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Andrew Curran	HSL, Science and Resources Director
Paul Bridges	HSL, Unit Head – Engineering Safety Unit
Michael Stewart	HSL, Technical Lead – Engineering Safety Unit
Shuna Powell	HSL, Unit Head – Human Sciences Unit

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Report Authorised for Issue by: **Paul Bridges, Engineering Safety Unit, HSL**

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Contributing Authors:	Paul McCann
Project Manager:	Paul McCann
Technical Reviewer:	Dr Michael Stewart
	Julie Bell
Editorial Reviewer:	Dr Paul Bridges
HSL Project Number:	PH04152
HSE Upside Number:	OH2212

Harpur Hill, Buxton
Derbyshire, SK17 9JN
T: +44 (0)1298 218000
F: +44 (0)1298 218590
W: www.hsl.gov.uk



**Identification of safety good practice in the
construction and deconstruction of temporary
demountable structures**

**Annex A
Suggested model for the safe management of
temporary structures**

ES/FE/11/01/A

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FOREWORD

Each year, the UK holds a number of large ‘events’ including sports, musical and corporate events. These events require extensive provision of temporary demountable structures (TDS) such as staging, seating, temporary buildings, video screens, camera platforms, etc.

In 2012, London will host the Olympic and Paralympic Games. The requirement for temporary demountable structures will be beyond anything undertaken in the UK for previous events and is likely to extend beyond the venues to include cultural and other events. This will put pressure on the associated supply chain in terms of capacity and experience.

The provision of temporary demountable structures is influenced by factors that may have less significance in other industries such as speed of erection and deconstruction, limited use, adaptability of design, transportability and use by public. Management structures in the events industry are often less formalised than in other comparable industries.

There have been failures of these types of structures, in the UK and beyond, including a recent incident in France, in which two died when a temporary stage roof collapsed during erection.

HSL have undertaken a review of current management practices in the events industry, which is published in tandem with this work (HSL report ES/FE/11/01). This review identified potential weaknesses in some areas of the event management.

This suggested model seeks to clarify the good practice standards required for the safe design and construction management of temporary demountable structures. The model includes recommendations for designers, clients, event managers and those workers involved in erection/deconstruction.

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1 INTRODUCTION

Each year, the UK holds a number of large ‘events’ including sports, musical and corporate events. These can take place at a range of locations from city centres to remote green field sites. Sports stadia and arenas are commonly used as venues for events other than sports.

Event organisers are frequently required to provide infrastructure as well as extensive provision of temporary demountable structures (TDS) including staging, seating, temporary buildings, video screens and camera platforms.

The providers of temporary demountable structures are influenced by factors which may be far less significant to other industries, such as ease of erection and deconstruction, limited use, adaptability of design, transportability and use by public.

Speed of operation is critical to a company’s profitability and determines the number of events that a provider can service. Work patterns can be intensive, involving long hours and requiring additional casual staff, particularly during the summer events season.

The requirement to respond quickly and remain flexible has engendered the events industry with a ‘can do’ attitude, of which it is rightfully proud. However, working reactively may reduce the effectiveness of planning. The requirement to safely manage the workplace in a fast moving, ever changing environment can be challenging.

Much of the guidance and regulation, which may be relevant, has not been specifically phrased in terms of the events industry and this may hamper its acceptance and application.

This document seeks to provide a source of advice, which can contribute towards the drafting of industry specific advice on the good practice standards required for the safe management of temporary demountable structures.

The content of this document is derived from HSL report FE/ES/11/01 - “Identification of safety good practice in the construction and deconstruction of temporary demountable structures”. Details of the processes involved in formulating the recommendations for an advice document, included here, can be found in this report.

This work reviewed current practices within the events industry, visiting a number of sites and reviewing their management of safety, particularly with respect to temporary demountable structures. The work differentiated between good and bad practice and both provided information used in this Annex.

In support of this process, HSL reviewed the recommendations of relevant regulation and guidance and re-assessed a number of incidents occurring within the events industry using the HFACS (Human Factors Analysis and Classification System) tool to determine the underlying management cause.

2 DEFINITION OF ROLES

A range of job titles are in global usage within the events industry. These roles may differ from comparable positions in other parts of the construction industry.

Allocation and interpretation of the roles can vary between events and different requirements may be attached to the role at different events. In order to simplify the identification of where responsibility is held, this advice uses the following definition of roles throughout.

For smaller events with smaller management teams, roles may need to be combined.

Customer	Individual or organisation on whose behalf the event is organised (where that person or organisation is not also the event organiser).
Event Organiser	An event organiser, organises an event on behalf of themselves (i.e. they are also the customer) or a third party customer. Promoter - The promoter takes the financial risk on an event, organising it for recompense (and profit) through ticket sales. Promotions Company – Organises events (which are not normally reliant on ticket sales), usually on behalf of a third party customer.
Production Manager	A production manager plans and manages the event on behalf of the event organiser (or touring artist), within budgetary limits agreed with the event organiser (or touring artist). A production manager will normally be involved with the development of the event from the initial concept.
Site Manager	A site manager manages the site preparation (and subsequent removal) including the construction and deconstruction of any temporary demountable structures, on behalf of the event organiser.
Site Co-ordinator	Co-ordinates advance preparations of an event site between the event organiser and the touring artist, on behalf of the touring artist.
Health and Safety Manager	A health and safety manager co-ordinates health and safety on behalf of the event organiser. On site, the h & s manager will have a safety advisory role.
TDS (Temporary Demountable Structures) Contractor(s)	The temporary demountable structures (TDS) contractor is responsible for designing, supplying and building the temporary demountable structures in accordance with the requirements of the agreed concept.

