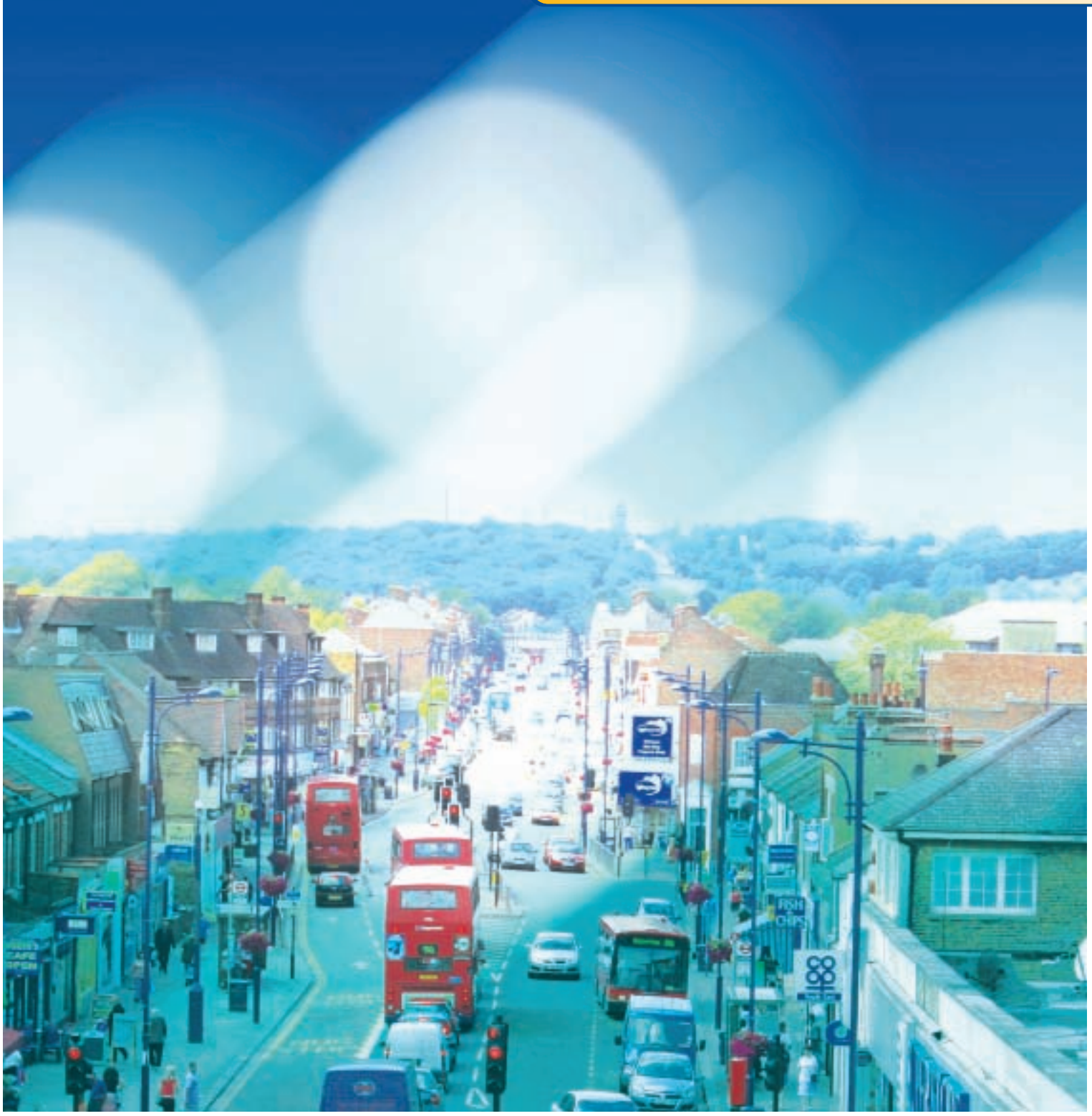
THE INSTITUTION
OF HIGHWAYS &
TRANSPORTATION

ROAD SAFETY AUDIT



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Registered Charity No. 267321

PUBLISHED BY THE INSTITUTION OF HIGHWAYS & TRANSPORTATION

PUBLISHED OCTOBER 2008

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ISBN 978-0-902933-40-8

Acknowledgements

The Institution of Highways & Transportation would like to thank the following people without whom the document would not have been possible.

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Proof Reader:
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Financial Support:
Department for Transport, Rees Jeffreys Road Fund and County Surveyors' Society

Photographs courtesy of:

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Published by the Institution of Highways & Transportation,
6 Endsleigh Street,
London WC1H 0DZ
Registered Charity No. 267321
Published 2008. ISBN: 978-0-902933-40-8

These Guidelines are dedicated to the memory of Jack Simpson, who carried out over 4,000 Road Safety Audits in the UK and Ireland between 1993 and 2007.

FOREWORD



By David Tarrant
IHT President 2008-2009

Road safety continues to be an important issue for Government, the profession and individuals. Around 3,000 people are killed on our roads each year and 28,000 are seriously injured. As we look beyond 2010 and to new casualty reduction targets we must not underestimate the contribution Road Safety Audit continues to make to the delivery of safer roads for all modes of travel.

The aim of Road Safety Audit is to minimise the number and severity of situations in which road users are injured whilst using the streets and roads. This task is undertaken by experienced road safety engineering practitioners who examine new schemes and highway improvements during the design and construction stages. As such, Road Safety Audit makes a valuable contribution to a society in which all citizens can aspire to travel in relative safety for a variety of journey purposes including business, leisure, education and shopping.

I would like to thank all those involved in the production of this document, for their expertise, time and dedication, particularly the Steering Group members, the Managing Editor Steve Proctor, the contributing authors and those who peer reviewed the early drafts. I must particularly thank our sponsors – The Department for Transport, the County Surveyors' Society and Rees Jeffreys Road Fund – who have made this document possible.

On behalf of the Institution I commend these Guidelines to all involved in Road Safety Audit - those commissioning the scheme, those undertaking and responding to the Road Safety Audit task, and those writing procedures for organisations responsible for the Road Safety Audit process. I trust that you find these Guidelines helpful as you seek further ways to make our roads and streets safer.



David Tarrant
President 2008-2009

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THE PURPOSE OF THESE GUIDELINES

This third edition of the IHT Road Safety Audit Guidelines has been produced following two recent initiatives in road safety and related fields.

The revised UK Design Manual for Roads and Bridges (DMRB) Road Safety Audit Standard HD 19/03 was produced in 2003, and the Manual for Streets (MfS) was produced in 2007. Both documents have significant consequences for Road Safety Audit.

HD 19/03 is the national standard for undertaking Road Safety Audit, and is mandatory for use on any trunk road or motorway scheme. In the absence of anything to the contrary, it is the "industry standard" and provides a basis for comparison, not least if anything goes wrong. HD 19/03 is often applied beyond trunk road schemes, as HD 19/03 " is commended to other highway authorities".

HD 19/03 sets a high standard of Road Safety Audit which can prove challenging for some local highway authorities, given the resources available and the number and scale of highway schemes most local authorities have to consider.

MfS sets the tone for the planning and design of all streets and has technical details relevant to the design of highway schemes in residential streets. MfS also adopts a more flexible approach to design than that adopted in previous local design guides and in the DMRB. MfS seeks to encourage designers to move away from a prescriptive, standards based, approach and make decisions based on local conditions and risk assessment. A significant research document, produced by TRL[1], backs up the change of approach suggested in MfS.

MfS can also be challenging for some local highway authorities. For instance it questions the standards used for visibility at junctions – a potential safety issue for many Road Safety Auditors. MfS also promotes balancing Road Safety Audit with other scheme assessments – within a new "Quality Audit" process.

The purpose of these Guidelines is to update previous IHT Road Safety Audit Guidelines, with advice, for example, on qualifications for Road Safety Auditors and on legal issues within Road Safety Audit.

In addition, these Guidelines seek to advise local highway authorities in ways in which they can appropriately resource a Road Safety Audit process relative to their own needs. It advises of those areas in which they may consider carrying out Road Safety Audits in a different way to that set out in HD 19/03. It also gives advice on how to respond to issues in the Manual for Streets, including how to work within a "Quality Audit" process for certain types of schemes covered by MfS.

Note: throughout this document the term "collision" has been used to describe road crashes, as opposed to the term "accident". This convention is one adopted by most road safety practitioners in a climate of setting road safety targets in order to intervene in a proactive manner to reduce and prevent crash injuries. Where the term "accident" remains, it is either taken from a direct quotation, or the use of "accident" is more appropriate in that context.

In some sections the term "incident" has been used as opposed to collision. This is because Road Safety Audit seeks to minimise both collision risk and issues such as slips and trips within the highway.

HOW TO USE THESE GUIDELINES

These Guidelines provide a comprehensive review of Road Safety Audit. Whilst they can be read as a complete document, it is more likely that users will be searching for information and advice in relation to a specific requirement. The following chapter guide is intended to help readers to find the chapter they are looking for.

Chapters 1-5 are broadly descriptive, providing information and context.

Chapter 1 provides a general introduction to Road Safety Audit and is suitable for anyone wishing to gain a quick overview of the subject.

Chapter 2 sets Road Safety Audit in context, making distinctions between Road Safety Audit, Road Safety Assessment, other road user audits and other road safety studies. This chapter is important for those users, for example developers' consultants, who are looking to acquire specialist external input to their scheme.

