SCOSS Bulletin
STANDING COMMITTEE ON STRUCTURAL SAFETY
JULY 2002

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DYNAMIC BEHAVIOUR OF GRANDSTANDS

SCOSS has been concerned for some time at the dynamic behaviour of certain structures, particularly cantilevered structures at sports grounds. This concern was outlined in Chapter 3 of the 13th Report published in May 2001 (now available on the SCOSS website).

The Institution of Structural Engineers has published *Dynamic performance requirements for permanent grandstands subject to crowd action - Interim guidance on assessment and design*. The report, prepared by a joint Working Group of the Institution of Structural Engineers (IStructE), the Department for Transport, Local Government and the Regions (DTLR) and the Department for Culture, Media and Sport (DCMS), has been developed in the wake of observed changes in recent years with regard to:

- the design of grandstands (i.e. they tend to be of lighter construction and incorporate longer spans)
- the range of sporting and entertainment events for which the grandstands serve
- the tendency for crowd behaviour to be more volatile compared with former times.


The principal advice given in the Guidance document concerns the recommended vertical natural frequencies and horizontal load resistance of grandstands considered necessary to provide the safety and comfort of the public for a range of sporting and other entertainment events.

The Working Group recognises that there is a need for further research on this subject and hope to report again in eighteen months time. In the meantime the Working Group seeks feedback on the actual behaviour of grandstand structures as this is essential to the development of comprehensive advice and guidance.

A further advisory note *Dynamic testing of grandstands and seating decks* was published in June. The Working Group documents are available from the IStructE free of charge.
SAFETY OF TALL BUILDINGS GROUP

Following the tragic and dramatic events of September 11 an international multi-disciplinary Working Group was convened by the Institution of Structural Engineers with the support of ICE, CIBSE, RIBA, RICS, IFE and other professional bodies, to investigate the causes of collapse and review the adequacy of current design rules in respect of strength, fire resistance and escape procedures in tall and/or large buildings. The resulting report was published in July*. The Building Performance Assessment Team of the Structural Engineering Institute of the American Society of Civil Engineers have also recently published a report on the World Trade Centre buildings** which recommended that –

• Structural framing systems need adequate redundancy and/or robustness
• Fireproofing needs to adhere under impact and severe fire conditions
• Connection performance under impact and fire loads needs to be analytically understood and quantified
• Fire protection ratings that include the use of sprinklers require a reliable and redundant water supply
• Egress systems need to be evaluated holistically to ensure they provide adequate performance when building damage occurs
• Fire protection ratings and safety factors for structural transfer systems should be evaluated in respect of the role these play in the overall building stability.

*available from the Institution of Structural Engineers (www.istructe.org.uk)
**available on www.house.gov/science/hot/ietc/wtcreport.htm

BUILDING REGULATIONS: COMMENTS ON PART A AND PART B

SCOSS commented in detail on the proposal by DTLR to amend Part A of the Building Regulations, and in particular Requirement A3 (Disproportionate Collapse). The consultation period ended in November 2001. SCOSS also commented on the proposals for Part B (Fire Safety-European Supplement) the consultation period for which ended in February 2002.

SCOSS indicated its support for the proposal to bring all buildings within the compass of Requirement A3; the Committee has always believed that practical guidance on satisfying the A3 requirement can be prepared and that, where existing guidance has proved difficult to use, improved guidance is needed rather than ignoring the requirement. SCOSS also suggested that the scope of A3 should be extended to include fire and consequential hazards, and for certain buildings, vandalism and malicious acts (it is thought that following the events of 11 September it may be appropriate to take the latter into account). In fact it is likely that the ‘Safety of Tall Buildings’ Working Group (referred to elsewhere in this Bulletin), will also have comments on this topic and on the manner in which substantial or special buildings are regulated.

With regard to Fire Safety, apart from a number of minor comments, SCOSS suggested that fire safety in high rise buildings requires further review, particularly in respect of escape routes, protected shafts, air pressurisation, smoke extract, refuges, structural integrity and relevant fire protection of steel structures.

ENGINEERING ETHICS

The Royal Academy of Engineering has published the text of a talk by John Uff entitled ‘Engineering Ethics: Do engineers owe duties to the public?’. The talk is of great general interest but also has a particular relevance to SCOSS as part of Uff’s theme concerns warnings of preventable disasters where he makes reference to the comments made in the last SCOSS Report (see elsewhere in this Bulletin).

Uff goes on to discuss the constraints and issues surrounding the whole issue of disclosure of information to others by individual engineers where that engineer has a concern in respect of safety. The feasibility of trialling a confidential information feedback system is currently being considered by SCOSS.

CHANGE IN SECRETARIAT

John Menzies has stepped down as Secretary to the Committee after some 10 years valued service. He is replaced by John Carpenter, until recently Director of Health and Safety at Symonds Group, and now an independent consultant.
**SCOSS ALERTS**

The ‘Alert’ is a means of drawing attention to a particular point of concern that has come to the notice of the Committee and which warrants publicity prior to the next Report or Bulletin.