TDS Designer	The person who designs the configuration of the TDS as proposed for use at the event, on behalf of the TDS contractor.
Rigging Contractor	The rigging contractor designs, supplies and installs any rigging required for suspended equipment such as sound / video and lighting.
In-House Crew	In-house crew are provided (although not necessarily directly employed) by the contractor. In-house crew have experience of a contractor's product and methods of construction.
Touring Crew	Touring crew accompany a touring artist. Touring crew will have experience of the tour set-up and methods of construction.
Local Crew	Local crew are supplied on a casual basis, by a crewing agency and will have limited (if any) experience of a contractor's product and methods of construction. Local crew may be supplied with specialist skills or may be supplied as basic labour.
Crew Chief	A crew chief accompanies a team of local crew, to act as a first point of contact (or supervisor).
Landowner	A landowner owns the site (generally undeveloped) where the event takes place.
Venue Owner	A venue landowner owns the venue where the event takes place.
End User	The person or organisation (other than public) that will use the completed structure (for example the performing artist).
Sponsor	Sponsors provide financial support to an event in return for an advertising opportunity.

3 MANAGING THE EVENT

The events industry mostly consists of small companies and individual freelancers. The team responsible for managing an event is generally assembled by the event organiser, specifically for the management of that event.

3.1 SELECTING THE TEAM

1. The event organiser should identify a 'lead person' to co-ordinate all aspects of the management of the event. This role will normally be defined as the 'production manager'. This production manager may be part of the event organiser's organisation, a specialist company or a suitably competent freelancer. The event organiser should ensure that the production manager is suitably competent for this role.
2. The lead person or production manager is deemed to hold 'ultimate control' over the design and construction process.
3. The event organiser (with advice from the production manager) should determine the degree of support the production manager will require to ensure that the event is managed in a safe manner. This assessment should be based on the requirements of the event (such as size, number of structures and complexity of technical requirements) and the skills and knowledge available. Based on this assessment, the production manager will assemble an event management team suitable for managing the event.
4. All members of the event management team should be competent to undertake the roles to which they are appointed. The event organiser should put in place systems for verifying that competence, prior to appointing the management team.
5. The event organiser should ensure that the event management team has a good (and up to date) understanding of all of the Health and Safety regulation and guidance relevant to the event (or can readily access this advice). This will generally be part of the health and safety manager role, but for smaller events it may be held elsewhere.
6. The implications of Health and Safety regulation should be considered when planning any work.
7. The event organiser should ensure that all personnel have suitable contractual arrangements and that these arrangements clearly identify the individual's role and duties.

3.2 MANAGEMENT HIERARCHY

8. The event management team should establish a clear management hierarchy, identifying the duties of individuals. Care should be taken to prevent overlap or gaps between roles.
9. The event organiser and / or production manager (where appropriate) should ensure that a suitable management system is put in place to safely manage the event from start to finish.
10. The production manager should ensure that the management hierarchy (including details of specific duties) is clearly communicated to all interested parties.

3.3 TIME AND RESOURCES

11. The event organiser should ensure that the available timescales and budgetary resources are realistic for the safe delivery of the event, as a whole.
12. The event organiser should ensure that there is a reasonable contingency in allowance for foreseeable delay (such as poor weather).
13. In determining the necessary timescale (and contingency), consideration should be given to likely work patterns and the additional risks that may be associated with managing:
 - High density workplaces.
 - High intensity shift patterns and long working hours.
 - Night working.
14. The production manager should ensure that the planned breakdown of resources is realistic and that suitable time and budgetary resource is allocated at each stage of the process.

3.4 THE EVENT SITE OR VENUE

15. Where the landowner has an ongoing role that extends beyond the provision of the site, then that role should be subject to clear contractual arrangements.
16. Where a venue owner has specific responsibility to discharge with respect to the safe management of the event, then they should appoint a representative to liaise with the event management team (such as ensuring safe audience accommodation) in discharging these responsibilities.

4 DEVELOPING THE CONCEPT OF THE STRUCTURE

The requirements of a structure (i.e. the objective(s) that it is expected to achieve) will initially be encapsulated in the 'design concept' or 'structure concept'. As well as technical requirements (such as loading or occupancy), the concept will include details of location, budget and available timescales.

The development of a fully realised design concept can help to reduce the requirement for subsequent change and ensure that all work undertaken is adequately planned, using safe methods of working.

The initial concept should be open for discussion and technical input, particularly in terms of practicality and achievability. The concept should be agreed by all parties, before being finalised.

4.1 DETERMINING THE DESIGN CONCEPT

17. The event organiser and production manager should identify the necessary and desirable requirements of the structure (i.e. what it is required to do and how it is required to do it) and encapsulate them in a design concept.
18. The event organiser should ensure that the requirements of the concept are readily achievable given applicable constraints (e.g. technical, timescale or budget).
19. In order to achieve this, the production manager should seek and accept comment from those with specific knowledge (technical or otherwise) in terms of the feasibility of the concept and develop the concept accordingly.
20. The TDS contractor should actively contribute to the development of the concept in areas where they hold specific knowledge.
21. The event organiser should ensure that the concept fully meets the requirements of the end user and that the end user has fully understood the limits of the concept.
22. Once the design concept has been agreed by all participants it can be finalised. The taking forward of provisional or incomplete design concepts should be avoided as this can result in built structures which fail to meet their requirements and will inevitably require modification.
23. For a touring event, the requirements of the relationship between the artist (or artist management) and production manager should mirror those between the event organiser and production manager.

