



# STRUCTURAL SUBMITTAL PACKAGE

for

**Eurostage Mobile Stages**

**Model ES-3322**

Submittal Date: 3/21/2023

Clark Reder Project Number: 22.501.122

Reviewed by:



Jeffrey M. Reder, P.E.  
CA Registration #: C70581

Prepared by:



Tyler Fannin, P.E.



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## **Project Information**

### **Project Summary**

The project referenced by this submittal consists of a mobile stage (model ES-3322) constructed of aluminum and steel framing to create a mobile trailer with expandable wings and roof to create a temporary stage with a roof. All wings and expandable roofs are built of aluminum framing. The main chassis is constructed of steel framing.

### **Scope of Review**

Clark Reder Engineering reviewed the mobile stage for gravity and lateral loading. Gravity loading includes self-weight and rigging loads. Lateral loading includes wind loading in various scenario.

A high wind action plan must be strictly enforced. See the operation management plan for additional information.

### **Conclusions**

Our review has concluded that the mobile stage meets the structural requirements of the 2018 International Building Code, ASCE 7-16, and ASCE 37-14.

### **Limitations and Exceptions**

The scope of review for this submittal is limited to the items listed above. All other temporary or permanent structures on site not specifically referenced above under "Scope of Review" are the responsibility of others.

Where the items covered by this submittal are attached to existing structures, it is the responsibility of the engineer of record for those existing structures to review the impact of the elements referenced in this submittal.

Clark Reder Engineering has not reviewed the mechanical components for the trailer.

## GENERAL STRUCTURAL NOTES

### CODES

1. 2018 INTERNATIONAL BUILDING CODE
2. ASCE 7-16: MINIMUM DESIGN LOADS AND ASSOCIATED CRITERIA FOR BUILDINGS AND OTHER STRUCTURES
3. ASCE 37-14: DESIGN LOADS ON STRUCTURES DURING CONSTRUCTION
4. 2015 ALUMINUM DESIGN MANUAL
5. AISC 360-16: SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS

### REFERENCES

1. ANSI E1.21-2013 ENTERTAINMENT TECHNOLOGY, "TEMPORARY GROUND-SUPPORTED OVERHEAD STRUCTURES USED TO COVER THE STAGE AREAS AND SUPPORT EQUIPMENT IN THE PRODUCTION OF OUTDOOR ENTERTAINMENT EVENTS"
2. ANSI E1.2-2012 ENTERTAINMENT TECHNOLOGY, "DESIGN, MANUFACTURE AND USE OF ALUMINUM TRUSSES AND TOWERS"

### DESIGN LOADS

1. DEAD LOAD: SELF-WEIGHT OF STRUCTURE
2. LIVE LOADS:
  - A. PERFORMANCE STAGES: 75 PSF
3. RIGGING LOADS: SEE ALLOWABLE LOADING IN APPENDIX A
4. WIND LOADS:
  - A. WIND RISK CATEGORY: II
  - B. BEFORE HIGH WIND ACTION PLAN IS ACTIVATED:
    1. DESIGN SERVICE-LEVEL WIND SPEED: 40 MPH
    2. EXPOSURE: C
  - C. AFTER HIGH WIND ACTION PLAN IS ACTIVATED:
    1. DESIGN SERVICE-LEVEL WIND SPEED: 67 MPH
      - a. REQUIRED WIND SPEED HAS BEEN REDUCED IN ACCORDANCE WITH ASCE 37-14 DUE TO THE TEMPORARY NATURE OF STRUCTURE
    2. EXPOSURE: B
  - D. SITE ELEVATION: 0 FT
  - E. REFERENCE THE HIGH WIND ACTION PLAN FOR SPECIFIC ACTIONS THAT SHALL BE TAKEN TO ENSURE STABILITY OF THE TEMPORARY STRUCTURE IN HIGH WINDS.
5. 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. STRUCTURE HAS BEEN DESIGNED AS A TEMPORARY STRUCTURE THAT SHALL BE IN PLACE FOR LESS THAN SIX WEEKS.