Chapter 3 describes Road Safety Audit in practice, setting out generic processes for this type of work. This chapter is important for anyone looking for a more detailed explanation of what Road Safety Audit is about, and for Road Safety Auditors at the start of their experience in this field.

Chapter 4 provides some details of Road Safety Audit outside the UK.

Chapter 5 describes the current UK DMRB Standard – HD 19/03, and refers to the results of a questionnaire undertaken to examine how Road Safety Auditors have responded to this Standard. This chapter is important reading for anyone wishing to know about the application of the Standard.

Chapters 6-9 contain recommendations regarding the Road Safety Audit process and those involved with that process.

Chapter 6 describes issues arising when undertaking Road Safety Audits on local streets. This should be read by those with an interest in the Manual for Streets, and those with concerns about how to apply Road Safety Audit to residential and high-street environments.

Chapter 7 sets out the circumstances in which local authorities can adopt a more flexible approach to Road Safety Audit, both on internal schemes and on schemes funded through external development. This chapter should be read by staff who are preparing local Road Safety Audit procedures, and by staff interested in Quality Audits and how to integrate Road Safety Audit into development control practices.

Chapter 8 develops the themes raised in Chapter 7 and provides advice on setting out local Road Safety Audit procedures and polices.

Chapter 9 looks at the legal implications of Road Safety Audit and should be read by those responsible for the management of the process.

EXECUTIVE SUMMARY

These Guidelines provide a thorough description of the subject of Road Safety Audit.

They provide guidance to local highway authorities who wish to produce local procedures that differ from the national standards and provide parameters for making reasonable decisions about where to vary from those standards.

These Guidelines also include extensive recommendations regarding Road Safety Audit relating to issues for schemes in local streets, and development control.

Further guidance is provided with respect to Quality Audit and legal issues.

The Guidelines also introduce the concept of Interactive Checklists as an aid to the Road Safety Auditor.

The main recommendations arising from these Guidelines are described below:

- Road Safety Audits should be undertaken on new road schemes and on highway improvement schemes on local roads;
- Road Safety Audits should be undertaken by suitably experienced staff, in teams of at least two people, who are independent from the design team;
- Road Safety Audits should not be undertaken simply as a "check on standards". This advice applies in all situations, including local street, high street and main road schemes. The Road Safety Audit should be concerned with determining interactions between road users leading to potential collision types or footway trips, rather than making sure that the scheme complies with the DMRB, TSRGD, or MfS;
- The Road Safety Audit Report should be written in a clear, consistent, manner that identifies potential road collision scenarios and recommends ways of reducing those risks;
- The Road Safety Audit Report should lead to a formal documented response. The entire Road Safety Audit process should be well documented and be kept on file;
- The Road Safety Audit should be advice provided within the design process, and the scheme client should retain control over the scheme at all times;
- Local highway authorities should consider whether they wish to vary their Road Safety Audit practice from that set out in DMRB;
- Where they do vary from DMRB, local highway authorities should draw up Road Safety Audit procedures relevant to their own requirements and available resources. These procedures should be presented to local politicians to enable their formal adoption as council policy;
- Local highway authorities should ensure that developers submit a Road Safety Audit and/or Road Safety Assessment with their Transport Assessment or Design and Access Statement as part of the planning application, and that this road safety input is reviewed by all relevant officers within the planning and highway authorities;
- Local highway authorities should include a requirement for appropriate stages of Road Safety Audit within their Section 38 and Section 278 agreements, or within their Road Construction Consent process;
- Private sector organisations undertaking Road Safety Audits should establish procedures covering the practical aspects of Road Safety Audit, and the competency of their own internal Road Safety Audit Teams. Those private organisations commissioning Road Safety Audits should also establish procedures for dealing with the management of the Road Safety Audit process;
- Road Safety Auditors should consider using risk assessment techniques in specific Road Safety Audit situations, as required by the client. Risk assessments should examine the potential frequency and severity of collisions, in order to evaluate risk. Risk assessment techniques should also be used within Road Safety Assessments; and
- A Road Safety Assessment should be undertaken when there is a comparative risk assessment to be made, for example between scheme options, or when comparing different road users' safety requirements within a scheme.

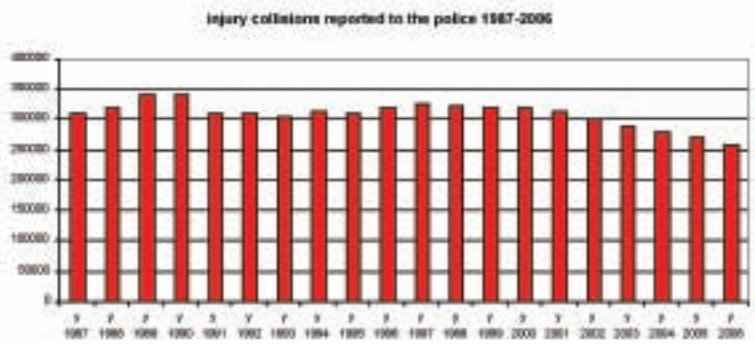
A good Road Safety Auditor can provide a major contribution to developing roads and streets to be proud of and that have exemplary safety records. There are many qualities that make a "good" Road Safety Auditor. They are by no means all "engineering" skills, although there are engineering aspects to the task. Neither are they all "road safety skills", although these are essential to provide the experience required. A "good" Road Safety Auditor needs:

- An ability to co-ordinate tasks and liaise with people within tight timescales;
- An ability to write clear, concise reports;
- An ability to visualise schemes from plans;
- An ability to visualise schemes from the points of view of ALL road users;
- Good attention to detail;
- An ability to understand complex schemes;
- A good memory of standards, control data and advice notes;
- An experience of existing road safety issues and an ability to translate this experience into identifying new and existing hazards;
- An ability to evaluate the likely frequency and severity of collisions, trips and slips arising from those hazards identified;
- An ability to discuss and defend a position, without appearing domineering or intransigent; and
- A willingness to accept innovation without precondition or prejudice

01 INTRODUCTION TO ROAD SAFETY AUDIT

1.1 The scale of the problem

In 1987 the UK Government brought in its first casualty reduction target, seeking to achieve a one-third reduction in collision casualties by the year 2000[2]. In 2000 a second set of targets was introduced, concentrating on killed and seriously injured (KSI). By 2010 the objectives were to reduce KSIs by 40%, and by 50% for road users less than 16 years old[3]. Good progress was and is being made towards achieving these targets in some areas of road safety[4]. However, it is important to note that in the 20-year period between 1987 and 2006 nearly 80,000 people were killed in road traffic collisions in Great Britain, nearly 900,000 were seriously injured, and over 5,200,000 were slightly injured. This crash toll is estimated to have cost the country £120 billion over that period of time (at 2006 costs)[5]. With that money the country could have provided 500 hospitals, or 1,000 prisons, or 6,000 schools. Alternatively we could have built 600,000 homes.





Over 6 million people have been injured in collisions in the last 20 years. Photo source: On The Spot Project, VSRC, Loughborough University

In addition to the number of people injured in road traffic collisions, it is estimated from local studies and highways claims that several hundred thousand people are injured each year in the UK through falling within the public highway.

1.2 The highway factor

There is an economic, moral and social responsibility to reduce road collisions. One aspect of addressing the problem is obtaining good quality data, so that the causes can be established. The main causes of road collisions are well established[6], and researchers and practitioners have for a long time quoted the 'human, vehicle, and highway' factors that act in combination to form the chains of events leading to collisions.

The multi-factor nature of road collisions means that it is very difficult to assign a single cause to any collision, and estimates have long been made of the contribution that the highway makes[7] to collision causation. Whilst there are a relatively small number of collisions caused by "something wrong" with the highway, there are many more crashes where the highway contributes a crucial, if minor, factor. Hence the key to understanding the highway contribution in any collision lies in answering the following question: "Why did this road user fail to cope with their road environment?".

Example - In the following collision a driver lost control of a car on a wet road at a rural road junction, at night and crashed through a hedge, landing in a field. The car had been travelling along a straight road with clear edge delineation provided by road studs and carriageway markings. The junction had good advance signing.







This would appear to be a case in which driver error was an overwhelming factor, and there is little doubt that human factors played a significant part in the collision. However, close inspection of the site reveals that on the final approach to the junction the edge of carriageway road studs and markings stop and the alignment kinks back to the right. The kerb shows evidence of overrun. The road surface is slippery. These highway factors could have contributed to the driver losing control at the junction, as he sought, at the last minute, to avoid a collision with a kerb that he had not seen on the approach.





Photo source: On The Spot Project, VSRC, Loughborough University

1.3 Prevention is better than cure

In the case described above, the highway factor contribution can be understood. This understanding develops from a retrospective analysis of the collision and the road users' actions, and their interaction with the highway environment. Steps could now be taken to improve the situation, and to reduce the possibility of similar collisions occurring. However, had these interactions been understood sufficiently at the design stage of that section of road, it may have been possible to intervene and "design out" the highway contribution. This concept that "prevention is better than cure" provides both the philosophy for Road Safety Audit, and the incentive to undertake this specialised safety activity.

This emphasis on collision prevention is given added weight by words in the 1988 Road Traffic Act[8], referred to in more detail in Section 9.2. The Act places a statutory duty on local highway authorities when constructing new roads. They "must take such measures as appear to the authority to be appropriate to reduce the possibilities of such accidents when the roads come into use".

