SCOSS TOPIC PAPER

ASSESSMENT AND INSPECTION OF BUILDINGS, and other facilities.

Introduction

1 SCOSS has been concerned for some time\(^1\) at the potential for deterioration of buildings and other facilities during their working lives such that there results an inadequate reserve of strength against collapse of the whole or part of the structure.

2 Such a situation may arise through a variety of routes, for example:

<table>
<thead>
<tr>
<th>Action:</th>
<th>Leading to:</th>
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<tr>
<td>Change of Use</td>
<td>Increased floor loadings; introduction of dynamic effects.</td>
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<tr>
<td>Material deterioration</td>
<td>Corrosion of reinforcement, loss of strength</td>
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<tr>
<td>Design deficiency</td>
<td>Old code requirements now known to be deficient</td>
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<tr>
<td>Alteration</td>
<td>Poorly controlled (in design or construction) alteration or refurbishment resulting in loss of structural integrity.</td>
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<tr>
<td>Quality Control</td>
<td>Built structure does not reflect designers intent</td>
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<tr>
<td>Lack of Maintenance</td>
<td>Ingress of water, loss of protective systems</td>
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3 Deterioration may affect the structural frame or its associated elements, or may be attributed to structural fixings of other components such as cladding or signage.

4 Our building stock represents a valuable asset; to individual owners, to occupiers with insuring/repairing leases, and to the nation at large that depends upon such facilities remaining serviceable throughout their expected lives. Historically we have not been good at nurturing these assets and recognising that they may need a planned strategy of periodic inspection, review and repair.

5 The business case for a planned assessment and inspection programme is strong.\(^2\) It cannot be right that the built environment, in both public and private sectors, is allowed to deteriorate in an uncontrolled fashion. In addition to the business case however there is a statutory obligation to have regard to the state of buildings, and other structures, where their condition may cause an unacceptable risk to safety; there is also the necessary consideration of civil liability - a growing concern in today’s litigious society.

Purpose of this Paper

6 This note is written to draw attention to this important management matter, to highlight some of the key issues, to stimulate debate and to make recommendations for action. It is not intended to consider the technical approach to assessment and inspections as this is covered adequately elsewhere (Institution
of Structural Engineers and others). It is intended to cover general building stock and does not relate to specialist structures such as nuclear or off-shore facilities.

**Background**

7 The need for a structured programme of building inspection by property owners and others has again been recently brought into sharp focus as a consequence of the Sheriff’s Inquiry in Edinburgh (3) relating to a young adult killed on the pavement when struck by falling masonry from the adjacent building, and the reports published by IStructE(4), ODPM(5) and ICE(6) stimulated by the Pipers Row car park collapse.

8 In the Edinburgh case, the cause was determined as poor workmanship during roof refurbishment some years earlier, leading to several large pieces of stonework becoming detached.

9 The Sheriff who led the Fatal Accident Inquiry noted that there was no legal requirement on the City to inspect buildings that might be at risk, nor did they have right of entry. He indicated that the City should immediately carry out an audit of those buildings thought to constitute a risk, in order that this then permitted existing statutory powers to be used to ensure safety. They were also charged with reminding those responsible for maintenance of buildings of their responsibilities for public safety.

10 Edinburgh may have specific issues as a consequence of its unique building stock, but the essential principles of the safety of the public and others when in, or close to buildings (usually old, but not necessarily so), and how these sit with existing legislation and enforcement policy, apply more widely.

**SCOSS Concerns**

11 SCOSS has considered the wide question of building inspection on a number of occasions and set these out specifically in Report 12 (see Appendix A). With regard to car parks in particular, the Institutions have responded by producing two reports relating to various aspects of procurement, design and management, viz:

i) Design recommendations for multi-storey and underground car parks, IStructE revised June 2002 (4)

ii) Recommendations for the Inspection and Management of Car Park Structures, ICE National Steering Committee October 2002 (6)

and these have been supplemented by an ODPM report *Enhancement and whole life performance of existing and future car parks* PII project, Mott McDonald November 2002. (5)

12 Notwithstanding, there remain many car parks that have yet to receive an assessment, or be managed according to a structured management plan. This shortfall applies equally to structures in general where an ageing infrastructure, and use of building techniques giving rise to potential safety issues if not assessed and maintained, exist around the UK. Hence SCOSS’ concern remains.
**Designer Obligations and Design Assumptions**

13 Designers have a professional duty of care to consider, at the time of their design, the implications of their design decisions over the lifespan of the facility, a point not always appreciated. This duty is supplemented by the parallel statutory responsibility emanating from Section 3 of the Health and Safety at Work Act, and further supplemented in the Workplace Regulations\(^{(7)}\) in respect of ‘solidity and stability’.

