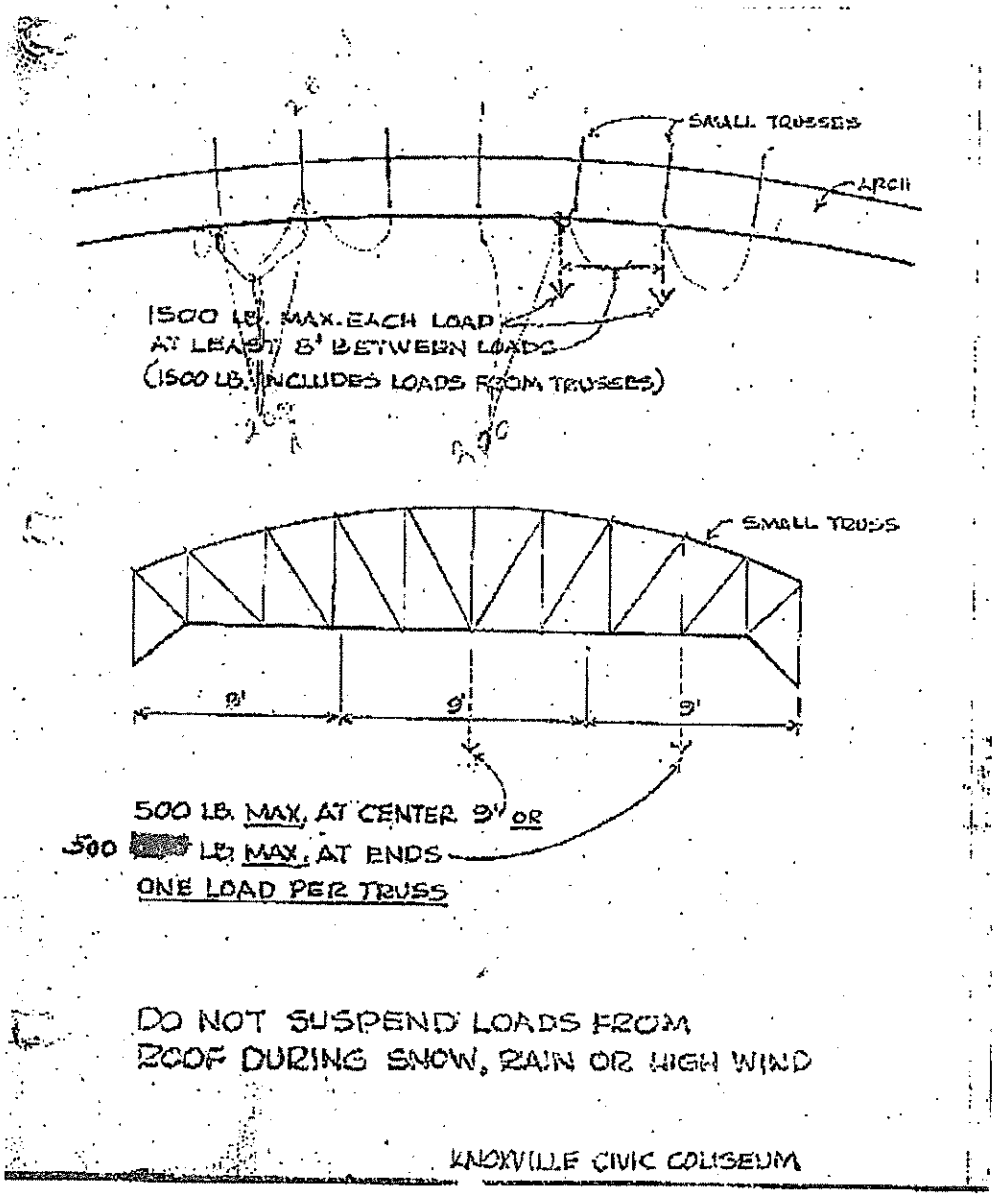


Rendered Isometric View of Eight Bay Model



Rendered Isometric View Close-Up of Eight Bay Model
(Roof Deck & 'Bulb-T Purlins Not Shown for Clarity)