1.4 Definition of Road Safety Audit

A Road Safety Audit is a formal, systematic, independent assessment of the potential road safety problems associated with a new road scheme or road improvement scheme.

The assessment should involve equal emphasis being placed on all road users. This means Road Safety Auditors should consider pedestrians, cyclists, motor cyclists, people with disabilities, children, equestrians, and older road users as well as drivers and passengers of motor vehicles.



Risk to vulnerable road users - this puffin crossing has been constructed close to a service bay for shops, leaving pedestrians, especially children, at risk if they step out at the end of the "green man" phase. The parked vehicle blocks both the crossing and the signal head.

The Road Safety Audit should NOT be simply a technical check on highway design standards or traffic regulations, or a check on whether the scheme has been constructed in accordance with the design. Technical reviews of this type should be undertaken by others within the design process, and are intended to minimise errors and ensure consistency with standards and best practice guidelines. The role of the Road Safety Auditor, on the other hand, is to ask two very important questions when looking at a design or a newly constructed scheme:

"Who can be hurt in a collision on this part of the highway, and how might that happen?" followed by:

"What can be done to reduce the potential for that collision, or to limit its consequences?"

These questions should be answered by practitioners who are experienced in road safety engineering, with a background in understanding how collisions happen and how to reduce them. More details on Road Safety Auditor experience can be found in Section 3.1. The Road Safety Audit findings are produced in a formal Road Safety Audit Report, containing a series of "problems" and recommendations". More detail on the report can be found in Section 3.3.6. Whilst a major task for the Road Safety Auditor is to identify potential collisions, the emphasis on vulnerable road user safety implies that identifying issues such as footway slips and trips form an important and integral part of the road safety audit task.

1.5 The history of Road Safety Audit in the UK

Road Safety Audit in the UK is a relatively new discipline, having been formally introduced by some local authorities in the early 1980s[9]. The reason given for its introduction was that road safety engineers were implementing casualty reduction schemes on relatively new roads – many of them built to what were then modern design standards. The idea quickly spread that rather than wait until collision problems emerged on new schemes, the design process should be using the road safety engineering expertise to reduce the likelihood of collisions taking place once the schemes were opened.

By 1996 the DMRB had produced two sets of Standards and Advice Notes[10], and the IHT had produced two sets of Guidelines on Road Safety Audit[11]. In 2003 the Highways Agency in England produced a much changed Standard following on from an extensive research project[12]. This Standard is referred to in more detail in Section 5.1. By 2003, Road Safety Audits were being carried out on all trunk road and motorway schemes in the UK, by most local highway authorities on some of their schemes, and on many of the highway schemes prepared by developers and subject to planning consideration.

Some of these schemes involve roads providing access to, and within, new housing developments and in 2007 the Department for Transport published Manual for Streets[13]. The implications for Road Safety Audit are referred to in more detail in Chapter 6.

1.6 An international history of Road Safety Audit

Road Safety Audit spread from the UK, initially to Australia and New Zealand, and to Denmark and Ireland. By 2007, road safety audit practices were common throughout much of Western Europe, North America, South-East Asia, and Australasia, and on major highway schemes throughout the world. More information on Road Safety Audit in other countries can be found in Chapter 4.



Pedestrian sign in Boston, USA

1.7 General scope of Road Safety Audit

The principles of auditing schemes to minimise future collision occurrence can be applied to any scheme where there is a change to the existing road infrastructure – whether that change is alignment, signage, signalisation, marking, lighting, street furniture, landscaping or road surface – and even if that change is only temporary. Whilst some organisations limit the schemes that they audit on the basis of size or cost, another way of deciding where to employ scarce resources is to assess the level and severity of potential conflict within a scheme. Some small schemes like new zebra crossings can generate significant use and conflict between different road users, whereas a large drainage scheme may have little or no impact on the road user.

1.8 Costs and benefits

A Road Safety Audit has costs in terms of:

- The time taken to undertake the audit;
- The potential delay to the scheme's progress as a result of the audit;
- The cost of redesign to accommodate recommendations; and
- The additional cost of any construction arising from recommendations that would not otherwise have been undertaken.

There may be occasions when the audit recommendations save costs by suggesting "less design and construction".

The RIPCORD study[14] found that on average, throughout Europe, road safety audit costs were significantly less than 1% of construction costs.

The monetary benefits of Road Safety Audit are more difficult to quantify. The scheme is either built or not built. Evaluation of the recommendations can not therefore take place in a conventional before/after manner. One study by Surrey County Council[15], comparing audited schemes with similar non-audited schemes, suggested that undertaking Road Safety Audit could save one casualty per scheme audited per year. Other studies have suggested first-year rates of return from this work varying between 149 and 600%[16 17]. There can be little doubt that Road Safety Audit of schemes is cost-effective over time.

Road Safety Auditors undertaking this work over a long period of time for the same client have found that the average number of safety issues per audit declines over time. This is because designers anticipate the safety issues, learn from the Road Safety Audit process, and design in safety features from the start. Another benefit of Road Safety Audit is therefore that it contributes to a "safety by design" culture within organisations.

There are also wider environmental benefits in reducing collisions. A reduction in collisions should lead to less network disruption, so reducing the carbon footprint, and linking government policies across departments.

Summary

- Road collisions cause significant misery both in terms of economic loss and personal trauma;
- How well road users cope with the road environment is a crucial aspect of investigating collisions;
- Steps can be taken to prevent collisions before they occur;
- Road Safety Audit has been demonstrated to be a successful preventative tool for use on new road schemes and highway improvements.

02 ROAD SAFETY AUDIT IN CONTEXT

2.1 The design and construction process

The design process involves the production of a scheme to meet the specific needs of a client. The client specifies the requirement through a design brief, which includes the setting of scheme objectives. A designer is appointed to produce the scheme, consultation may be involved at varying levels, expert responses may be sought from a variety of specialists, and political approval may be needed – for planning or budgetary reasons.

Once a scheme has moved to the construction phase, the designer works with a contractor to build the scheme. Again, specialist advice may be sought during construction from a number of sources.

Road Safety Audit is one of the specialist inputs that should be sought throughout the preparation of a scheme.

The design process may involve feasibility, preliminary and detailed stages, depending on the size of the scheme.

One very important principle of this process is that the client remains in ownership of the scheme throughout the process, and that none of the other participants remove this ownership from the client.

2.2 Internal and external schemes

Most local highway authorities deal with schemes originating from two different sources.

First there are "internal" schemes, initiating from within the authority itself. These schemes range in scope from minor footway works to major capital schemes. In organising a road safety audit procedure, a local highway authority needs to consider which of these schemes should be subject to Road Safety Audit, and what resources are required for this. In this situation defining who the client is appears to be quite straightforward – it is the highway authority engineer responsible for that scheme.

The second group of schemes originate externally. They mainly involve the highway infrastructure part of developments, ranging in scope from small housing accesses to major capital projects funded by development. Within their road safety audit procedures highway and planning authorities need to consider whether such schemes should be subject to Road Safety Audit, at what stage within the design and construction process, and by whom. This can be problematic, not least because the role of client is less well defined in these situations. In the early stages of the scheme the developer is effectively the client, but at some stage during or after construction the local highway authority will "adopt" the scheme, and become legally responsible for its future maintenance, and assume a duty of care towards those people who use it. They should therefore have some say with regard to how and when processes such as Road Safety Audit take place.

2.3 An overview of Road Safety Audit within design and construction

The principle of a client-driven process is very important within Road Safety Audit. Inevitably guidelines about "Road Safety Audit" talk about how to do Road Safety Audit, which schemes to audit, how to write the report and so on. But it is important to realise that Road Safety Audit is a small (but important) part of scheme development, and that the Road Safety Auditor is one of a number of specialists offering advice. Some of this advice may be in conflict, and the scheme client may also wish to balance varying scheme objectives, one of which is safety. For these reasons, it is very important that the client provides a brief for the Road Safety Audit, and a response to the Road Safety Audit. This process is investigated in more detail in Section 3.2.

2.4 Different types of audit

In recent years it has become more common for designers to ask for a variety of "highway audits" at varying stages of scheme design. The one aspect in common for each of these audits is that they apply to new schemes – highway improvements on new roads and streets. Therefore the audits take place as a result of proposed change. Where similar techniques are applied to the existing road network they are commonly referred to as "reviews", as opposed to "audits".

2.4.1 Road User Audits

A Road User Audit is an assessment of a proposed new scheme or a proposed change to an existing road in terms of its convenience, comfort, continuity, personal security (and sometimes road safety) for a particular road user type, for example for pedestrians or cyclists. The IHT has produced Guidelines for both Pedestrian and Cycle Audits[18 19]. The Highways Agency, through its Standard HD 42/05[20], requires a Non-Motorised User Audit (NMU) for all new road schemes on the trunk and motorway network. NMU Audits examine requirements for pedestrians, cyclists, equestrians and those road users with disabilities. NMU Audits are part of a continuous process, usually carried out within the Design Team. The NMU Team Leader is identified as part of the Design Team under HD 42/05. HD 42/05 is not applicable in Scotland. Cycling by Design[21] sets out the criteria for cycle audits in Scotland.



