Entertainment Structures Group
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This article is not intended to be a thorough treatment of the topic of structural evaluation. Local, state and national building codes should be consulted. The author cannot be responsible for any evaluation based solely upon this article.

Tech Brief: Operations Management Plan for Temporary Outdoor Roof Systems

Section 3.5.3 of *ANSI E1.21-2006, Temporary Ground-Supported Overhead Structures Used to Cover the Stage Areas and Support Equipment in the Production of Outdoor Entertainment Events* contains requirements for an Operations Management Plan ("OMP"). This overall plan includes detailed drawings, engineering documentation, and describes various allowable loading conditions, but it also focuses on contingencies for high wind conditions affecting the lateral stability of the roof structure.

A typical engineering analysis for any structure will include lateral loading considerations. However, the requirements for temporary structures are often different from those for permanent structures. In some cases, the requirements are less stringent because the structure is temporarily installed, but in many cases they are more stringent due to the types of commonly used lateral force resisting systems for temporary structures. The engineer is required by law to verify compliance with applicable building codes, but in some cases a more flexible interpretation of the lateral force resisting system for temporary structures permits the use of a lower design wind speed. In those cases, the engineer may find ANSI E1.21-2006 useful to help determine when lower wind load designs are justified.

Wind speed design load conditions differ based upon the total amount of surface area exposed to wind loads, which include not only the roof covering (the "skin"), but also any sidewall coverings; all exposed surfaces contribute to the effects of wind load, and the Operations Management Plan is intended to make the user think about – and plan for – these contingencies. However, other environmental factors, such as rain or snow loads, must also be considered. In order to successfully achieve this goal, a proper OMP will describe several installation and operational requirements: installation planning, user training, documentation, and on-site weather conditions monitoring are all covered in the OMP.

The basic criteria for an OMP should include the following:

1. Engineering documentation defining the maximum design wind load assumptions
2. Engineering documentation, including detailed drawings of the lateral force resisting system, and its maximum capacity
3. Definition of all possible operating conditions, including the worst-case wind load exposure area, and any alternative conditions that reduce the wind load exposure area – e.g., removal of sidewalls, if applicable.
4. Definition of how local weather conditions will be monitored, who will monitor, and who is responsible for issuing any alerts, if required. Essentially, this is the operations manager, also known as the competent person in charge.
5. Definition of wind speed limits at which progressive remedial action is required. This will include a minimum speed at which a high wind alert is issued, another higher wind set point where sidewalls are lowered (if applicable), perhaps another higher wind speed at which the roof is lowered – provided that lowering the roof does not decrease lateral stability - and yet another maximum speed beyond which the system is deemed unsafe, and may include evacuation of the area.
6. Definition of other possible environmental considerations, including when and how they will be mitigated during operation of the system.
7. Training of all on-site operating personnel, including the designation of a competent person in charge

Remember: Your OMP criteria is both system- and site-specific and, if necessary, should be reviewed and revised for each event.

Anyone who sells, uses, rents or installs a temporary roof system should be thoroughly familiar with not only the local codes governing the use of those systems, but also of *ANSI E1.21-2006, Temporary Ground-Supported Overhead Structures Used to Cover the Stage Areas and Support Equipment in the Production of Outdoor Entertainment Events.* Published the Entertainment Services & Technology Association (ESTA), copies of this standard are available through the ESTA Foundation, and can be found at www.estafoundation.org.