4.2 TIME AND RESOURCES

24. The event organiser should ensure that the available timescales and budgetary resources are realistic for the safe realisation of the concept.

4.3 MANAGING THE LOCATION

25. The venue or landowner has a responsibility to ensure that the site is safe and without risk to those hiring it. To that end, the landowner should make all relevant information about the venue or event site available to the production manager, including any known hazards or restrictions. Relevant information may include:
- Ground type and loadings.
 - Presence of underlying (or overhead) services.
 - Presence of underlying structures or voids.
 - Proximity of other structures or buildings.
 - Slopes and gradients.
 - Drainage and flooding.
 - Potential conflict with other usage (or users).
 - Restrictions on access (and use) for plant and equipment.
 - Any other known hazards.
26. Where a site has any further limitations of use (such as conflict with other uses of the site) the venue or landowner should also make these known to the production manager.
27. All information provided should be clear, unambiguous and contain only confirmed information. Vague statements and general assertions of possibility should be avoided.
28. This information should be provided in a timely manner, to allow contractors to fully consider its implication in the design of any structure.
29. Accurate site information is critical to the integrity of the structure, the production manager should ensure that the TDS has access to full information about the site before the structure is designed and built.
30. Where reliable information on site conditions is unavailable, the venue or landowner should make arrangements to either obtain that information or to allow contractors access to undertake their own site assessment. Contractual arrangements should make it clear who will obtain this information.
31. The TDS contractor should consider all of the above in determining the suitability of the location (or the suitability of a structure for use at that location).

4.4 SPONSORS

32. The requirements of sponsorship should be considered at the earliest opportunity. Where a structure is likely to carry advertising then this requirement should be included in the design concept.
33. The production manager (or delegated member of the production team) should manage the production and placement of advertising, on behalf of the sponsor, to ensure that it is made of suitable material, dimensioned and placed appropriately. The sponsor should be prohibited from supplying additional or alternative advertising.
34. The TDS contractor should make it clear which structures are suitable for carrying advertising and what forms of advertising are permissible. Where a structure has not been approved for advertising, by the TDS contractor, then the production manager should ensure that no advertising is placed upon that structure.

5 DEVELOPING THE STRUCTURAL DESIGN

When a design concept has been agreed and finalised, a design will be developed to meet the requirements of that concept. Temporary demountable structures are predominantly constructed from modular systems. The design process will often consist of identifying and verifying the most appropriate configuration for the application.

The final design will be accompanied by an erection plan, which effectively forms a 'how to' guide for the structure, presenting information from the design in a format that can be followed by the construction team, enabling them to erect the structure in accordance with the design.

5.1 COMPETENCY

35. The TDS contractor should be competent to design and construct a temporary demountable structure that will safely meet the requirements of the final design concept. If that expertise is not available in-house it should be accessed externally.
36. The production manager should verify the TDS contractor's competence to undertake the work.
37. In support of this, the TDS contractor should:
 - Demonstrate knowledge and understanding of the work and the hazards involved.
 - Provide evidence on the competence of the key staff for this project (in-house and external).
 - Confirm that they have resource levels sufficient to undertake the work.
 - Provide details of previous experience of similar work...

Or

 - ... in the absence of experience of similar work, the TDS contractor should demonstrate that they have an appropriate level of technical ability to undertake the work.
38. The TDS designer should be competent to undertake the design of temporary demountable structures, with specific knowledge and understanding of:
 - The type of loads likely to be experienced by a temporary demountable structure.
 - The properties of materials used in their construction.
 - The properties of the proprietary systems (and their structural elements) used in their construction.
 - The work techniques necessary for construction and the risks involved with these techniques.

5.2 TIME AND RESOURCES

39. The TDS contractor should ensure that the available timescales and budgetary resources are realistic to allow for the design of the structure and the subsequent verification of that design.
40. The TDS contractor should ensure that any design is realistic in terms of the timescales and budgetary resources available for implementation.

5.3 IDENTIFICATION OF HAZARDS

41. The production manager should undertake a full assessment of the potential risks relating to the realisation of the final design concept and its relationship with the event as a whole.
42. The TDS contractor should undertake a full assessment of the potential risks arising from the use of the structure or system, particularly those hazards inherent in the techniques required for construction and deconstruction. This could be a generic assessment common to all uses of the structure or system.
43. The TDS contractor should undertake a full assessment of the potential risks arising from the realisation of the final design concept. This assessment should be specific to the requirements and location of this concept.
44. As well as intended use, the TDS contractor should also assess the potential of risks arising from foreseeable misuse of the structure.
45. The TDS contractor should ensure that this information is available to (and given adequate consideration by) those undertaking the design of the proposed configuration of the temporary demountable structure.

