SCOSS Bulletin 3 - February 1999

This Bulletin summarises the recommendations and findings in Structural Safety 1997-99: *Review and Recommendations, the Twelfth Report of SCOSS* - The Standing Committee on Structural Safety

Contents

Recommendations on General Principles

Codes of practice for structural design

1. The Institution of Civil Engineers and The Institution of Structural Engineers and the British Standards Institution should review the whole production and writing process of codes, including the Structural Eurocodes, and define and vigorously implement a strong policy, agreed and actively supported by industry and government, addressing the following issues:

- The growing portfolio of codes of practice in structural engineering and the inadequacies and confusions within them.
- The need to converge as far as possible to a single set of codes that clearly distinguishes between performance requirements, principles and rules.
- The need to keep codes reasonably in line with technological advance and to withdraw codes that are obsolete.
- The need for positive management of the process of code development for the UK.

Control of risk through design

2. The Institutions of Civil and of Structural Engineers should prepare guidance on procedures for assessment of hazards and risks affecting structural safety that should be followed as part of an explicit risk management process starting at the design stage of projects. The procedures should include the definition and prioritisation of critical situations relating to hazards to the structure during its life, and the determination of the need for, and adequacy of, safeguarding measures.

3. The regulatory requirements for risk management should be clarified by the relevant government departments.

Quality management systems and design

4. Managers of quality assurance systems relating to structural design should ensure that they are explicitly based on a direct response to the specification clauses of ISO 9001. In particular design management controls for verification and review should be based on ISO 9001 Clause 4.4.

Use of computers

5. Those responsible in universities, the professional engineering institutions and government for the education of engineers and their continuing professional development should provide more guidance on understanding structural behaviour and its modelling for computer analysis, and on avoiding uncritical reliance on computer-generated results.

Resistance to disproportionate collapse

6. The Department of the Environment, Transport and the Regions should continue consideration of the SCOSS recommendation that resistance to disproportionate damage (robustness) should be required by regulation for all structures, especially those where large numbers of people may congregate.

Structural Robustness: aftermath of a bridge strike by a road vehicle and its load on a railway underbridge (Photo: Cornwall County Council)

7. The Department of the Environment, Transport and the Regions should issue Approved Document guidance on the design of structures for robustness and provision against accidental actions including advice on identification of hazards and analysis of critical situations.

Periodical structural inspection

8. Owners and operators of buildings and other structures should arrange for periodic inspections and structural appraisals to ensure their safety is adequate as they continue in use; this process is particularly important for structures where large numbers of people may congregate.

Continuing structural safety - the regulatory regime

9. The review in progress by the Department of the Environment, Transport and the Regions and the Health and Safety Executive of the respective roles and responsibilities of the Health and Safety Executive and Building Control Authorities for the continuing safety of permanent and short-life structures should be completed to determine an adequate regulatory and enforcement regime.

Recommendations on Specific Topics

Safety management of bridges

10. Responsibilities for the enforcement of the requirement for safety of highway bridges should be independent and completely separated from those for maintenance, operation and use.

11. The owners of rail underbridges should consider adopting a safety file approach as a framework for managing the safety of each bridge.

Multi-storey car parks and edge barriers – technical issues

12. The Institution of Structural Engineers should expedite the preparation of up-to-date guidance on the structural design and assessment of multi-storey car parks including edge barriers.

Stadia structures

13. Owners of stadia should arrange a detailed structural inspection and appraisal of the structures periodically by a competent person to ensure their safety is adequate in the light of current circumstances and use.

Periodic inspection of cladding

14. Owners of buildings should arrange for periodic inspection of claddings to check safety. The requirement for checking should be defined in the CDM health and safety file.

Inspection and material sampling of cladding by rope access
(Photo: Messrs Sandberg)

Bridge strikes

15. The Bridge Strikes Prevention Group, regulatory authorities and industry should more vigorously seek and implement measures for the prevention and mitigation of bridge strikes and their effects.

Reinforced autoclaved aerated concrete planks

16. Owners of both school and non-school buildings which have pre-1980 RAAC plank roofs should arrange for these roofs to be inspected if this has not been done since 1994 although generally the deterioration of RAAC planks may not jeopardise structural safety.

Lighting columns

17. Owners of existing lighting columns should arrange for them to be inspected periodically giving greatest priority to those that are likely to be most vulnerable due to position, age, environment, detailing and quality.