14 The new Eurocode EN 1990-Basis of Structural Design\(^{(8)}\) sets out some critical assumptions in this respect, applicable to all structures designed within its remit viz:

- Adequate supervision and quality control during construction
- Use of construction materials and products that comply with Eurocode requirements
- That the structure is adequately maintained
- That the structure is used in accordance with design assumptions.

15 The reliability required for structures designed within the scope of EN 1990 is achieved through design in accordance with the code, appropriate execution and use of quality management measures. The code goes on to specify that the quality management measures shall consist of:

- Definition of the reliability requirements
- Organisational measures and
- Controls at the stages of design, execution, use and maintenance*

*author’s emphasis.

Current codes contain similar implicit assumptions.

16 Given the amount of published information available on this topic therefore, there is little excuse for designers failing to properly consider the implications of their design over the intended operational lifespan, and, essentially, to advise the Client accordingly.

**Legislative Position**

17 The legislative position in respect of the safety of structures during their working life is not as well defined as it might be. This is exacerbated by the fact that responsibility for structures during this phase is split between Government Departments (currently ODPM and Work and Pensions). When a building abuts a highway the safety aspects in this respect relate also to the highway authority introducing further interests.

18 There are a number of Acts and Regulations that touch on this issue, although none comprehensively covers the essential needs.
Building Act

As noted in SCOSS Report 12, the Building Act is not constructed so as to assist if there is no apparent sign of danger; this was the issue highlighted by the Sheriff noted in para 9. In practice, unless a structure may be reasonably classified as ‘dangerous’, Building Control has no real power.

Housing Act

The Housing Act 1985, and its subordinate regulations, also have provision to deal with property in disrepair, however it appears to suffer from the same deficiency as the Building Act in that the powers are activated by ‘signs of disrepair’.

Defective Premises Act 1972

This act relates only to dwellings and creates terms to be implied into contracts for the construction of dwellings to see that the work is done in a workmanlike manner, or professional manner as the case may be, with proper materials and so that as regards that work, the dwelling will be fit for habitation when completed. It provides no duties beyond the date of completion. Hence the act does not lend itself to enhancing safety in all buildings during their operational life.

Health and Safety at Work Act (HASWA)

Sections 2 of the HSWA requires employers to have regard to the health, safety and welfare of employees; Section 3 places a similar obligation in respect of others not in their employment, arising out of their work activities. With regard to the subject matter of this paper, these duties are discharged on a day today basis firstly through designers, who create designs affecting not only those who will construct and maintain facilities (stages covered by the CDM Regulations) but also those who work within the facility, or who may be passing by, and secondly by property owners who operate the property as part of their undertaking.

HSWA also covers the safe use of premises in Section 4, placing duties on persons in control of premises, in order to protect those persons other than employees, who are using the premises for work purposes.

However the Act:

i) does not explicitly require building owners or occupiers to inspect and manage their property,

ii) does not apply if it is not a place of work.(S4),

iii) leaves scope for doubt as to the split of responsibility where there are a number of tenants within one structure,

iv) S3 relies on the definition of ‘undertaking’.

Fire Precautions Act

Fire safety and escape is covered by the Fire Precautions Act 1971 and the Fire Precautions (Workplace) Regulations 1997. This note however is concerned with
the safety of the fabric and structure. (Note that ODPM are considering the future of fire safety and hope to rationalise all fire legislation.) They are also considering the results of consultation on the Building Regulations (Part B) relating to Fire design.

Workplace Regulations

26 The Workplace Regulations 1992 have recently been revised, in order to clarify the regulations implementing the ‘solidity and stability’ requirements of the EC Workplace Directive. This has been achieved by the following inclusion:

‘Stability and Solidity
4A Where a workplace is in a building, the building shall have a stability and solidity appropriate to the nature of use of the workplace.’

27 This short, and unexplained insertion, implies that its ‘stability and solidity’ should have regard to

i) Persons’ safety, (those employed and others)
ii) Potentially detrimental effects such as excess static load, dynamic effects, material deterioration and the like, likely to cause deterioration.

28 However the above will not apply if the building is not made available to be a workplace, or is a special case such as a car park which is ‘in use’ but not a workplace.

29 In summary therefore the existing law:

i) tends to be used in a reactive manner,
ii) does not clearly cover all situations,
iii) is fragmented

and, although the legal profession may argue that it is clear, because it has developed through case law over the last 25 years, it is not always suitably framed for use by duty holders where clarity is required in a simple, ready to use format. Authoritative guidance is needed.