5.4 DESIGNING FOR CONSTRUCTION / DECONSTRUCTION

46. The TDS designer should ensure that any design follows the recommendations of the Institute of Structural Engineers “Temporary Demountable Structures” Guide and any other applicable regulation or guidance.
47. The TDS designer should design the proposed configuration of the temporary demountable structure with adequate consideration to its stability and structural integrity (including the likely effects of dynamic loading).
48. The TDS designer should design the proposed configuration of the temporary demountable structure with adequate consideration for safety of the workforce, during construction and deconstruction.
49. The TDS designer should consider the materials proposed for use in the structure and their performance during fire while developing the structure design.
50. The TDS designer should consider other factors, which although not directly related to safety, could affect audience behaviour and therefore potentially have safety implications (such as sight lines).
51. The TDS contractor should ensure that the design fully meets the requirements included in the design concept.
52. Where hazards relating to stability and structural integrity cannot be fully resolved, the TDS contractor should provide information on the limitations of the structure, the risks involved and any possible means of control. The TDS contractor should ensure that this information has been communicated to, and understood by, the production manager.
53. When sourcing new product (such as proprietary systems), the TDS contractor should ensure that sufficient consideration is given to resolving the above at the earliest opportunity.

5.5 VERIFICATION AND MODIFICATION

- 54. The TDS designer should ensure that the design process is traceable and that all designs, modifications and calculations are controlled by a suitable document management system. Documentation should be identifiable to the specific project.
- 55. The TDS contractor should ensure that the final design is subject to an independent verification and that those verifying the design and calculations are competent to do so. This competence may be sourced in-house or from a third party.
- 56. The TDS contractor should ensure that all subsequent modifications to the final design are documented and subject to the same independent verification process as above.
- 57. The TDS contractor should ensure that modifications undertaken on site (during or after construction) are documented and subject to independent verification. The TDS contractor should ensure that the structure is not used until all modifications have been verified and inspected.

5.6 DEVELOPMENT OF ERECTION PLAN

- 58. The TDS contractor should ensure that the information included in the design is translated into suitable plans and drawings to enable the safe construction and deconstruction of the structure on site.
- 59. These plans should be sufficiently detailed to identify individual components and how they are utilised in constructing (and deconstructing) the structure.
- 60. The erection plan should detail the methods of work (including any specialist techniques, tools or protective equipment) required to construct (and deconstruct) the structure in a safe manner.
- 61. The TDS contractor should ensure that these plans and drawings are available to those managing the construction of the structure on site and that those undertaking the construction of the structure on site have an adequate understanding of the erection plan and what is required.
- 62. Plans and drawings should also be available to those responsible for the management of health and safety on site.
- 63. Where hazards relating to safe construction and deconstruction cannot be fully resolved, the TDS contractor should provide training to all staff (including casual staff) on the nature of those risks and the most appropriate working techniques (including work equipment and PPE) in mitigation of those risks.

5.7 NOTE ON NOVEL STRUCTURES

While many demountable structures are based on modular systems, there are some structures (notably the stages used by high profile touring artists), which may be entirely or partially custom designed or incorporate significant elements of custom design.

- 64. A novel structure may require specific competencies beyond those required by other TDS. The production manager should ensure that any contractor designing, fabricating and erecting a novel structure is competent to do so.

65. For novel structures, the structure designer should undertake a full assessment of the potential risks specific to the construction and use of the structure.
66. Where novel structures incorporate elements or technology with which the structure designer may be unfamiliar, then the structure designer must ensure that they access the appropriate expertise to include these safely.
67. When designing novel structures particular attention should be given to the work techniques necessary to construct them. Every effort should be made to minimise risks to those undertaking the construction during the design phase.
68. The production manager should organise a 'structure rehearsal' to allow touring management and crew the opportunity to familiarise themselves with the structure and the techniques required to construct and deconstruct it in a safe manner.
69. Lessons learned during the rehearsal should be documented and used to develop a plan for future erection. The plan should identify individual components and their relationship within the structure and the marking of components is recommended. The plan should also include details of suitable safe working practice.

6 BUILDING THE STRUCTURE

The site and structure should be managed to provide a safe working environment for all personnel. While erection of the structure is managed by the TDS contractor, it is a single aspect of the site preparation and must also be managed in conjunction with other activities.

The TDS contractor's site team (management and crew) will implement the erection plan on site and erect the structure in accordance with the design. This team will generally consist of a mix of 'in-house' and local crew.

6.1 MANAGEMENT OF THE EVENT SITE

70. The event organiser is responsible for developing an event management plan for the event. Where an event organiser is organising multiple events, the policy may be generic, but should be fully reviewed before each event. This should include:
 - The approach to health and safety.
 - How that approach is to be implemented.
 - Health and safety roles and responsibilities.
71. Information on the construction and deconstruction phases of the event should be included in the event management plan. The production manager should ensure that adequate consideration is given to contractors input during the development of this plan.
72. The event management team (principally production, site and health and safety managers) should determine which global safety rules (such as driving on site, PPE, emergency procedures, drugs and alcohol policy, etc.) are required to support the safe implementation of the plan. These should be introduced and implemented as separate site safety rules.
73. The site manager should manage the implementation of the above plan and procedures.
74. The relevant requirements of regulations such as the Provision and Use of Work Equipment Regulations (PUWER), the Lifting Operations and Lifting Equipment Regulations (LOLER), the Work at Height Regulations (WAHR), the Personal Protective Equipment (PPE) Regulations and Manual Handling Regulations must be implemented on site.
75. The site manager should ensure that there is a suitable support structure for the workforce (including welfare).

6.2 MANAGEMENT OF INTERLOCKING ROLES

76. The event organiser should work to foster co-operation and co-ordination at all levels.
77. The production manager should ensure that the activities of all contractors are planned so as to minimise conflict, particularly those contractors carrying out concurrent or consecutive activities on the same structure.
78. The site manager should ensure that the activities of all contractors are managed so as to minimise conflict.