Poor quality cycle facilities



Highway needs for equestrians are examined within NMU Audits

2.4.2 Mobility Audits

These are sometimes referred to as Accessibility Audits, Mobility Audits or Disability Audits. The Mobility Audit is a check on the scheme to ensure appropriate access to the highway for a range of users with disabilities. The 2005 Disability Discrimination Act (DDA)[22] amended the previous DDA to remove an exemption regarding highway services. It is now a statutory duty for highway authorities to provide reasonable access to the highway for disabled road users, within new schemes.



Minimalist approach to tactile paving

2.4.3 How these audits fit together

Any of the above audit types may be required by the scheme client in addition to a Road Safety Audit within a particular scheme. It is the responsibility of the client to organise these audits, and to balance any conflicting recommendations.

In practice, whilst the Road Safety Audit is always an independent assessment, the above audits are often carried out by the Design Team. If this is the case the other audits should be submitted to the Road Safety Auditor as part of the information for the Road Safety Audit.

2.4.4 Quality Audits

Quality Audit is specifically recommended in the Manual for Streets (which supersedes the previous guidance for local housing layouts and streets in England and Wales). MfS sees Quality Audit as an holistic approach, taking into account a wider range of issues, as a guide and aid to the design process. A Quality Audit could be undertaken independently from the design, with regular inputs into the design process by a single Audit Team. Alternatively the client might collect an independent Road Safety Assessment, Road Safety Audit, Road User Audits, visual quality check, and Access Audit from separate audit teams. This will be examined in more detail in Sections 6.4 & 7.2.

2.5 Different types of road safety studies

Road Safety Audit is one of a number of different types of road safety based studies, and it is important to distinguish exactly what is meant by these, in order to avoid confusion or ambiguity.

2.5.1 Collision investigations

A collision investigation may form part of a local safety scheme (LSS) or casualty reduction scheme (CRS) at a single site, along a route or through an area. It involves looking at the historical collision records for an existing location with a pre-identified "high risk", analysing the data, defining the collision problem, and making recommendations based on cost/ benefit estimates for reducing the defined problem. Guidelines for this type of work have been written by RoSPA, IHT[23], and the DfT[24].



2.5.2 Forensic Collision Reconstructions

These are undertaken by experienced police officers trained in Collision Reconstruction, and usually follow on from a fatal or serious road traffic collision. The police officers attempt to identify the contributory factors involved within the collision, including highway factors. Similar techniques are used by expert witnesses when commissioned to act in criminal and civil court proceedings.

2.5.3 Risk Assessments in Road Safety

Formal risk assessment, whilst comparatively common in many professional disciples, has been relatively uncommon in road safety work. A true risk assessment involves the identification of hazards, who is at risk from the hazard, and an evaluation of the risk in terms of how serious the consequences might be if the hazard is realised, together with how often that might happen. Collision studies use historical data to define road safety problems on the existing road network, and Road Safety Audit uses this experience to identify hazards within improvement proposals, without necessarily formally evaluating the level of risk.

There are many situations on the existing network where road safety practitioners can not reference collision data because it does not exist. This often occurs where the proposal is for an activity to change, as opposed to a scheme change. Examples include school travel assessments, walking buses, safer routes, kerbcraft and cycle training. In these cases risk assessments are carried out. More information is presented on risk assessment within Road Safety Audit in Section 6.5.



School travel plans should include assessments of how children arrive at school

2.5.4 Road Safety Assessment

The principal task within Road Safety Audit is to identify highway elements with the potential to contribute to injury, together with the road users who could be hurt in those situations. This "hazard identification" process works well in a system where the detail of a scheme has been determined, and where the client wishes to know what the safety consequences are and how to minimise them. On that basis, for most design stage Road Safety Audits, the Road Safety Auditor accepts the fundamental principles presented for design and does not seek to redesign schemes. They identify the road safety issues within the design and suggest appropriate measures that will improve road safety.

Hazard identification works less well in a comparative situation. For example, at the feasibility stage of a large scheme, there may be options between routes, or between forms of junction control. Whilst a conventional Road Safety Audit can provide a list of hazards associated with each option, it does not compare the relative risk of each of those hazards. In this situation a Road Safety Assessment is required.

A Road Safety Assessment, sometimes known as a Road Safety Appraisal, is an independent comparative assessment of the road safety implications of different scheme options, or a comparative assessment of risks to different road users within one design option. Road Safety Assessments require as their base some understanding and application of risk assessment techniques.

This comparative assessment does provide an opportunity to assess the safety implications of fundamental design principles. The opportunity to make comparative assessments makes Road Safety Assessments an ideal tool for use within the early stages of design – particularly within a Transport Assessment for a development proposal. They are referred to in the EC Road Infrastructure Safety Management Directive[25] (as Road Safety Impact Assessments), and should become mandatory on all major road schemes in Europe when the Directive is adopted.

More advice on when to use Road Safety Assessments is given in Section 7.4.

2.5.5 Road Safety Reviews of existing roads

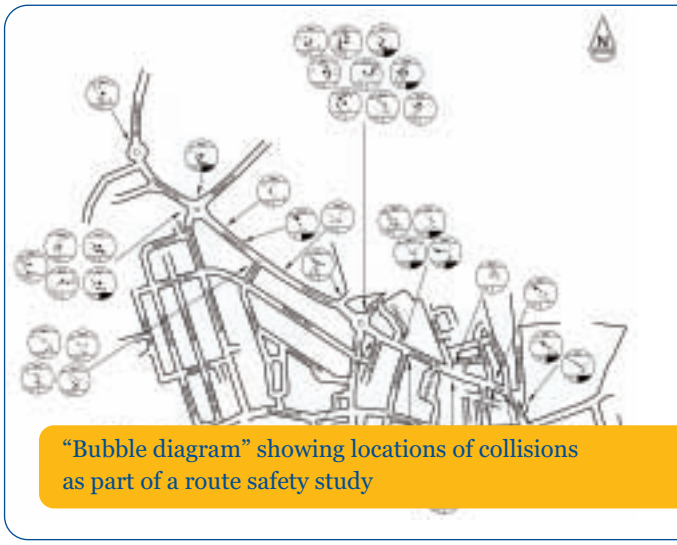
Road safety audit techniques can be applied to existing roads, in order to identify potential future collision locations, with a view to making improvements to prevent such collisions. Where such work is carried out it is generally referred to as Road Safety Review (or Road Safety Inspections within the EC Directive), to avoid any confusion with Road Safety Audit.

Summary

- Road Safety Audit is one of a number of different "checks" that can be carried out during the design and construction process. Road Safety Audit differs from many of the other checks in that it is carried out independently of the design process by staff with appropriate skills, training and experience for the task;
- Road Safety Audit is one of a number of different types of road safety study carried out on transportation schemes. The other studies tend to be either retrospective investigations of historical collision data or individual crashes, or appraisals of scheme options using risk assessment techniques.

03 ROAD SAFETY AUDIT IN PRACTICE

This chapter examines some of the issues concerned with Road Safety Audit in practice. The ideas discussed are considered to be generic and therefore relevant in most situations where Road Safety Audit is carried out. The themes developed in this section relate to Section 5.1 which refers to the specifics of the UK DMRB Road Safety Audit Standard, and to Chapters 7 & 8 which suggest ways in which local highway authorities can develop their own road safety audit procedures.



"Bubble diagram" showing locations of collisions as part of a route safety study

3.1 Who should carry out Road Safety Audits?

Road Safety Audits should ideally be undertaken by practitioners with suitable road safety engineering experience. They can identify likely road safety issues for road users by virtue of their training and understanding of collision causation. They also have experience in what can be done to reduce the potential for collisions occurring, and/or in limiting collision consequences.

Unlike many elements of highway and traffic engineering there are comparatively few calculations to make and no standard details. Road Safety Audit is based on the Audit Team's previous experience and expert professional opinion that there is a both a road safety problem present, and that the recommendation will address this risk. It is imperative that the team has a sound training background. More importantly, they should have experience in investigating road traffic collisions, and experience of the most appropriate measures to minimise the potential for the risks arising.

There are a number of requirements that contribute to effective Road Safety Auditors and Audit Teams. These are described below.

3.1.1 Experience requirement

Knowledge and experience in road safety engineering

In order to identify road safety problems Road Safety Auditors should have experience in collision analysis[i]. By undertaking collision investigations Road Safety Auditors will become aware of issues that lead to collision occurrence, and recognise differences between perceived risk, and actual risk. They will also be aware of the issues that affect collision severity. Through analysing collision clusters at a variety of locations Road Safety Auditors should become aware of how and why collisions occur and how the environment contributes to them.

Recommendations included in Road Safety Audits should be based where possible on proven collision reduction techniques and Road Safety Auditors should have experience in this area. The experience gained in proposing appropriate remedial measures provides the Road Safety Auditor with the skills needed to identify those solutions most likely to be effective in tacking the specific risks identified. These include monitoring the site to identify the success of the remedial measures and building up control data from many sites of similar types.

Road Safety Auditors should be aware of issues that affect the road safety of all road users.

This experience is not a one-time requirement. Road Safety Auditors should have continuing and recent experience in road safety engineering in order to keep up to date with the latest theory, research and techniques in tackling collisions.

Knowledge and experience in highway and traffic engineering

In addition to road safety engineering, experience in highway and traffic engineering is highly desirable. Road Safety Audit recommendations should be proportionate and viable. Road Safety Auditors should have a basic knowledge of highway and traffic engineering to ensure that the recommendations that they make are sound. Without such requirements recommendations may be at best impracticable and at worst illegal and potentially dangerous.