ATTACHMENT #1
PREVIOUS RIGGING GUIDELINES



PROJECT Knoxville Civic Coliseum NO. 2009145.00

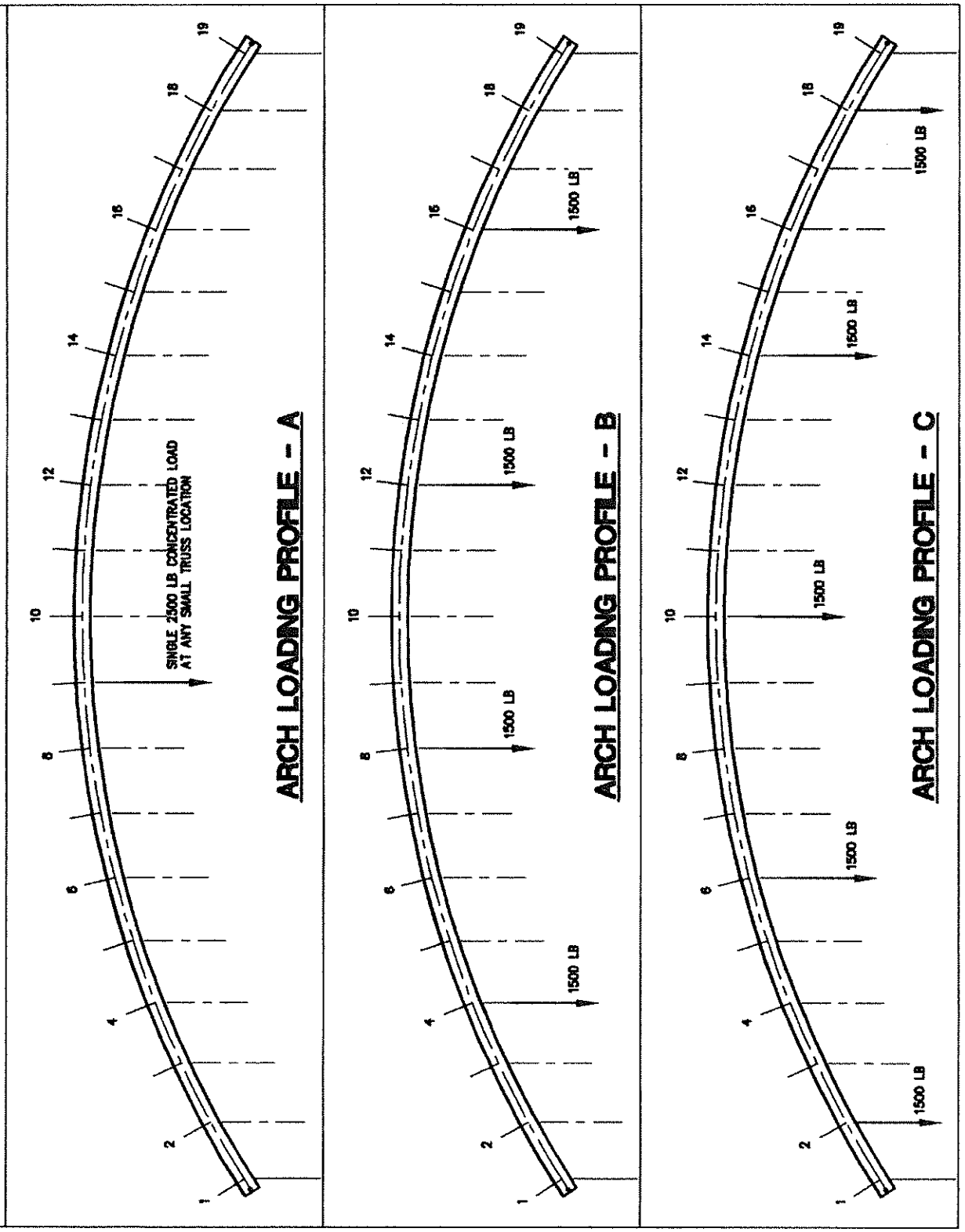
COMPUTED BY MRR DATE 11/30/11 CHECKED BY _____ DATE _____

SUBJECT Allowable Steel Arch Loading Profiles SHT 9 OF 11

Carpenter Wright Engineers

Structural Consultants

LOADS SHOWN TO INCLUDE ANY RIGGING LOADS IMPOSED ON TRUSSES.