79. The site manager should ensure that the workplace is safe and that workers undertaking separate tasks do not increase the level of risk to each other (for example by physically separating activities or introducing exclusion zones).
80. The site manager and TDS contractor should ensure that when other contractors are accessing the structure (for example, during load-in), there is a clear handover. This should include details of:
- Any incomplete areas of the structure (such as voids or missing handrails).
 - Any ongoing work on the structure.
 - Structural limitations (such as load bearing capacities and locations, wind loading, etc) in its current state.
 - Any other risks associated with the structure.

6.3 COMPETENCY

81. All appointees should be competent to undertake the roles to which they are appointed. The production manager should put in place systems for verifying that competence.
82. All personnel working on the structure should be able to prove a basic level of event specific safety awareness (at least) equivalent to that embodied in the Safety Passport Association (SPA) or Made-up Textiles Association (MUTA) Structure Safe safety passport.
83. Crew undertaking specialist roles such as rigging or driving should be able to prove that they have the appropriate competence. Where possible competence should be supported by an appropriate accredited qualification.

6.4 TIME AND RESOURCES

84. The TDS contractor should ensure that the structure, as designed, can be safely constructed given the available timescales and budgetary resources.
85. Where timescales necessitate working patterns involving high staffing levels, long working hours or night working. The site manager and TDS contractor should take appropriate action to minimise the associated risk.
86. The erection plan should have the flexibility to deal with temporary delays resulting from unfavourable weather (such as high winds or rainfall), material defect or other disruption without adversely affecting safety.

6.5 MONITORING AND REVIEW

87. The site manager should ensure that there are systems in place to monitor the implementation of the event plan and intervene in case of deviation from that plan.
88. The site manager should ensure that there are systems in place to monitor the implementation of the site safety rules and intervene if they are not being obeyed.

6.6 MANAGEMENT OF THE STRUCTURE BUILD

89. The TDS contractor should ensure that the work of all personnel under their control (including casual staff) is planned, managed and supervised.

90. When planning work, the TDS contractor should give consideration to the behaviour of the structure while incomplete, where that differs from its behaviour in its complete form.
91. The TDS contractor should ensure that there are systems in place to monitor the implementation of the erection plan and intervene in the event of deviation from the plan.
92. The TDS contractor should ensure that there are systems on site for recording and reporting any problems encountered during construction of the structure.
93. The site manager and TDS contractor should ensure that when the structure is complete, that there is a clear signing-off procedure. This should include details of the permitted use and limitations of the structure. The TDS contractor should ensure that the structure is not signed off until it is complete.
94. The completed structure should be subject to an erection check undertaken by a suitably competent structural engineer prior to use. It is preferable that the check be carried out by an independent source but it is recognised that this requirement may become overly limiting.
95. The TDS contractor should ensure that if other contractors (and their staff) are required to access the structure, before it is completed, then there is a system in place to ensure a suitable and sufficient handover of the structure including details of all associated risks.
96. In this instance, the TDS contractor should make it clear which activities may be safely undertaken on the incomplete structure.

6.7 SUPERVISION

97. The site manager should ensure an adequate level of supervision for all personnel (either directly or indirectly) employed on the site. The site manager should ensure that all those required to provide supervision are competent to do so.
98. The TDS contractor should ensure an adequate level of supervision for all personnel employed (either directly or indirectly) on their structure(s).
99. The health and safety manager should provide an additional level of supervision, checking that systems are being implemented, verifying compliance with health and safety regulation and facilitating good health and safety behaviour.
100. The TDS contractor should ensure that they evaluate the competence and abilities of the casual workers available to them and that they are assigned roles appropriately.
101. The crew chief should act as a point of contact for the TDS contractor (and / or site manager).
102. The crew chief should ensure that all staff under their control are aware of, and understand, the risks associated with the site, the site safety rules and the requirements of the role assigned to them.

6.8 CHANGE CONTROL

103. The TDS contractor should ensure that there is a procedure for change control and that any modification (regardless of reason) is considered by the structure designer and leads to a revision of the original structure design and calculations.
104. The TDS contractor should ensure that those undertaking construction on site are aware of this procedure.
105. All revisions to the structure design should be subject to the same design verification process as the original design.
106. The TDS contractor should ensure that any damaged or faulty component is not included within the structure. Damaged or faulty components should be identified and quarantined for subsequent repair or disposal. Where there is no direct replacement for a faulty component and this necessitates a design change, then this design change should be subject to verification.
107. The production manager should ensure that there is no unauthorised modification of the structure after sign off.

7 USE

Management of the use of temporary demountable structures is essential to ensure the safety of users. Access by the public will inevitably give rise to an enhanced potential for variations in use or misuse. This should be considered in the event plan and design concept.

The possibility of serious unplanned or emergency occurrences will be considered in the emergency plan, which will include details of the likely behaviour of temporary demountable structures.

7.1 OPERATING CONDITIONS

108. The production manager should ensure that there are systems in place to monitor local environmental conditions throughout the event (including construction and deconstruction).
109. The TDS contractor should ensure that the limitations of use, defining performance limits under various environmental conditions, are clearly understood by the production manager.
110. The production manager should ensure that structures are only used within their specified limitations of use and that there are systems in place to monitor and control the use of the structure in accordance with the specified limitations of use.
111. The TDS contractor will provide advice on a suitable response to emergencies involving the structure. Using this information the production manager will develop an emergency plan for the structure (which may be incorporated into the emergency plan for the site).