A Road Safety Audit is required to address many types of highway and traffic engineering schemes, including more specialised areas such as traffic signals and street lighting. Whilst a typical road safety auditor is not required to be an expert in these fields, a basic knowledge is required in order to be able to identify hazards associated with these elements and to provide expertise to recommend proportionate and viable

[i] obtained through detailed collision analysis of Stats 19 data, police sketches and/or witness statements, statistical analyses etc., the RoSPA Road Safety Engineering Manual and IHT CPR Guidelines provide more information on these tasks. Experience in crash causation can also be gained through investigating individual collisions, for example within a police accident reconstruction team, or within a research contract such as the DfT On the Spot (OTS) study

solutions. Areas in which some knowledge and experience are desirable include:

- Highway design and construction including an appreciation of the Design Manual for Roads and Bridges (DMRB);
- Traffic and Speed Management including an appreciation of the Traffic Signs Manual (TSM) and the Traffic Signs Regulations and General Directions (TSRGD);
- Traffic signal and roundabout design;
- Street lighting;
- Highway maintenance;
- Transport planning;
- Road user behaviour (education, training and publicity - ETP);
- Enforcement; and
- Urban design and Manual for Streets.

Experience in some of these areas can be substituted with appropriate training if necessary.



Delegates on a traffic engineering training course

However received, good background knowledge of highway and traffic engineering is important. For example, if an auditor does not know the design principles regarding closely associated secondary traffic signals or locating lighting columns on bends, they are at an immediate disadvantage when identifying problems and making recommendations in these areas.

Knowledge and experience in Road Safety Audit

A Road Safety Auditor also needs appropriate and relevant knowledge and experience in Road Safety Audit. Road Safety Audits are undertaken on all forms of highway and traffic schemes from cycle and pedestrian schemes to multi-lane motorways. Experience in undertaking Road Safety Audits of one type of scheme does not necessarily mean that Road Safety Auditors are suitable to undertake Road Safety Audits of all schemes.

Each type of scheme performs different functions, provides for different road user requirements and hence different risks arise. It is therefore important, where possible, for Road Safety Auditors to have experience in undertaking audits on the type of scheme to be audited, especially where they are taking on a Team Leader role.

For example, it is not appropriate for a Road Safety Auditor with experience only in low speed urban schemes to undertake the Team Leader role on a new high speed rural section of motorway. It is equally inappropriate for the person with experience only in high speed roads to lead an Audit Team on an urban mixed-priority scheme.

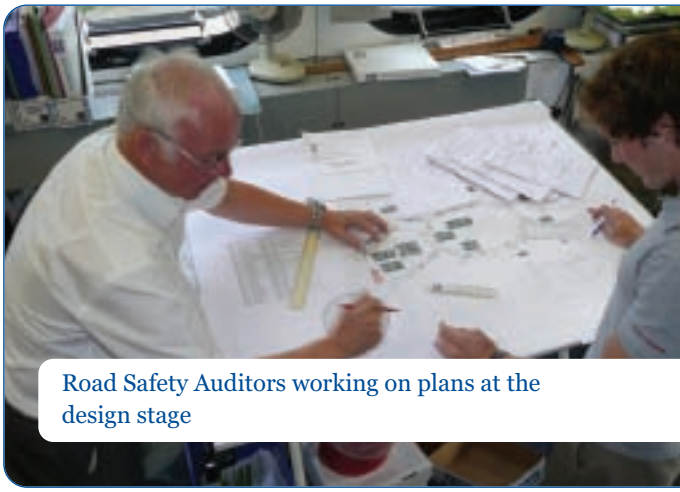
Undertaking Road Safety Audits on a full-time basis is considered to be undesirable, as the Road Safety Auditor needs to continue to keep up to date and maintain experience in other areas of road safety engineering.

3.1.2 Team requirement

Road Safety Audit is a “team task”, with two or more people usually forming the Road Safety Audit Team. This is primarily because two people auditing a scheme have been demonstrated to find more issues than one person[26]. However, there are other advantages of having two people carry out a Road Safety Audit.

Firstly, the team members can make sure that each others’ enthusiasm to find safety issues does not overburden the design process with “non-safety issues” that would simply add cost and time to the design. Each team member can scrutinise the others’ comments, and they can decide together whether the issues raised are likely to lead to a collision occurring if left untreated.

Secondly, there is a greater possibility that a team will be able to develop more effective recommendations, compared to one person working alone.



Road Safety Auditors working on plans at the design stage

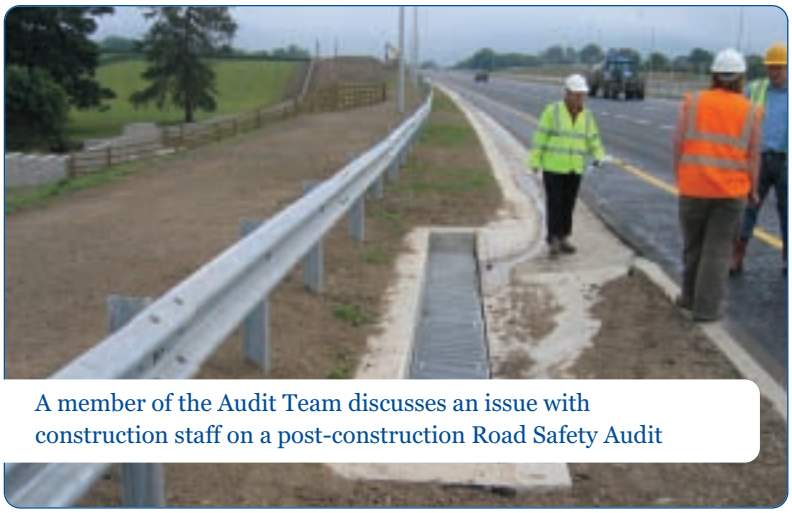
In those circumstances where the risks arising during a site visit are significant, it is good health and safety practice to undertake site visits with at least two members of staff in attendance.

A Road Safety Audit Team usually comprises a “Team Leader” and a “Team Member”. It is also possible to have additional Team Members, and “Team Observers”, or “Trainees”, in some circumstances. Both

Team Member and Team Leader should have appropriate experience, although the Team Leader will take a lead for a particular Road Safety Audit, maybe based on greater experience of that type of scheme. The Team Observer role fulfils a training opportunity for less experienced staff to gain experience to assist them to become a Team Member in the future.

Specialist advisors, additional to the core Road Safety Audit Team, may also take part in the Road Safety Audit process.

More information on the Audit Team can be found in Section 3.3.1.



A member of the Audit Team discusses an issue with construction staff on a post-construction Road Safety Audit

3.1.3 Independence requirement

The Audit should be carried out by experienced staff who are completely independent of the scheme design. It is acceptable for them to work for the same organisation, but the principle here is that they should not audit their own scheme. This is because the designer has developed a scheme within a number of constraints, and to a number of competing objectives. Most schemes are not primarily designed to improve road safety, and an independent Road Safety Audit of the scheme should focus purely on road user safety needs. It is also unlikely that the designer will have the experience necessary to undertake the Road Safety Audit. Client pressure can also be brought to bear on non-independent audit teams, and in those situations where the normal Road Safety Audit Team has been involved in the detail of the design, a completely independent team should be sought out.

However, it is acceptable for the Audit Team to provide safety advice to the Design Team during the design process. This can be particularly helpful on larger, complex, or innovative schemes. This advice can be provided without compromising the independence referred to above, as long as the advice is restricted to the road safety implications of aspects of the design, and does not stray into other aspects of design.

The Audit Team can also communicate directly with the Design Team, where they seek clarification of issues regarding the design.

3.1.4 Qualifications requirement

The Highways Agency, in HD 19/03, has made recommendations for suitable road safety audit qualifications. These are described in Appendix 5. Section 7.1.3 describes the manner in which local highway authorities may choose to vary their requirement from the recommendations in HD 19/03.

3.1.5 Certification requirement

Section 4.2 describes a European Commission proposal for requiring Road Safety Auditors to have their competence certified, for work on the Trans-European Road Network. This certification is in addition to experience and qualifications based requirements.

3.1.6 SoRSA requirement

The Society of Road Safety Auditors (SoRSA) was established as a technical branch of IHT in 2007[27]. The objectives of SoRSA include providing support to Road Safety Auditors, and establishing a list of Road Safety Auditors with appropriate qualifications and experience which will be available to prospective clients. In order to fulfil this objective SoRSA has established entry, intermediate and higher level requirements of experience and qualifications for Road Safety Auditors which can be used by prospective clients in assessing the suitability of Road Safety Auditors for a scheme.

3.1.7 Road Safety Audit training

Experience gained in road safety engineering is the most important element for a Road Safety Auditor. However formal training courses have a part to play in developing the knowledge and skills required, and especially in updating knowledge in the light of new road safety research and innovative design.

A Road Safety Auditor requires training both to supplement their road safety engineering experience, and in Road Safety Audit itself.

Regular refresher training is also required to ensure that the Road Safety Auditor is kept up to date with the current practice in collision investigation and the latest research in road safety engineering. This can cover a number of subjects from research into driver behaviour to the latest technological advances available to tackle the road safety risks that arise for road users.

Additional Continuing Professional Development (CPD) could include elements from associated disciplines such as planning, urban design, or landscape design where the Road Safety Auditor's role includes consideration of new developments.