### RIGGING

1. ALL POINTS SHALL BE DEAD HUNG POINTS.
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. ALUMINUM SHALL CONFORM TO THE FOLLOWING UNLESS NOTED OTHERWISE ON THE DRAWINGS:
  - A. MEMBER ALLOY: 6082
  - B. CHANNELS, PLATES AND SHEETS: 6082
  - C. WELD FILLER ALLOY: 4043 OR EQUIVALENT
2. ALL DETAILING, FABRICATION AND ERECTION SHALL CONFORM TO THE ALUMINUM ASSOCIATION ALUMINUM DESIGN MANUAL, CURRENT EDITION.
3. WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY LATEST EDITION.
4. FIELD CONNECTIONS SHALL BE BOLTED UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
5. WHERE THE CONTACT OF DISSIMILAR METALS MAY CAUSE ELECTROLYSIS, MEANS SHALL BE PROVIDED TO SEPARATE THE DISSIMILAR METALS WITH A NON-CONDUCTIVE MATERIAL.

**ALUMINUM TRUSS**

1. ALUMINUM TRUSS SHALL BE MANUFACTURED BY ONE OF THE FOLLOWING COMPANIES OR AN APPROVED EQUAL:
  - A. MILOS TRUSS
2. TRUSS TO TRUSS CONNECTION HARDWARE (UNLESS NOTED OTHERWISE):
  - A. SPIGOT ENDS
3. TRUSS END PLATE BOLTS SHALL BE TIGHTED TO THE SNUG TIGHT CONDITION. SNUG TIGHT CONDITION EXISTS WHEN ALL PLIES IN THE CONNECTION HAVE BEEN PULLED INTO FIRM CONTACT BY THE BOLTS AND ALL BOLTS HAVE BEEN TIGHTENED SUFFICIENTLY TO PREVENT REMOVAL OF THE NUTS WITHOUT THE USE OF WRENCH.
4. UNLESS NOTED OTHERWISE, ALL LOADS SHALL BE APPLIED TO TRUSSES AT PANEL POINTS.
5. RATED SPANS, CAPACITIES AND LOADING CONDITIONS PUBLISHED BY THE TRUSS MANUFACTURER SHALL NOT BE EXCEEDED UNLESS REVIEWED AND APPROVED BY A LICENSED ENGINEER FOR A SPECIFIC USE.
6. DO NOT PLACE LIGHTING CLAMPS OR WIRE ROPE IN DIRECT CONTACT WITH THE TRUSS UNLESS THE CHORD MATERIAL IS PROTECTED FROM DAMAGE DUE TO OVERTIGHTENING OR WIRE ROPE RUBBING.

**WIRE ROPE AND RIGGING ACCESSORIES**

1. WIRE ROPE 3/8" OR LESS IN DIAMETER: 7X19 GAC, MEETING FEDERAL SPEC. RR-W-410E
2. WIRE ROPE 7/16" OR GREATER IN DIAMETER: 6X19 IWRC, MEETING FEDERAL SPEC. RR-W-410D, TYPE 1 CLASS 2
3. SHACKLES: GALVANIZED, SCREW PIN ANCHOR TYPE, ASTM A153
4. TURNBUCKLES: GALVANIZED, ASTM F-1145
5. FORGED WIRE ROPE CLIPS: GALVANIZED, MEETING FEDERAL SPEC. FF-C-450 TYPE I CLASS I
6. WIRE ROPE THIMBLES: GALVANIZED, MEETING FEDERAL SPEC. FF-T-276B TYPE II
7. RATCHET STRAPS: MEETING ASME B30.9 - 2018
8. CHAIN PULLERS: MEETING ASME HST-2 - 2018
9. POLYESTER OR STEEL CORE ROUND SLING: MEETING ASME B30.9 - 2018

**INSPECTIONS**

1. ALL TRUSS UNITS, SCAFFOLD AND/OR OTHER RIGGING EQUIPMENT SHALL BE VISUALLY INSPECTED PRIOR TO ERECTION. DAMAGED OR CORRODED EQUIPMENT SHALL NOT BE USED. FIELD MODIFICATIONS SHALL BE APPROVED BY THE ENGINEER OF RECORD PRIOR TO INSTALLATION.