Current Actions and Initiatives

30 There are some current initiatives that have a bearing on the subject:

a. Tall Buildings: The report by the IStructE led working group does not touch on the subject of building inspection and maintenance; however it includes the recommendation for a risk management approach (in parallel with the prescriptive regulatory requirements of design). This philosophy is equally applicable to buildings of a lesser size and is an appropriate route to formulating a policy on the frequency and detail of building inspections generally.

b. HSE is due to issue a consultative document in Spring 03 on suggested changes to legislation for the safety of structures and buildings during
their operational lifespan. This is tied up with the amendments to the Workplace Regulations mentioned above and other Regulations.

c. HSE are considering a wide range of construction related health and safety matters through the Discussion Document ‘Revitalising Health and Safety in Construction’\(^{(11)}\). This offers the opportunity to widen the requirements in respect of the Health and Safety File in particular, with benefits to the longer term management of facilities.

d. The ICE’s Structures and Buildings Board has called for ‘compulsory regular safety audits of buildings in built up areas. (ICE press release March 2002) The detail necessary would be based on a risk appraisal of the building age, construction, proximity to the public, and potential for elements falling from a height’.

e. BSI is proposing to produce a standard on ‘Risk Assessment on Buildings’.

31 The ICE Board has discussed with ODPM and the Scottish Executive the benefit of setting up a group to review this area; this has met with a favourable reaction. The Construction Industry Council (CIC) has published a paper advocating the rationalisation of legislation in respect of buildings \(^{(12)}\) The arguments presented are consistent with the theme of this paper.

32 The letter issued by the City of Edinburgh (para 9) made reference to BS 8210:1986 Building Maintenance Management. Whereas this would be a good vehicle on which to construct the requirements for ‘compulsory’ safety audit, it precedes the introduction of CDM and hence the health and safety file. There is then a need to update this BS in any event. SCOSS has written to BSI drawing their attention to this need.

33 Other organisations such as BRE and CWCT are also interested in the regular inspection of buildings from a good housekeeping viewpoint and have ongoing work programmes in this respect. BRE in conjunction with others, has recently published advice on façade inspection \(^{(13)}\) although this only mentions civil liabilities.

Conclusions

34 It is not the intent that a layer of bureaucracy and additional cost be imposed upon building owners and others unnecessarily; there has to be a business case for changing the status quo. It is SCOSS’ view however that greater clarity needs to be brought to bear as to responsibility and proactive preventative actions in respect of building stock (to include miscellaneous structures such as car parks, private ownership bridges and the like) so as to sensibly minimise the opportunity for another ‘Edinburgh’ or ‘Pipers Row’. The need for this increases as the building stock constructed in the post war years in particular begins to age.

35 SCOSS is of the view that this may be achieved, reasonably and efficiently, by:

i) Rationalisation of the various legal statutes relating to structures once built.
ii) Removing the distinction, for this specific case, as to whether the building is a place of work, or part of an undertaking.

iii) Extending Building Control into the operational phase of a building by requiring continued compliance.

iv) Designers adopting a risk management approach to identify necessary inspection, repair and refurbishment regimes. The conclusion of such an analysis should feature within a ‘life care plan’ and which might feature in conjunction with the health and safety file.

**Recommendations**

It is recommended that:

**General**

36 The concept of whole life risk management is given greater emphasis and utilised in such a manner that it encompasses the identification of hazard and associated risk during the operational phase of a facility’s life. From this assessment will emerge an overall management plan included within which will be a protocol for inspections throughout the structure’s lifespan (analogous to the recommended servicing detail and frequency for a car perhaps and to the manner in which Highways Agency structures are managed).

37 The durability of structures and their components, and a clearer meaning of ‘lifespan’, should be considered to supplement the explicit attention at the design stage already given to strength and serviceability limit states.

38 By implementing this assessment during the design stage, the consequences of the design upon whole life costs will become apparent. For many structures, the risk analysis may show, so far as reasonably possible, that minimal action is required as the form of structure and its environment and use, are such that no significant risk is anticipated to arise.

39 The outcome of this exercise should feature as a ‘life care plan’ and be presented in conjunction with the health and safety file, having been discussed and agreed with the client during the design phase.

**Designers**

40 Designers should adopt the approach outlined above, at the time of design, on the basis that the aim is to achieve minimum whole life cost consistent with an adequate safety margin, as well as achieving compliance with the law. The approach adopted by the Eurocodes requires such an explicit analysis to be made. It also sits comfortably with sustainable design philosophy.

41 Designers should be aware of the need for special consideration on those structures that:

i) have minimal redundancy
ii) attract large numbers of people
iii) are tall
iv) use innovative design or materials
v) exist in an aggressive environment
vi) were designed to now outdated codes
vii) fall outside the scope of verified code methodologies.