CPD does not need to be limited to formal training courses, conferences and seminars. The highway and traffic related professional institutions provide guidelines on how CPD requirements can be achieved. This can range from structured reading to on-the-job training. Road safety is a wide-ranging subject and covers aspects as diverse as human psychology and vehicle technology. Road Safety Auditors should be familiar with the sources and range of research reports that are available.

3.1.8 Training available in the UK

Whilst there is no standardised formal training course for Road Safety Audit in the UK, a number of organisations[28] do provide appropriate training in both Road Safety Engineering and Road Safety Audit.

A range of road safety audit courses lasting from one to three days exist, at both introduction and advanced level. In addition there are courses designed to maintain an up-to-date perspective on Road Safety Auditing.

There are numerous road safety engineering courses of varying length and intensity, and in addition a selection of advanced road safety engineering courses is now available.

Case Study – Danish Road Safety Audit Qualifications

In Denmark[29] Road Safety Auditors are required to attend training courses. A series of pre-training qualifications are required which neatly sum up the requirements that make up a competent Road Safety Auditor. These include:

- Knowledge of road safety problems, collision investigation, road user behaviour, collision reduction measures, effectiveness of treatments, control data;
- Experience in highway and urban design to demonstrate how to analyse a given design, identify relevant problems, propose and document solutions; and
- Clarity in writing and speech, ability to work both independently and as part of a team, to contribute to constructive discussion, a willingness to continue learning, and practical analytical skills.

Summary of Road Safety Auditor requirements

- Road Safety Audit should be independent from the design, and be undertaken in teams of at least two practitioners experienced in road safety engineering;
- Road Safety Auditors should have experience in collision investigation and a sound knowledge of the most appropriate techniques to address the risks arising to all road users and ranges of road user ability;
- Road Safety Auditors should have suitable experience and/or training in a variety of elements of highway and traffic engineering in order to develop effective, proportionate, and viable recommendations;
- Audit Team Leaders should have experience in auditing the type of scheme to be audited. It is desirable that Team Members also have this experience;
- Road Safety Auditors should maintain a good level of continuing professional development to ensure that they are up to date with the latest research in road safety and the latest engineering measures available to tackle road safety risks; and
- Road Safety Auditors should have an understanding of the road safety needs of all road users.

3.2 How to manage the Road Safety Audit process

3.2.1 Scope of Road Safety Audit

Section 5.1 describes the UK DMRB requirement for Road Safety Audit on trunk roads and motorways. Any scheme that involves a permanent change to the existing alignment, signage, markings, street lighting, fencing or other highway feature requires a Road Safety Audit. This includes maintenance schemes that involve a permanent change to the highway, and exceptional temporary traffic management schemes that will affect the network for a considerable period of time.

Local highway authorities are involved in a variety of schemes that involve change to their existing network:

- Major highway schemes, for example new bypasses, road widening, grade separated roundabout construction;



New single carriageway road construction

- Traffic management schemes, for example bus priority, cycle schemes, pedestrian schemes, traffic signal modification, installation of pedestrian crossings;



Improvements to accommodate street running of trams

- New traffic signal or roundabout junctions;



Improvements to a roundabout in Perugia, Italy

- Road safety schemes, for example local safety schemes, safer routes to school;
- Traffic calming schemes – urban and rural;



New 20mph zone

- Minor improvements, for example footway alterations, road markings and signage schemes;
- Highway maintenance schemes that replace existing features with improvements or changes, for example maintenance of safety fences to provide new terminal protection standards; and
- Temporary traffic management schemes that involve road works for significant periods of time.



Road works in Ireland

In addition local highway authorities, through their highways development control function, enter into agreements to adopt schemes derived through:

- Major developments, for example new highway construction arising from retail, housing or commercial development;



New set of traffic signals on a major development site

- Minor developments, for example improvements to an existing access to accommodate a small housing development;
- Low-speed developments such as home zones or new housing layouts where the control of traffic speed is fundamental to the design; and



New housing development

- Public realm or “Streetscape” type schemes.



Streetscape scheme in O’Connell Street in Dublin

Highway authorities may consider undertaking Road Safety Audits on any or all of the above schemes. Section 7.1.3 looks at this issue in more detail.

In order to address some of the issues that will rest with the local highway authority once the scheme is operational, it is recommended that authorities develop procedures and policies to define the scope of schemes that will be subject to Road Safety Audit, and the manner in which that Road Safety Audit will be undertaken. Chapter 8 advises on how to develop a procedure and policy.

3.2.2 Stages of audit

Road Safety Audit can be carried out at any of the following stages during the progress of a scheme, depending on the scope and extent of the scheme.

Design Stages:

- Feasibility (Stage F) – scheme concept, for example discussion of options for a new road, or discussion of options for a form of junction control for a development access;
- Preliminary design (Stage 1) – the alignment and junction choice has usually been determined, and the drawings show the horizontal and vertical alignment, road widths, junction types, locations of structures and so on;
- Detailed design (Stage 2) – aspects considered during Stage 1 should be reviewed. The drainage, kerbs, edge details, lighting, landscaping, fencing, signs, markings and signal control details have been added to the plans. Features which affect cyclists, pedestrians and equestrians should be examined;
- Single design stage (Stage 1/2) – a combination of Stages 1 & 2, often applied on relatively minor schemes; and
- Safety advice – advice that is given by Road Safety Auditors to designers at any stage during the design process (known as Interim Audit within the formal HD 19/03 system).

Post-construction Stages (Stage 3):

- Substantial completion (Stage 3A) – the main infrastructure parts of the scheme are complete, but the signs and markings have not yet been installed. The scheme may be working with some temporary traffic management;



Footway construction not yet complete on this new scheme

- Pre-opening – (Stage 3B) – the scheme is now fully ready for traffic to run on it;
- Post-opening – for certain schemes, for example, a zebra crossing on an existing road, the scheme is opened to traffic once completed, and an Audit is carried out as soon as possible during scheme use; and
- Safety advice – advice that is given by Road Safety Auditors at any stage during the construction process (known as Interim Audit within the formal HD 19/03 system).

Subsequent stages:

- Monitoring (Stage 4) – a review of the operation and performance of the scheme 12 or 36 months after completion.

For major D&B/DBFO/PPP schemes, the Stage 1 Road Safety Audit is often undertaken at concept design prior to tender, with a comprehensive design stage Road Safety Audit undertaken on the final design.

For many local highway authority traffic schemes there is only one design stage audit, and only one

post-construction audit. Section 7.1.3 provides advice on how to develop an approach for determining the appropriate level of audit, depending on size of scheme.

In some situations a scheme will have been dormant for some time, or will have changed substantially since a design stage road safety audit has been carried out. In these scenarios it is recommended that the scheme is subjected to a re-audit.

3.2.3 Commissioning the Road Safety Audit

The party responsible for commissioning the Road Safety Audit is known as the scheme client. The client role depends on the type of scheme and the Road Safety Audit stage.

In-house schemes	local highway authority Project Sponsor or design engineer
Development-led	designer/developer (although local highway authority may have a role too)
Major trunk road	Project Sponsor (England and Wales) Employer's Agent (Scotland)
Post tender DBFO	Project Sponsor (England and Wales) Main Contractor (Scotland)

It is the responsibility of the client to prepare an Audit Brief, and select an appropriately experienced Audit Team for each stage of Audit.

The Audit Brief should describe the scope of the scheme, its context and relevant constraints, and provide a list of information that will be provided to the Audit Team, depending on the Stage of the Audit. An example of a checklist to assist in preparing the Audit Brief is given in Appendix 1. Not all of this information will be available in each case, particularly on smaller local schemes.

The Audit Brief should identify how the process will be managed, the Stages of Audit required, and the client to whom the Audit Team should report. The manner in which the process is managed will vary depending on the type of scheme and stage of Road Safety Audit. For many small local schemes, the client and the designer are the same person.

Once the Audit has been commissioned, it should be carried out in accordance with the Brief, and to the timescales agreed between the client and the Audit Team Leader.

The Audit should be written by the Audit Team. It is crucial how each issue is written within the report. Each road safety problem should be written in terms of a potential collision scenario involving injury to a road user, and how the aspects of the highway layout could contribute to that collision. The recommendation should then address the potential problem by suggesting measures that remove or reduce the potential for the collision to occur, or that minimise the consequences were the collision to take place. In some scenarios the "collision" will involve the potential for an incident that involves injury that does not involve a motor vehicle, for example a footway trip or slip.

3.2.4 Response to the Road Safety Audit and the Exception Report

Once the Audit Report has been produced and signed by the Audit Team Leader, it should be sent to the client as identified within the Audit Brief. The client should then review the report, in conjunction with the scheme designer. Initially the designer needs to respond to the audit, and to inform the client of those recommendations that are acceptable, and any that are not.

A simple designers' response form is shown in Appendix 2. This allows the designer to respond to each Road Safety Audit recommendation. The designers' response should then be discussed with the scheme client.