7.2 DAMAGE AND MISUSE

112. The TDS contractor should ensure that the limitations of use, defining loading (and / or occupancy) are clearly understood by the production manager.
113. The production manager should ensure that structures are only used within their specified limitations of use and that there are systems in place to monitor and control the use of the structure in accordance with the specified limitations of use.
114. The production manager should ensure that there are systems in place to prevent unauthorised modification of (or tampering with) the structure, during use.
115. The production manager and TDS contractor should ensure that there is suitable access to the structure and that access to unauthorised positions of the structure (such as underneath) is restricted.
116. The production manager should ensure that there is sufficient stewarding to control the use of the structure in accordance with the above.

7.3 TDS SUPPORT

117. The production manager should ensure that expert advice on the structure can be accessed in instances of damage or other unforeseen event.

118. The practice of a representative of the TDS contractor (often referred to as a ‘babysitter’) remaining on site throughout the event is recommended where practicable.
119. The babysitter should monitor the structure (especially during critical times such as load in) and provide support as required.
120. Where a structure is in service for an extended period, the TDS contractor should ensure that there is provision for periodic inspection by a competent person. Additional inspection may also be required after unusual events (such as extreme weather).
121. Where minor damage occurs to the structure, the TDS contractor should provide an assessment of the risk to public safety. If there is a significant risk, the structure should be temporarily taken out of use, until a suitable repair can be affected. Where there is no significant risk, the structure can remain in service but damaged components should be identified for subsequent repair or disposal.

8 DECONSTRUCTION

After use the structure will be taken down and removed from the site. Deconstruction takes place in accordance with the erection plan (See Section 5.6). Timescales for deconstruction will often be shorter than for construction.

The process of deconstruction is not necessarily a simple reversal of construction, however there are common requirements. The recommendations included in Section 6 apply to both construction and deconstruction, this section does not seek to repeat the recommendations included in Section 6. Recommendations are only included if they differ, in some aspect, from the recommendations for construction.

8.1 MANAGEMENT OF SITE

- 122. The production manager should ensure that the event plan covers deconstruction and site clearance. The site manager should ensure that site safety rules are implemented and supervised throughout the event.
- 123. The site manager should ensure that sufficient support arrangements (such as welfare) remain in place until the work is complete.

8.2 MANAGEMENT OF INTERLOCKING ROLES

- 124. The priorities in terms of deconstruction should be clearly identified in the event plan. There should be an awareness that priorities during deconstruction may differ significantly from priorities during construction.
- 125. The production manager should ensure that all contractors have a clear understanding of the deconstruction process and what is expected from them.

8.3 MANAGEMENT OF THE STRUCTURE DECONSTRUCTION

- 126. The production manager should ensure that the available timescales and budgetary resources are suitable for the safe deconstruction and removal of the structure.
- 127. The TDS contractor should ensure that the erection plan also contains detailed instructions on the deconstruction of the structure. Emphasis should be placed on areas where the deconstruction process differs significantly from the erection process.
- 128. The TDS contractor should ensure that the deconstruction process takes place in a controlled and coherent manner and that there are systems in place for assessing components as they are removed and ensuring that damaged components are quarantined for subsequent repair or disposal.
- 129. The TDS contractor should ensure that adequate supervision is maintained throughout the work.

9 COMMUNICATIONS

Effective communication is critical at every stage of the specification, design and construction process. Poor communications are a significant source of risk and can lead to gaps and misunderstanding in the event plan, design concept and erection plan. The fragmented nature of the events industry increases the importance of maintaining reliable communications.

9.1 AGREED LINES OF COMMUNICATION

- 130. Contracts between customer and contractor should include details of the requirements for information flow. Lines of communication should be established and points of contact identified.
- 131. Contracts should provide details of the interaction and communication between different groups of contractors (and crew) during the build.

9.2 INPUT TO AND AGREEMENT OF THE DESIGN CONCEPT

- 132. The production manager should ensure that all information critical to the development of the design concept is supplied in a timely manner.
- 133. The production manager should ensure that all participants (including TDS contractors, end users and sponsors) are active in contributing to the agreement of the requirements for the structure.
- 134. The production manager should ensure that the final concept is clearly identified as such and communicated to all participants. All participants must understand and accept the final concept, including its explicit (and implicit) characteristics. When planning work, consideration should be given to the behaviour capabilities and restrictions.

9.3 INPUT TO AND COMMUNICATION OF THE DESIGN

- 135. The production manager should ensure that all information pertaining to design and construction of the structure (such as that supplied by landowners and end users) is communicated to the TDS contractor (and the structure designer).
- 136. The TDS contractor must ensure that the production manager understands the limitations of use for the structure. The production manager must ensure that all users also understand these limitations.

9.4 COMMUNICATION OF PLANS

- 137. The production manager should ensure that all participants are made aware of those sections of the event plan (and those site rules) that are relevant to their activities.
- 138. The TDS contractor should ensure that the event management team (principally production, site and health and safety managers) are informed of the contents and requirements of the erection plan.

139. The production manager should implement some mechanism to facilitate the free exchange of information and update participants on any changes to the event plan, during the event and preparation. Regular meetings between the management team and contractors may be suitable for this exchange.