## OPERATIONS MANAGEMENT PLAN

### IMPLEMENTATION OF PLAN

1. PRIOR TO EACH INSTALLATION, THE STAGING COMPANY IN CONJUNCTION WITH THE VENUE/PROMOTER SHALL DESIGNATE A RESPONSIBLE PERSON IN CHARGE OF IMPLEMENTING ALL PHASES OF THE OPERATIONS MANAGEMENT PLAN.
2. A MEETING SHALL BE HELD AT THE VENUE WITH THE PROMOTER, OWNER OR STAGE MANAGER TO DISCUSS THE HIGH WIND ACTION PLAN AND OTHER OPERATIONAL ITEMS.
3. THE METHOD OF INITIATING EVENT CANCELLATION MUST BE OUTLINED EXPLICITLY PRIOR TO THE EVENT ALLOWING FOR IMMEDIATE ACTION IF NECESSARY.
4. A COPY OF THIS PLAN SHOULD BE PROVIDED TO LOCAL POLICE OR FIRE DEPARTMENTS IN ORDER TO HELP USHER PATRONS IN THE EVENT OF AN EVACUATION.

### DAILY OPERATIONS PLAN

1. CHECK WEATHER EACH MORNING AND PERIODICALLY THROUGHOUT THE DAY.
2. CHECK TOWER BASES DAILY TO ENSURE ALL REMAIN LEVEL AND PLUMB
3. CHECK GUY WIRES TO VERIFY LINES ARE TENSIONED.
4. PROVIDE A DAILY LOG OF THE ABOVE CHECKS FOR EACH INSTALLATION.

### HIGH WIND ACTION PLAN

1. THE HIGH WIND ACTION PLAN SHALL BE IN EFFECT FOR THE ENTIRETY OF THE EVENT. AN EVENT SHALL BE DEFINED AS STARTING AT THE INITIAL COMMENCEMENT OF THE STRUCTURE INSTALLATION AND ENDING ONCE THE STRUCTURE IS COMPLETELY DISMANTLED.
2. A COMPETENT RESPONSIBLE PERSON FROM THE STAGING COMPANY SHALL BE PRESENT FOR THE DURATION OF THE EVENT TO IMPLEMENT THE HIGH WIND ACTION PLAN (SEE ABOVE).
3. A REGULAR LIAISON WITH LOCAL AIRPORTS AND/OR WEATHER INFORMATION CENTERS SHALL BE MAINTAINED TO ASCERTAIN IF ANY SIGNIFICANT WEATHER EVENTS ARE EXPECTED IN THE IMMEDIATE VICINITY OF THE STRUCTURE
4. AN ANEMOMETER SHALL BE PLACED ON THE STRUCTURE TO MONITOR WIND SPEEDS. THE ANEMOMETER SHALL BE PLACED AT THE TOP OF A TOWER OR AN ADJACENT STRUCTURE AT A HEIGHT EQUIVALENT TO THE HEIGHT OF THE TOWER. THE ANEMOMETER SHALL BE LOCATED WITHIN 50 YARDS OF THE STRUCTURE.
5. NOTED WIND SPEEDS ARE 3-SECOND GUSTS IN ACCORDANCE WITH ASCE 7
6. **WHEN WIND SPEEDS ARE EXPECTED TO EXCEED 20 MPH:**
  - a. A TEAM OF QUALIFIED PERSONNEL SHALL BE PUT ON ALERT. ALL NECESSARY PERSONNEL SHALL BE IN PLACE AND PUT ON STANDBY.
7. **WHEN WIND SPEEDS ARE EXPECTED TO EXCEED 30 MPH:**
  - a. ALL PERSONNEL SHALL BE EVACUATED FROM THE ROOF GRID, SPOT TOWERS OR OTHER ELEVATED POSITIONS WITHIN THE ROOF STRUCTURE AND OTHER TEMPORARY STRUCTURES LOCATED ON SITE.
  - b. ALL SIDEWALL SCRIM AND BANNERS SHALL BE LOWERED AND/OR REMOVED FROM THE SYSTEM.
  - c. ALL VIDEO WALLS AND LARGE SPEAKER CLUSTERS SHALL BE LOWERED TO THE DECK AND/OR GROUND AND SECURED.
  - d. LOWERING OF SCRIM OR EQUIPMENT SHALL BE DONE FROM THE GROUND BY MEANS OF REMOTELY ACTIVATED EQUIPMENT SUCH AS MOTORS OR MECHANICAL RELEASES.
8. **WHEN WIND SPEEDS ARE EXPECTED TO EXCEED 40 MPH:**
  - a. ALL SHOW OPERATIONS SHALL BE SUSPENDED, AND THE IMMEDIATE AREA SHALL BE EVACUATED OF ALL PATRONS AND NON-ESSENTIAL PERSONNEL.
9. **AT WINDS SPEEDS IN EXCESS OF 50 MPH:**
  - a. ALL PERSONNEL SHOULD MAINTAIN SAFE DISTANCE FROM THE ROOF SYSTEM.
10. THE HIGH WIND ACTION PLAN SHALL BE POSTED AT A CONSPICUOUS AREA ON SITE. IT MUST BE AVAILABLE AT ALL TIMES TO VENUE OPERATORS AND CREW.
11. FAILURE TO FOLLOW THE HIGH WIND ACTION PLAN MAY RESULT IN COLLAPSE OF THE ROOF SYSTEM, DAMAGE TO EQUIPMENT AND INJURY TO PERSONS.
12. IN THE EVENT OF A HURRICANE OR TROPICAL STORM, THE STRUCTURE IS REQUIRED TO BE COMPLETELY DISMANTLED AND REMOVED FROM THE SITE IF TIME PERMITS. IF ADEQUATE TIME IS NOT AVAILABLE THEN ALL SKINS, INCLUDING ROOF SKIN SHALL BE REMOVED FROM THIS STRUCTURE AND THE GRID SHALL BE LOWERED TO THE DECK.