There are three scenarios that can result from this process:

- Scenario 1. The designer and client accept the road safety problem, and agree with the recommendation. In this case, the client should move to change the scheme as all parties are in agreement.
- Scenario 2. The designer and client accept the road safety problem, but are unable to implement the recommendation, maybe due to constraints imposed on the design through, for example, cost or land-take, or due to constraints imposed by employers' requirements.
  In this case, the designer and client should agree an alternative to address the problem, as both agree that there is a road safety risk within the current scheme proposal. This alternative should be presented to the Road Safety Audit Team, who should respond[ii]. In the case of major design amendments, a further Road Safety Audit may be required. The discussions between the client and Audit Team should be recorded and kept on file. In some situations, despite the designer and client accepting that a road safety problem exists, it may not be possible to come up with a mutually acceptable solution, or indeed any solution at all. In these cases the client needs to prepare an "Exception Report", stating clearly why the problem can not be effectively addressed.

[ii] This can be recorded on Appendix 2, in the column to the right hand side of the form which records the Audit Team's response.

- Scenario 3. The designer does not accept the problem, and therefore does not accept any requirement to alter the scheme in line with the recommendation.
  In this case, if the client agrees with the designer, the client should write an Exception Report, stating clearly the reasons for rejecting the road safety problem as stated in the Audit Report. A copy of the Exception Report should be sent to the Road Safety Auditor.

The Audit Report, the designer's response, and any Exception Reports should remain together as a complete record of the Audit process, and remain in the public domain for future reference.

For many small local schemes, the client and designer may effectively be the same person.

3.2.5 Arbitration

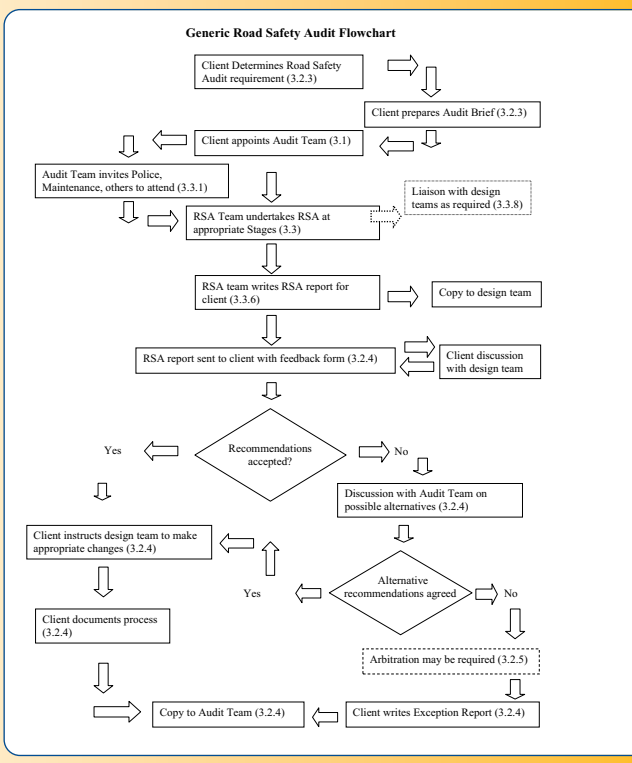
In some situations, for example where a client/designer is a relatively junior person within an organisation, or where a scheme is particularly sensitive, the client may wish to refer to someone at a strategic level in the organisation to arbitrate between a Road Safety Audit issue and a designer's response.

3.2.6 Roles and responsibilities

The main roles and responsibilities within the Road Safety Audit process are listed below.

Role	Responsibilities
Scheme client	Person or organisation responsible for the funding and ultimate operational management of the scheme Provides Road Safety Audit Brief Writes Exception Report
Designer	Person or organisation responsible for drawing up designs to client specifications Responds to Road Safety Audit and advises client accordingly Responsible for internal Road Safety Audit procedure for design organisation
Road Safety Audit Team Leader	Lead Auditor, responsible for compiling Audit Report, representing Audit Team, and arranging external participants to assist with Safety Audit
Road Safety Audit Team Member	Second Auditor, responsible for contributing to Audit Report
Observer	Road Safety Audit Team "trainee"
Arbitrator	Person in client organisation with authority to arbitrate between Design and Audit Teams, if required

Example - The flowchart illustrates the Road Safety Audit process, and is referenced to appropriate sections in the text.



3.2.7 Road Safety Audit procedure and policy

A procedure is a local guideline written by an organisation to describe how work is carried out within that organisation's area of responsibility.

A policy is a local highway authority procedure that has been submitted to elected members for their approval and accepted as official council policy.

3.2.8 Road Safety Audit on private finance schemes

The demands of D&B, DBFO and other modern contractual arrangements usually mean that design work is an ongoing process throughout the period of scheme construction and the completion of works is often staged and strictly time bound. These requirements can be at variance with the normal Road Safety Audit procedures undertaken at discrete points during scheme design and construction.

Road Safety Auditors need to be aware of the necessity to work with designers and contractors delivering DBFO and similar schemes to ensure that as safe a road network as possible is provided. At times this may involve Road Safety Auditors working in a closer relationship than is usual with designers and contractors, but the independence and integrity of the Audit Team must be maintained at all times.

Generally Stage 2 and Stage 3 Audits will be affected by these types of contractual arrangements. Wherever possible an Audit Team should be established at an early stage in the design and/or construction process and that Team should seek to undertake all the Road Safety Audits associated with the scheme. In this way there is a continuity of approach and both the Road Safety Auditors and the designers/contractors will have an understanding and appreciation of each others' role, position and requirements.

To assist in the planning and co-ordination of the Road Safety Audits, which can often be required at short notice and with a limited turn-round requirement for reporting, it is useful if single points of contact are established between the Road Safety Audit Team, the designers and the contractors. In addition, it is also useful if the Audit Team Leader has contributed to the programming of the design and construction activities, so that adequate time slots for Road Safety Audits can be incorporated.

Especially at Stage 3, the timing of the Road Safety Audit and possibly more importantly the issuing of the Road Safety Audit Report can be very critical to scheme completion. The Audit Team will often have to visit the site on a number of occasions to suit the construction timescale, and make a series of visits as specific sections of the scheme are finalised.

The time taken in preparation and submission of Road Safety Audit Reports could adversely affect the construction process, especially when the scheme is close to final completion. One method of addressing this issue is for the Audit Team Leader to meet the contractor and designer following the Audit site visits and provide verbal feedback with the formal reports following shortly afterwards. Consistency between the verbal and final report is important, and the independence of the Audit Team should not be compromised at any verbal feedback meeting.



DBFO side-road tie-in at Stage 3 Road Safety Audit

Summary of management of the Road Safety Audit process

- Road Safety Audit should be undertaken on highway schemes. Schemes subject to Road Safety Audit can range considerably in scope from major highway construction schemes to small traffic improvement schemes;
- Road Safety Audit should be undertaken at formal stages throughout the design and construction process;
- Roles and responsibilities for Road Safety Audit activities need to be properly defined by the organisations responsible, and set out in procedural and policy documents;
- A Road Safety Audit report should have a formal response, and arbitration may be needed in some circumstances; and
- The construction process for privately financed schemes often necessitates a different approach to Road Safety Audit. It is important not to compromise the independence of the Audit Team through any differences that arise.

3.3 How to undertake A Road Safety Audit

3.3.1 The Road Safety Audit Team and others involved

For most Road Safety Audits, a team of two people will be sufficient, with one member of the team taking a "Team Leader" role. In addition, it is important for the Audit Team Leader to consider whether it is appropriate to invite other non-team members to contribute:

- On post construction (Stage 3 Road Safety Audits) the police and representatives from the maintaining authority should be invited to attend. In some situations it is beneficial to invite police contributions at the design stages. The police provide an important contribution and offer a perspective that adds value in the following areas:
  - They can comment on non-reported collisions that have occurred at that location in the past, or since the scheme was opened, or on similar collisions that have occurred at similar types of location;
  - They can relay comments from members of the public;
  - They can reflect a range of drivers' views;
  - They often have experience of driving a wide range of vehicles including riding motorcycles to an advanced level and are trained to observe detail in similar situations;
  - They can offer a practical view on the regulatory aspects of the scheme, particularly speed limits and how drivers are likely to respond to them; and
  - They may offer advice on any exposure to potential future litigation.



The Police have an important role within Road Safety Audit

- The role of the representative from the maintaining authority at a post-construction stage Road Safety Audit is to:
  - Comment on any drainage and road surfacing issues;
  - Comment on the future maintenance regime and how that will affect the scheme operation;
  - Comment on any street lighting issues;
  - Comment on likely wear and tear on the scheme, for example how a narrow carriageway could be affected by large vehicle tracking; and
  - Comment on any monitoring requirements.
- At post-construction stages, representatives from the client or designer may be invited depending on the nature of the scheme:



Site and design staff discuss issues with the Audit Team at Stage 3

  - Trainees or Observers wishing to become Team Members can be invited at the discretion of the Audit Team Leader;
  - Depending on the nature of the scheme, specialists can be invited to provide advice to the Audit Team, for example traffic signals engineers, road safety officers, street lighting engineers, urban designers, access or mobility officers.

The police, highway authority representatives, specialists, and trainee/observers' names should not be added to the Audit Team Member list. However, their names should be recorded as having attended the Road Safety Audit.

The Audit Team Leader is responsible for assessing the contributions of others involved in the Road Safety Audit and deciding whether to include their comments within the report. Only those comments with a road safety implication should be included within the main body of the report.

Where possible, the same Audit Team (or at least Team Leader) should be retained throughout the scheme being audited.