Fatigue fracture of a steel lighting column
(Photo: Flint & Neill)

Other Topics Considered

Additional topics covered in the Report include scour, slab/column reinforcement in concrete flat slabs, thaumasite sulphate attack on concrete and calcium aluminate cements in construction

Pervasive Trends and Changes

SCOSS has become increasingly concerned over recent years by the growing background threats to the achievement of acceptable structural safety arising from a number of pervasive trends and changes. These concerns are reflected particularly, but not exhaustively, in the recommendations on general principles given in the Twelfth Report.

There is potential in all building and civil engineering structures for unsafe situations to arise. Gravity is unrelenting. Extreme climate and man-made events may occur. The deterioration of materials and structures eventually over time is inevitable. However, the number of structures that have become unsafe in the United Kingdom and in many other parts of the developed world in recent times has been quite small due largely to the skill and dedication of professional civil and structural engineers in averting recurrences. There is a strong tendency, amongst those in government and others who are responsible for structural maintenance and procurement resources, to make the comfortable assumption that all is well and will continue to be well even if resource is reduced.

A good structural safety record will not be sustained in the future unless adequate resources are provided to enable vigilance and effort in the maintenance of safety standards. Continuous effort is required to offset the potential adverse effects on structural safety of several pervasive trends and changes:

- Partly as a result of legal trends, organisations and individuals have become more intent on specifically defining the boundaries of their responsibilities and denying any role in areas they believe to be outside those boundaries. One result of this trend is that the concept of collective responsibility for safety amongst groups of organisations is now largely in the 'back of the mind'. It has therefore become increasingly difficult to achieve collective agreement on action and strategy in areas where many organisations all have an interest in safety, eg. the development of codes and standards for structural design.
- For the ageing infrastructure in the UK and elsewhere, the climate of increasing commercial competition and drive for efficiency may lead to reduced emphasis on safety requirements. Owners of structures seek ways of making them 'work harder'. Consequently professional engineers are under pressure to identify and quantify existing margins of safety and to reduce them. Bridge assessment is one area where such pressures exist.
- There is a natural but not inevitable tendency amongst engineers towards collective amnesia concerning previous structural failures and the lessons to be learned from them. This process occurs naturally as older engineers retire and their places are taken by younger ones. It falls largely to educators, continuing professional development and feedback mechanisms, such as that provided by SCOSS and the technical press, to offset this natural tendency.

Feedback Invitation

Engineers and others are invited to express concerns about trends adverse to structural safety, on a confidential basis if they so wish, to SCOSS. Feedback on experiences where structural failure has occurred, or where it has been averted, ie. 'near-misses', is especially valuable.

SCOSS invites comments on this Bulletin and the Twelfth Report

Contact: Dr John Menzies (Secretary)
Tel.01923 675106
Fax 01923 680965;

Or

Mr John Fenn (Technical Officer)
Tel. 0171-235 4535
Fax. 0171- 235 4294.

Email: scoss@istructe.org.uk

SCOSS, 11 Upper Belgrave Street, London SW1 X 8BH, UK.

The Twelfth SCOSS Report

The Twelfth SCOSS Report, Structural Safety 1997-99: Review and recommendations, contains the full text of the findings and recommendations summarised in this Bulletin. The Report has 58 pages and is published by SETO Ltd, price £25.00, including postage and packing, ISBN 1 874266 46 8.

The Report is in six sections:

1. Introduction
2. Topics of greatest concern
3. Other topics of concern
4. Other topics considered during 1997-99
5. Other matters
6. Future SCOSS programme

References are given throughout the Report to help engineers and others to find more information on structural safety on each topic.

Ordering Information

The Twelfth SCOSS Report may be ordered using the order form here, or from:

- The Institution of Structural Engineers, 11 Upper Belgrave Street, London SW1X 8BH, UK. Tel: 0171-235 4535, Fax 0171-235 4294. Cheques should be made payable to SETO Ltd. Credit cards (Visa or MasterCard) are welcome.
- Thomas Telford Ltd. Publications Department,
  1 Heron Quay, London E14 4JD.
  Tel: 0171 987 6999.
  Fax: 0171-537 3631

Cheques should be made payable to Thomas Telford Ltd. Credit cards (Visa or MasterCard) are welcome.

- Thomas Telford Bookshop, 1 Great George Street, London SW1P 3AA, UK.
  Tel: 0171-665 2019.

^ top