42 Clients should be specifically briefed by designers, in the early stages of projects, on the likely long term implications of the design adopted, the need for appropriate periodic assessment and review and the basis of their design, i.e. that the design assumes adequate construction quality control and life long maintenance of the facility.

Regulators

43 The HSE Discussion Document expected in the Spring of 2003 should be used to give weight to this approach, and to re-emphasise the statutory obligation on designers to consider the risks, at the time of design, arising from all anticipated phases of a structure’s life.

44 The interface between local authority building control and HSE should be clarified and strengthened, particularly in respect of structures not showing clear signs of danger, eg. where at present the Building Act is ineffective.

45 The responsibility of owners or others for buildings which are unoccupied, or otherwise not a place of work, should be clarified.

British Standards Institution

46 The BSI should consider the need for updating BS 8210: 1986 and consider also the need for the production of a new risk management standard.

Institutions

47 The ICE should consider organising a seminar in conjunction with others, as already suggested by their Structures and Building Board, to review the subject and make proposals.

48 The ISE and ICE should consider how the recommendations of this paper might be emphasised to their members, and through the professional standing of the Institutions to industry at large.
Appendix A: SC OSS Report Comments and Recommendations

In the 12th Report the subject arose twice:

Firstly in section 2.4 Continuing safety of existing structures - the regulatory regime

A1 This section was in relation to car parks where there was an understandable concern at the time given the reluctance of owners to undertake inspections unless there was some imminent danger. The report went on to illustrate the problems arising from the division of responsibility between Government departments, and the apparent ‘gap’ between the Building Regulations and the Health and Safety at Work Act.

A2 The recommendations were:

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

The review in progress by DTLR and HSE of the respective roles and responsibilities of the HSE and Building Control for the continuing safety of permanent and short life structures should be completed to determine an adequate regulatory and enforcement regime.

Secondly, in Section 3.3 Cladding on Buildings

A3 This section discussed the use of innovative cladding systems but in particular thin stone cladding and glass; it concluded with a general section on the need for periodic inspection, and how, in some other parts of the world this is mandatory.

A4 The recommendation was:

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.

Implementation of SC OSS Recommendations

A5 With regard to car parks (para A1), a number of actions have been put in hand to provide advice and guidance to car park operators and others. Specifically three documents relating to multi-storey car parks have recently been published.\(^4,5,6\)

A6 The IStructE report recommends that the design team provide the operator with a manual to include details of the facility and the frequency of inspection and maintenance of various parts of the structure. The text cross refers to the ICE report which also recommends the appointment of an appropriately experienced engineer to advise the Owner/Operator on structural safety, inspection, maintenance and repair. In addition it is recommended that a ‘life care plan’ be
adopted to allow these actions to be implemented efficiently including the keeping of records.

A7 No action has been taken in respect of other structures or where large numbers of people are likely to gather.

A8 The review of roles, although under review, has not been completed.

A9 No specific action has been taken in respect of the recommendation in para A4. The SCOSS Secretary has however written to those groups able to influence the compilation of health and safety files to draw their attention to this issue.
REFERENCES

1  SCOSS Report 12, Standing Committee on Structural Safety
   www.scoss.org.uk
2  The Long Term Costs of Owning and Using Buildings, Royal Academy of Engineering 1998
3  Fatal Accident and Sudden Death Inquiry of Christine Foster, February 2002
   Sheriff’s Court, Edinburgh.
4  Design recommendations for multi storey and underground car parks, IStructE
   2002
5  Enhancement and whole life performance of existing and future car parks, Mott
   McDonald 2002 ODPM (PII project)
6  Recommendations for the Inspection, Maintenance and Management of Car
   Parks Structures, ICE 2002
7  Workplace Regulations 1992 (as amended)
9  Consultation Document on the reform of fire safety legislation, ODPM July
   2002
10 Health and Safety (Miscellaneous Amendments) Regulations 2002
11 Revitalising Health and Safety in Construction. HSE Discussion Document
   September 02.
12 Regulation for Buildings: Harmonisation of legislation
   CIC December 2002
13 Building Façade Maintenance
   BRE October 2002

GUIDANCE ON INSPECTION OF BUILDINGS

1  Building Façade Maintenance
   BRE October 2002
2  Operation and Maintenance Manuals for Buildings
   CIRIA 1999
3  Condition Monitoring of Structures: a briefing note for clients and owners. ICE
   Structures & Buildings proceedings August 1999
4  Collapse: The erosion of factors of safety to 0.999, J G M Wood. Section on
   ‘Progressive Collapse’
5  Health and safety at Work etc Act 1974
6  BS 8210 1986 Building Maintenance Management
7  Cladding: the case for improved inspection. The Structural Engineer May 2000