

CROSS Safety Report

Temporary festival stage – an extreme example of bad practice

This month's report discusses an alarming situation regarding a temporary demountable structure including concerns about the quality and accuracy of the design calculations.

Report

An experienced reporter in the temporary demountable structures (TDS) field encountered an alarming situation at a site which raised safety concerns about a stage structure. After the reporter reviewed some provided documents, they reached the following conclusions:

- | The stage supplier appeared to have taken the name of a well-respected overseas TDS supplier.
- | The stage roof structure had previously been used by at least two other TDS contractors.
- | The design (which linked the second-hand roof structure to an entirely different substructure system with different kentledge arrangements) demonstrated high levels of incompetence.
- | The method of attaching the kentledge was unacceptable and largely ineffective. It could have failed altogether under uplift conditions.
- | The method of attaching the 'storm bracing' was entirely wrong and was identical to that implicated in previous failures in the US and Canada.
- | There was no anemometer on site (although another contractor had one on another part of the site,

several hundreds of metres from the main stage).

In addition to the above, the calculations caused the reporter the following concerns:

- | The accompanying documents formed a small part of what is required for a proper analysis of the various elements working as a composite structure.

Key learning outcomes

For event organisers and construction professionals:

- | The design and installation of temporary structures should be given the same degree of attention as primary structures to ensure they are safe
- | It is good practice to carry out independent design checks on temporary structures. A Chartered Engineer having adequate skill and experience can carry out these checks
- | Carrying out independent erection checks by a person who is competent to do so, can ensure that the temporary structure is built in accordance with the design
- | Information on all aspects of temporary structures can be found in the IStructE's publication *Temporary demountable structures: Guidance on procurement, design and use* (2017)

- | The foundation reactions report used an image of a different structure, with different section properties and overall geometry. The structure in the calculation was significantly more conservative than the reality on site.
- | The roof loading calculation used a different (and again more conservative) geometry to that delivered on site.
- | There was no conclusion to state whether the calculated deflections and forces are acceptable or not.
- | The truss member load check used the properties of steel, whereas the roof appeared to be entirely aluminium.

The reporter believes that the regulatory authorities should have been more active in identifying shortcomings in the design and construction of the stage structure.

The full CROSS Safety Report, including links to guidance mentioned, is available on the CROSS website (report ID: 917) at www.cross-safety.org/uk/safety-information/cross-safety-report/temporary-festival-stage-extreme-example-bad-917.



THE SITUATION DESCRIBED SUGGESTS ACTIONS THAT ARE, AT THE VERY LEAST, MISLEADING AND COULD BE POTENTIALLY FRAUDULENT

Expert Panel comments

This report draws similarities to *Licensing of temporary structures* (report ID: 276), that was published in 2012. It is very worrying that the same issues are still being experienced today. The Expert Panel comments provided in Report 276 are also relevant to the issues raised in this report.

The 2012 CROSS Safety Alert on *Temporary stage structures* should also be referenced, along with *Temporary demountable structures: Guidance on procurement, design and use*, published by the Institution of Structural Engineers in 2017.

CROSS has also published several other reports over the years that suggest this is an ongoing issue. These include *Use of water filled containers to anchor temporary structures* (report ID: 255), and *Example of small temporary stage structure* (report ID: 302).

It is concerning that no anemometer was located at the main stage. This would indicate that a wind management policy was not in place, or if there was one then it was not being implemented.

Rather than designing for maximum likely wind speeds as would be required for permanent structures, many temporary structures are wind managed. This requires an effective policy to be in place to monitor wind speed and take appropriate action when it reaches certain pre-determined speeds. Failure to abide by the wind policy could have disastrous consequences.

The effectiveness of operating in this manner might be questioned as these light stage structures can

be sensitive to sudden gusts. This is concerning as a large number of people are likely to be close to these stages. There have been cases of death, injury and panic resulting from such incidents.

The situation described suggests actions that are, at the very least, misleading and could be potentially fraudulent. As equipment is sold on in the industry, the need for thorough checking of both the materials and the design increases. Those licensing events ought to be demanding full designs for the structure, evidence of independent checking of the design and certification that what has been built accords with the design. This report highlights the importance of being an intelligent customer.

As an industry, we have sensible precautions in place for the design, erection, and ongoing inspection of scaffolding. Is this a model that we should be recommending for temporary demountable structures more widely?

Twelve years ago in Report 276, the Expert Panel raised the following question:

'The issue of a licence for a temporary structure should not be any less effective than the process of gaining approval under Building Regulations. Licensing mechanisms should preclude the possibility of workers and the public being at risk from the collapse of temporary structures but are the regulations tight enough and are they being applied with sufficient rigour?'

The Expert Panel asks – has there been any change on this issue in the last twelve years?

Further reading

CROSS Safety Reports and Alerts:

- | Licensing of temporary structures (report ID: 276)
- | Use of water filled containers to anchor temporary structures (report ID: 255)
- | Example of small temporary stage structure (report ID: 302)

SCOSS Alert:

- | Temporary Stage Structures (SCOSS alert ID: SC/12/001)

IStructE publication:

- | Temporary demountable structures: Guidance on procurement, design and use (2017)

What is CROSS?

Collaborative Reporting for Safer Structures (CROSS) helps professionals to make structures safer by publishing safety information based on the reports it receives and information in the public domain.

CROSS operates internationally in the UK, US, and Australasia. All regions cover structural safety, while CROSS-UK also covers fire safety.



How reporting to CROSS works

The secure and confidential safety reporting system allows professionals to share their experiences to help others.

Professionals can submit reports on safety issues related to buildings and other structures in the built environment. Reports typically relate to concerns, near misses or incidents. Find out more, including how to submit a safety report, at <https://bit.ly/cross-safety>. Your report will make a difference.



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