9.5 SITE BRIEFINGS

140. The site manager should ensure that all workers (including casual personnel) are given an adequate safety induction, prior to commencing work. This should focus on site specific risks and the site safety rules being implemented in mitigation of these risks.
141. The safety induction may be undertaken by the responsible contractor (or crew chief), however it is the site manager's responsibility to ensure it has both taken place and that its content was appropriate and understood.
142. In addition to the site briefing, there should be other means of communicating site safety rules (such as notice boards or warning signs).
143. Where local crew are undertaking a range of activities across the event, the site manager should ensure that there is a system for providing toolbox talks, giving details of the activity and associated risk, prior to commencing that activity.
144. The TDS contractor should ensure that all workers (including casual personnel) working on their behalf are given an adequate induction, covering their intended role, prior to commencing work.
145. The TDS contractor should ensure that all staff understand the details included in the erection plan, in terms of what is required and the appropriate working techniques to achieve it.

9.6 FEEDING BACK

146. The TDS contractor should ensure that there is a system of change control on site, with provision for reporting faults and defects, and that the crew working on site are aware of this system.
147. The TDS contractor should ensure that any problem, which may require modification, is communicated to the designer for verification prior to implementation.
148. The TDS contractor should ensure that all reportable accidents, diseases and dangerous occurrences on site are reported to the production manager. The production manager and TDS contractor should ensure that these incidents are recorded and reported, under RIDDOR, as appropriate.
149. The Health and Safety manager should provide a point of contact for workers to report safety issues and concerns.
150. After the event, the event organiser should conduct a review of the event management (with particular attention to health and safety) and identify any weaknesses and lessons learned for future events. Information gathered should feed into subsequent event plans and risk assessments.

9.7 DOCUMENTATION

151. The health and safety manager (or those undertaking the activities of this role) should collate and hold all safety related documentation. Documentation relating to specification of structures and competence of contractors may be held by the production manager (or event organiser).
152. Documentation should be held in a format that can be easily accessed by participants from different organisations and should also be available to enforcement agencies (for example secure internet access).
153. Suggestions, for the required documentation relating to temporary demountable structures that should be held, are detailed in Table 1 below.

Table 1 Documentation			
Document	Critical Content	Primary Source	Primary User(s)
H&S Policy		Event Organiser	Production Manager H+S Manager
Design Concept	Objectives	Event Organiser	TDS Contractor
	Technical Requirements	Production Manager	TDS Contractor
	Relevant Site Limitations	Landowner	TDS Contractor
Permissions and Licenses		Event Organiser	Event Organiser
Risk assessments	Event	Event Organiser	Production Manager
	Fire (and certificates)	TDS Contractor	Production Manager
	Design	TDS Contractor	Production Manager
	Erection and dismantling	TDS Contractor	TDS Contractor
Evidence of Competence	Designer	Designer	Production Manager
	TDS Contractor	TDS Contractor	Production Manager
	Crew	Crew Agency	TDS Contractor
Event plan	Site plans and layout	Production Manager	Site Manager
	TDS plans	Production Manager	Site Manager
	Site safety rules	Production Manager	Site Manager
Emergency plan		Production Manager	Production Manager
Designs and Calculations	Detailed drawings and calculations	Designer	TDS Contractor
	Method of design (software).	Designer	TDS Contractor
	Information on standards and codes.	Designer	TDS Contractor
	Load bearing type and capacity	Designer	Production Manager
	Ground loading	Designer	TDS Contractor
	Wind loading	Designer	Production Manager
	Independent design check	TDS Contractor	Production Manager
Erection plan	Method statement for erection	TDS Contractor	TDS Contractor
	Method statement for disassembly	TDS Contractor	TDS Contractor
	Risks during construction	TDS Contractor	TDS Contractor
	Component inspection records	TDS Contractor	TDS Contractor
Other documentation under LOLER etc		TDS Contractor	Site Manager
Sign off	Limitations of use	TDS Contractor	Production Manager

10 SUMMARY OF ROLES

Table 2 provides a summary of the requirements attached to each role and is included as a quick reference. This information is based on information gathered during the HSL site visits and the content of relevant guidance sources. It is acknowledged that this is not a definitive list and its principal value may lie in informing future discussion.

Table 2 Summary of the requirements attached to defined roles

Holder	Requirements
Landowner	To make available all relevant information about the event site (or venue) including any known hazards or restrictions in a timely, clear and understandable manner... Or ... Where reliable information on site conditions is unavailable, to allow contractors access to undertake their own site assessment.
Venue Owner	To liaise with the event management team in ensuring that the event is managed safely. To discharge their responsibilities in terms of safe audience accommodation.
Event Organiser	To create a health and safety policy for the event. To ensure that a suitable management team is put in place to safely manage the event from start to finish and to ensure that this team has the relevant competence and knowledge to achieve this. To ensure that timescales and budgetary resources are realistic for the safe delivery of the event and there is a reasonable contingency for foreseeable delay. To ensure that all individuals have suitable contractual arrangements clearly identifying their roles and responsibilities. To ensure that the requirements of the concept are readily achievable given constraints (such as timescale or budget). To ensure that all relevant additional information has been obtained, considered and where appropriate included. To disseminate the final agreed concept, to support its content and to ensure its importance is fully understood. To identify the necessary and desirable requirements for the structure (initial concept). To foster co-operation and co-ordination at all levels. To undertake a post-event review.