SCOSS has issued three Alerts since the last Bulletin; these have been placed in the Structural Engineer and on the SCOSS website. They relate to common structural issues, emphasising their broad importance to the profession.

**Stadia Crush Barriers**

Those who own, manage or advise in respect of stadia crush barriers need to be aware of the danger of deterioration through water ingress where the form of construction involves rolled hollow sections. This phenomenon has been observed in barriers only 4-5 years old.

**Concrete Systems Buildings**

Some precast system buildings are now around 50 years old. Those that contain post-tensioned tendons may have deteriorated with a risk of tendon failure unless risk mitigation works have been carried out in the meantime. SCOSS drew the attention of owners and their advisors to the continuing need for periodic inspection and appraisal of these buildings in order to control the risk of structural failure.

**Timber Design**

This alert drew attention to a concern that many timber trusses were not being designed with structural engineering principles in mind. As a consequence of member undersizing, lack of space for adequate jointing, and the failure to consider all applied loads, the resultant structure failed to provide the requisite levels of safety. The situation is thought to be exacerbated by the division of responsibility between the initial designer, and those finalising the joints (often on-site joiners).

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**UNREGULATED STRUCTURAL PLYWOOD**

The Committee has been made aware of concerns over the use of unregulated structural plywood. We are informed that this material usually emanates from South America, or the Far East, and does not exhibit the markings, nor meets the performance levels, required of structural plywood designed to BS 5268 (Structural Use of Timber). This appears to be a quality control issue rather than a lack of design attention. However structural engineers and those with responsibility for construction works on site, need to be alert to the possible use of this material and its structural deficiencies when compared to the British Standard requirements.

**FALSEWORK**

The Health and Safety Executive (HSE) has just issued a report entitled ‘Investigation into aspects of Falsework’ (394/2001) which paints an alarming picture in respect of the design and use of certain commonly used forms of falsework. It concludes that design is often carried out by those who do not understand basic engineering principles specific to falsework, that design briefs are poor, and frequently become obscured between designer and site. In many respects it takes us back to some of the faults existing prior to the Bragg Report in 1973, which led on to the publication of BS 5975 (Code of Practice for Falsework).

In the 1970s most main contractors had their own temporary works departments; over the years, in common with other industries, in-house skills have been shed, and many falsework systems have become the province of specialist suppliers. This lengthens the supply chain and hence increases the risk of the designer being unaware of the actual conditions on site. Those engaged in falsework procurement, design or use are urged to obtain a copy of the HSE Report and study its conclusions and, in particular, its recommendations. It may be downloaded from www.hse.gov.uk/research/crr_htm/2001/crr01394.htm

SCOSS would be interested in hearing of any safety issues. Readers are reminded that within the EU the CDM Regulations (or their country equivalent) apply to falsework.

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**SCOSS WEBSITE**

The website (www.scoss.org.uk) now contains copies of all 13 Reports (spanning the period 1977 to 2001), Bulletins 1 to 4, and four ‘Alerts’ (see above). An index is provided to aid location of specific subjects. This collection of papers represents an interesting view of structural engineering risk management concerns over some 25 years, many of which remain pertinent to today’s designers.
The 13th SCOSS Report discussed the issue of confidential reporting of matters relating to structural safety. This is a subject that remains on the SCOSS agenda and is being considered again by the Committee. Jonathan Wood also mentions this topic in his paper entitled ‘Applying lessons from failures to management and design’*. He also goes on to make some useful suggestions as to how engineers might report matters of concern in a standardised format that allows the key points to be communicated in a succinct manner. The paper is commended to readers.

*taken from ‘Learning from Failures: applied forensic engineering’ edited by Peter Campbell (Whittles Publishing).

An informed client, arising from greater involvement, is likely also to be a co-operative and understanding client in respect of risk issues raised by the structural engineer.

The Strategic Forum* has recently published a Consultation Document, ‘Accelerating Change’ which is an update on the seminal Egan Report ‘Rethinking Construction’. This may be downloaded from www.cbpp.org.uk/acceleratingchange/

This document is central to the process of changing the way in which the industry works- its procedures and, importantly, its culture. The three themes are: Improving Client leadership; Integrating the Team; and People issues (especially health and safety).

All three of these have the potential for lessening structural risk when viewed in its widest sense. An informed client, benefiting from greater involvement, is likely also to be a co-operative and understanding client in respect of risk issues raised by the structural engineer; the integration of the team allows a group approach to risk management- a far better way than individual members attempting this process on their own. The whole is demonstrably greater than the sum of the component parts. And finally, by addressing people issues – to include quality of intake, education, and life long learning( the three Rs of Recruitment, Retention and Respect) we will improve standards generally, and the approach to risk in particular.

*the Strategic Forum is chaired by Sir John Egan; its purpose is to drive through the changes stemming from the Rethinking Construction report and subsequent initiatives.

There is the opportunity to comment and contribute to this strategy either by commenting on the Document or by attending the briefing meetings being held around the UK and listed on the website given above. Structural engineers should be at the forefront of this debate.