**WHEN THE SYSTEM IS NOT IN USE OR LEFT UNSUPERVISED**

1. ALL VIDEO WALLS ARE REQUIRED TO BE LOWERED TO THE GROUND AND SECURED WHERE POSSIBLE.
2. ALL LARGE SPEAKER CLUSTERS SHALL BE LOWERED TO THE GROUND AND SECURED ONLY WHEN INCLEMENT WEATHER IS ANTICIPATED.

**SNOW/RAIN REMOVAL**


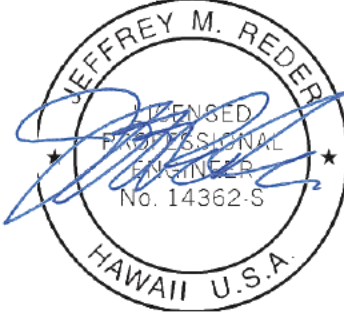
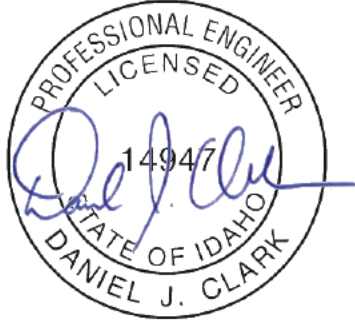
1. THE ROOF SKIN HAS NOT BEEN DESIGNED TO SUPPORT PONDED WATER OR SNOW. REMOVE ANY AND ALL SUCH ACCUMULATIONS.

**SEISMIC LOADS**


1. IN THE EVENT OF AN EARTHQUAKE, THE EVENT SHALL BE SUSPENDED UNTIL SUCH TIME THAT THE ROOF STRUCTURE HAS BEEN INSPECTED BY A COMPETENT PERSON ON SITE.

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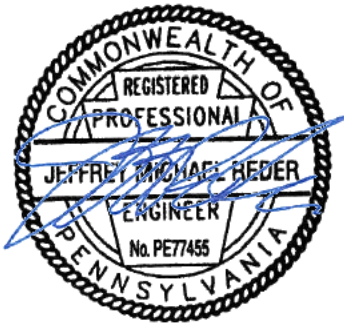
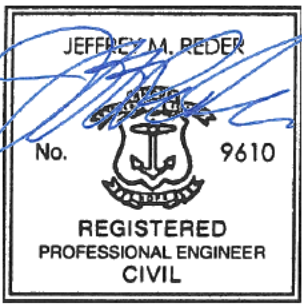







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**ES-3322**

**Codes and Referenced Standards**

- 2018 International Building Code
- Aluminum Design Manual, 2015 ed.
- American Institute of Steel Construction, Steel Construction Manual 15th Edition
- American Society of Civil Engineers 7-16 (ASCE 7-16) "*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*"