Table 2 Summary of the requirements attached to defined roles

<i>Holder</i>	<i>Requirements</i>
Production Manager	To ensure that the activities of all contractors are planned so as to avoid conflict.
	To ensure that all appointees are suitably competent for their roles.
	To seek and accept contribution to the design concept from those with specific knowledge in terms of the feasibility of the concept and develop the concept accordingly.
	To ensure that all contractors are allocated with sufficient timescales and budgetary resources, to enable them to safely complete their activities.
	To develop and implement a written plan for the event including detail of the construction and deconstruction phases.
	To ensure that adequate consideration is given to contractors input during development of this plan and to ensure that all participants are aware of those sections of the plan which are relevant to their activities.
	To ensure that all workers have suitable competence for the roles that they are allocated, including a basic understanding of risks specific to the working environment.
	To actively manage the expectations of sponsors.
	To ensure that all reportable accidents, diseases and dangerous occurrences are reported.
	To ensure that the use of the structure is monitored and controlled.
	To ensure that other participants fully understand their roles and that their responsibilities are adequately discharged.

Table 2 Summary of the requirements attached to defined roles

Holder	Requirements
Site Manager	To ensure that the activities of all contractors are managed so as to avoid conflict.
	To ensure that all contractors are managed in accordance with the event plan and site safety rules.
	To introduce suitable site safety rules to support the safe implementation of this plan.
	To ensure that there are systems in place to monitor the implementation of both the plan and supporting site safety rules and to intervene in the event of deviation.
	To ensure that there is a suitable support structure for the workforce (including welfare).
	To introduce and manage a forum for effective communication on site.
	To ensure that all personnel are briefed on site specific risks and site safety rules.
	To ensure that all structures are signed off when complete.
Health and Safety Manager	To ensure that any procedures relating to the safety and stability of the structure are implemented.
	To provide advice on the requirements of Health and Safety Regulation and Guidance.
	To collate and control safety related documentation.
	To provide an additional level of supervision, facilitating conformance with health and safety regulation and general safe behaviour.
TDS Designer	To provide a point of contact for health and safety concerns.
	To provide appropriate evidence of competence.
	To ensure that any temporary demountable structures have been designed with adequate consideration to application, stability, structural integrity and build ability.
	To review any subsequent revisions to the design and ensure they are subject to the same level of verification as the original drawing.

Table 2 Summary of the requirements attached to defined roles

Holder	Requirements
TDS Contractor	To ensure that there are sufficient timescales and budgetary resources to build the structure in a safe manner.
	To ensure active contribution to the design concept and event plan in areas where they hold specific knowledge.
	To undertake an assessment of the risks relating to the structure... and ... Where hazards, relating to safe operation of the structure, cannot be fully resolved, to determine safe limitations of use for the structure and to ensure that this is both passed on and understood... and ... Where hazards relating to safe construction and deconstruction cannot be fully resolved, to provide information on the risks involved and possible means of control.
	To ensure that the design (and any subsequent modifications) is subject to an independent verification.
	To ensure that there are suitable erection plans and drawings for the construction and deconstruction of any structure and that these are available to those managing the construction on site and to ensure that these plans encourage safe methods of working.
	To ensure that the competence of casual workers is understood and that they are assigned roles appropriately and that their subsequent activities are adequately supervised.
	To ensure that all workers (including casual personnel) are given an adequate induction and that the nature of the task and expectations of their role are fully explained.
	To ensure that the work of all personnel under their control (including casual staff) is planned, managed and monitored.
	To ensure that there is a suitable system for managing changes to the structure (due to problems, unforeseen situations or changes of requirement).
	To ensure that any structural revisions are fully verified by the designer.
	To ensure that there are systems for signing off the structure when complete.
	To ensure that there are systems for handing over the structure for use by other contractors
	To ensure that there is an erection check on the structure.
	To provide a representative to remain on site throughout the event, if required.

Table 2 Summary of the requirements attached to defined roles

<i>Holder</i>	<i>Requirements</i>
Crew Chief	To ensure that crew under their control have understood the risks and rules associated with the site.
	To act as a liaison between the event manager (or TDS contractor) and the local crew.

11 SOURCES

- 1 *Temporary demountable structures, Guidance on procurement, design and use*, (Third edition) IstructE 2007
- 2 *The event safety guide* HSE HSG195 1999 ISBN 0 7176 2453 6
- 3 *Guide to safety at sports grounds (fifth edition)* DCMS 2008 ISBN 978 0 11 702074 0
- 4 *Managing health and safety in construction: Construction (Design and Management) regulations 2007* HSE 2007 ISBN 978 0 7176 6223 4
- 5 *Management of health and safety at work. Management of Health and Safety at Work Regulations 1999. Approved Code of Practice L21* (Second edition) HSE Books 1999 ISBN 0 7176 2488 9.
- 6 *Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice L113* HSE Books 1998 ISBN 0 7816 1628 2
- 7 *Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice L22* HSE Books 1998 ISBN 0 7176 1626 6
- 8 *Manual handling. Manual Handling Operations Regulations 1992 (as amended): Guidance on Regulations (L23)* HSE
- 9 *Personal Protective Equipment Regulations 2002* Statutory Instrument 2002 No. 1144
- 10 *The Work at Height Regulations 2005* Statutory Instrument 2005 No. 735
- 11 *PAS 51 Guide to industry best practice for organizing outdoor events* BSI 2004 ISBN 0 580 43319 6
- 12 *The Licensing Act 2003* 2003 Chapter 17