PROJECT Knoxville Civic Coliseum NO. 2009145.00

COMPUTED BY MRR DATE 11/30/11 CHECKED BY _____ DATE _____

SUBJECT Allowable Steel Arch Loading Profiles SHT 10 OF 11

Carpenter Wright Engineers

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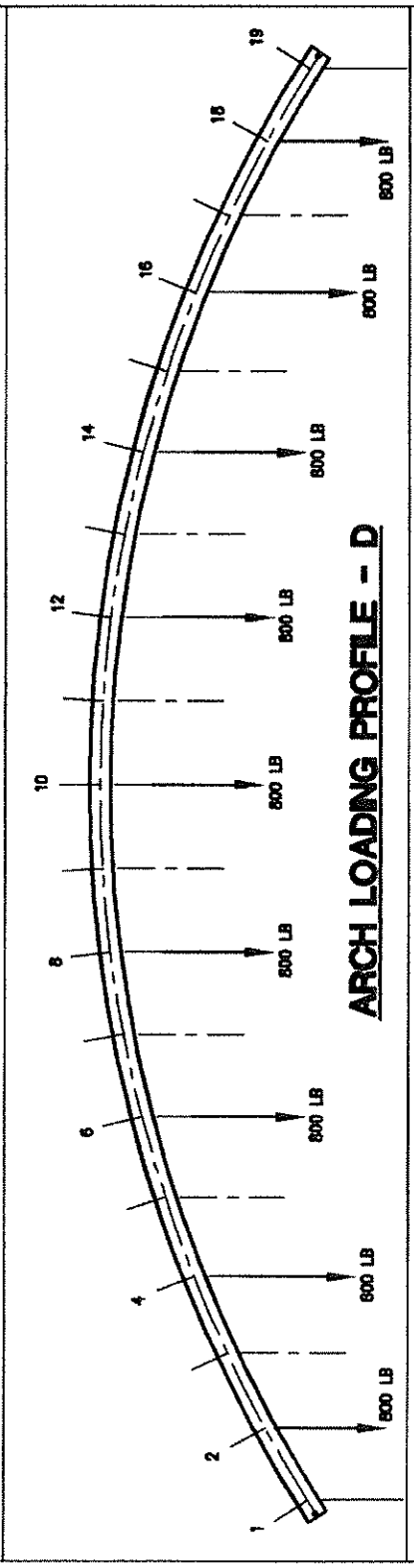
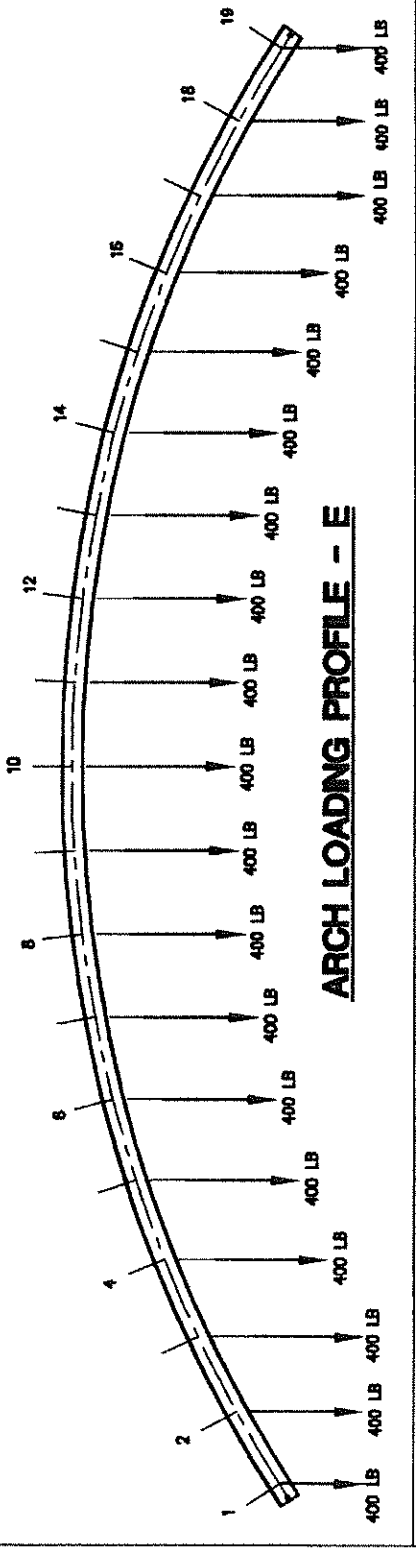
LOADS SHOWN TO INCLUDE ANY RIGGING LOADS IMPOSED ON TRUSSES.



ARCH LOADING PROFILE - D



ARCH LOADING PROFILE - E

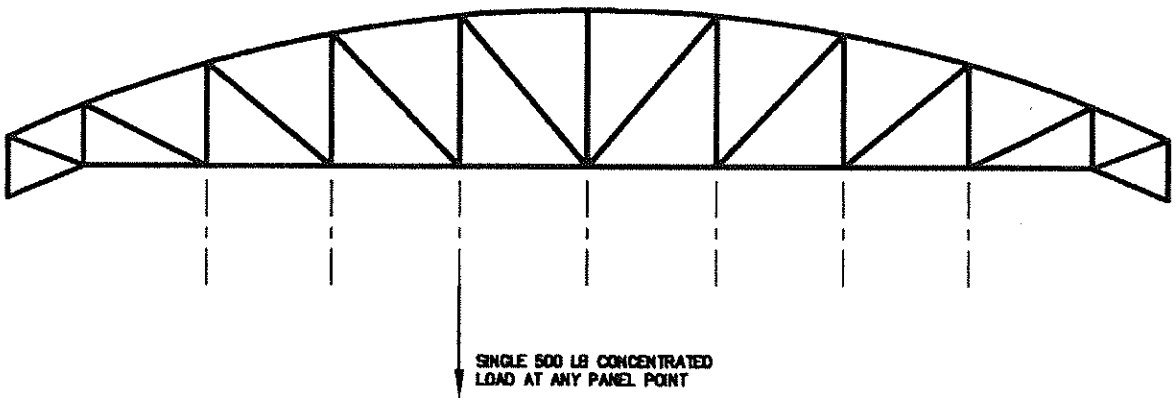
PROJECT Knoxville Civic Coliseum NO. 2009145.00

COMPUTED BY MRR DATE 11/30/11 CHECKED BY _____ DATE _____

SUBJECT Allowable Roof Truss Loading Profile SHT 11 OF 11

Carpenter Wright Engineers

Structural Consultants



ROOF TRUSS LOADING PROFILE - F

DO NOT APPLY CONCENTRATED LOADS BETWEEN PANEL POINTS THAT WILL PRODUCE BENDING OF TRUSS CHORDS.