3.3.2 The Road Safety Audit "tasks"

Once the Road Safety Audit Team has been confirmed, and the brief and information has been supplied, and accepted by the Audit Team Leader, the task can begin. For a design stage Road Safety Audit the following process is required prior to writing a report:

- The Audit Team should review the Audit Brief;
- The Audit Team should examine the plans to determine the scope of the scheme proposals. The Team should examine any previous Road Safety Audit and Exception Reports produced for the scheme;
- The Audit Team should undertake a site visit. Photographs should be taken;





A scheme was presented at Stage 1 involving an uncontrolled footway crossing of this road to connect two existing footpaths



The site visit revealed an alternative route along a canal and across a bridge

- The scheme plans, together with all other information supplied by the client, should be examined by each member of the Audit Team. Collision or traffic data for the existing layout should be analysed to provide background information on existing road safety issues and who is at risk. The scheme plans should be examined systematically, and a procedure should be developed to record Team Members' comments. A pro forma that can be used for this task is shown in Appendix 3. The objective of each Team Member should be to record those issues that they believe may lead to road user injuries occurring if the scheme remains unchanged;
- (Some Audit Teams prefer to undertake the site visit at this stage, having already made detailed examination of the plans and other information);
- The Audit Team can either work together to record their issues, or work completely independently from each other (at least at first). The latter method has the advantage of producing two completely independent analyses of the information;
- "Non-safety" items can also be recorded (at the Audit Team's discretion). These items should be passed on to the client in an appropriate format. Non-safety issues could include errors on the drawings, references to outdated design guidance, other design and operational issues that have no effect on road safety, and omissions from the drawings such as north points or scale reference; and
- The Audit Team members should discuss all of the issues raised during this part of the audit, in order to determine which issues are put into the Road Safety Audit Report. Only those road safety issues that are agreed by both Team Members should be included within the report. Non-safety issues should not be placed within the main body of the report.

For a Stage 3 Road Safety Audit the following process is required prior to writing a report, following acceptance of the Audit Brief:

- The Audit Team should review the Audit Brief;
- The Audit Team should examine a location plan to determine the extent of the scheme proposals;
- Prior to the site visit taking place all previous Road Safety Audit and Exception Reports should be collated and read through. Any outstanding issues should be revisited during the site visit. The construction drawings should also be examined;
- The Audit Team Leader should invite the police, highway maintenance and local highway authority representatives to attend the site visit;
- The Audit Team should undertake a site visit during the day. In most cases it will be necessary to visit again during hours of darkness. The purpose of the visits is to record any potential issues which the Audit Team believes may lead to road user injuries, or increase the severity of injuries. All issues should be recorded. A photograph should be taken of each issue identified;
- The views of all those contributing to the Audit inspection, should also be recorded, for potential inclusion within the report, as appropriate;
- The Audit Team Members should discuss all of the issues raised prior to leaving the site, in order to determine which issues are put into the Road Safety Audit Report. Only those road safety issues that are agreed by both Team Members should be placed within the main body of the report; and
- "Non-safety" items can also be recorded and passed on to the client in an appropriate format.

At Stage 4, the Audit Team Leader should invite representatives of the maintaining authority to attend, if the Road Safety Audit is carried out independently from that authority.

3.3.3 Site visits at design and post-construction stages

Care should be taken to ensure that all existing roads affected by the scheme are examined, and particular attention should be given to the point where the new work ties in to the existing network.

Photographs should be taken and documented. Site notes should be recorded where appropriate. In some situations the Audit Team may, at their discretion, decide that a visit needs to be made at a particular time of day (for example at school leaving times.)

Night-time site visits are recommended for most Stage 3 Audits.

Staff undertaking site visits should comply with their organisation's guidelines with respect to health and safety on site, and to any client or contractor's health and safety requirements.

3.3.4 Spotting hazards

The purpose of a Road Safety Audit, at any stage of the Road Safety Audit process, is to identify those issues that if left untreated could contribute to road user injuries, or to the severity of those injuries.

Experience in road safety engineering is of primary importance in assessing the features of a scheme most likely to lead to or contribute to risk of injury.

There are three methods which the experienced Road Safety Auditor can use to assist the hazard identification process. They are the use of checklists, the use of previous experience or control data, and the use of road user role play.

The use of checklists

Checklists have been produced since the early days of Road Safety Audit, and exist in a number of forms, often appropriate to the three principal stages of Audit (1, 2 & 3). The lists produced for the previous version of the IHT Guidelines are reproduced in Appendix 4.

Experienced Road Safety Auditors sometimes use checklists as a prompt at the end of their checking process to make sure that they have not forgotten any potential safety issues, or any specific road users. Less experienced Road Safety Auditors will find checklists an important part of the learning process.

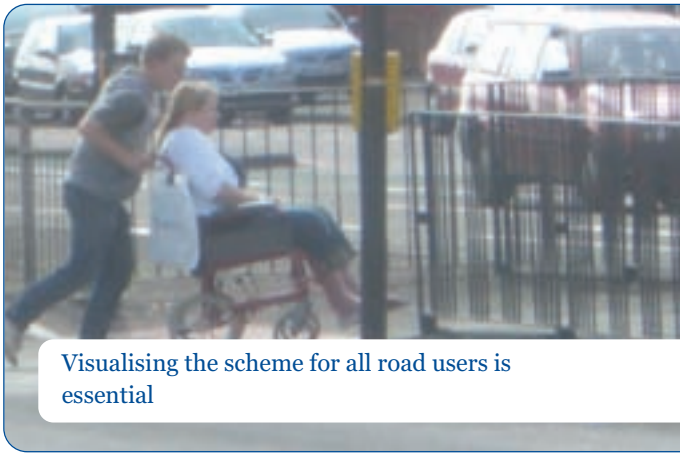
The use of control data

Control data provides some assistance in determining the answer to the question:
"Who can be hurt in a collision, and why?"

Collision statistics and road safety research should be used to assess infrastructure features that have the potential to be collision causation factors. It is important for the Road Safety Auditor to keep up to date with road safety research, and to undertake collision studies of varying types. The road safety research side of this produces "control data", which can be used to estimate collision risk, as described in Section 3.4.2.

The use of road user role play

In addition to the risks arising to drivers and pedestrians, the Road Safety Audit task requires the Auditor to identify hazards for all road users, including cyclists, motorcyclists, equestrians, people with sight and mobility impairment, those with special educational needs, children, older people, bus drivers and passengers, on-street tram drivers and passengers, and large goods vehicle drivers.



Visualising the scheme for all road users is essential

At the design stage it is essential to visualise the scheme from each user's point of view, and to imagine walking, riding, and driving the scheme. Once the scheme is built it is possible to do these activities for real – and on some schemes it is important to cycle the scheme as well as to drive and to walk, for example when specific cycle facilities are provided, or when there are large numbers of cyclists anticipated as users of a more general scheme.

Not all Road Safety Auditors will have direct experience of each of these user's needs. Consultation and carrying out Road Safety Audits with specific user groups can be very instructive. Road user training in specific areas, and an understanding of the literature in areas such as motorcyclists' needs[30], and the needs of people with disabilities[31], is very important.

The use of checklists on their own can lead to simply "ticking boxes", and road user role play can lead to unsubstantiated assessments of risk that bear little relevance to what happens in real-world collisions. Both methods need to be backed up by direct experience in road safety engineering – including an appreciation of the application of road safety "control data".

The interactive checklists described in Section 3.4.3 are a starting point for combining all three methods of hazard identification.

3.3.5 Insufficient information

Sometimes the Road Safety Audit Team receives insufficient information to complete the Audit.

Stage 1 is the first stage of Road Safety Audit for many major schemes built under conventional funding or D&B/DBFO/PPP mechanisms. At this stage any lack of detail can have significant implications for road safety. It is necessary at Stage 1 for the designer to identify the land required to construct the scheme. If all issues related to potential land-take, for example departures from Standard, have not been identified at that stage, the safety of the final design may be compromised. It is therefore important for the Stage 1 Road Safety Audit on a major scheme to consider such issues, and to obtain all the relevant information.

A common problem is an incomplete set of drawings or details at Stage 2, or poor quality drawings that can not be adequately used for the task. In this situation the Audit Team should request further information at an early stage to avoid delay to the design and construction process. If information is not provided the Audit Team should carry out the Road Safety Audit based on the information supplied, but describe the inadequacies within the report.

Stage 3 Audits are often asked for before the scheme is complete, with Audit Teams turning up to carry out a Road Safety Audit only to find that signs and markings have yet to be installed.



Footway/ cycle path incomplete at time of Stage 3 visit

This can lead to the Stage 3 Road Safety Audit taking place in two parts, 3A and 3B. However, 3A Audits can also be routinely planned for larger and more complex schemes, once substantially complete, followed by a final 3B Audit once the signs and markings have been installed. It may be appropriate on some schemes to undertake a third visit when traffic is running, enabling the Audit Team to observe road user behaviour. The timing of such Road Safety Audits should be discussed between the client and the Audit Team Leader.

The information provided to the Audit Team should be sufficiently detailed to allow them to consider all the road safety issues inherent at that particular stage of Audit. However, the client is responsible for ensuring that the correct information is available for a design stage Road Safety Audit, and that the scheme is completed to a level where a meaningful Stage 3 Road Safety Audit can take place.

3.3.6 Report writing

A Road Safety Audit Report should include the following sections – Road Safety Audit details, problem/recommendation section, Audit Team statement, and appendices.

Audit Report details

The report should set out:

- Brief scheme details, the extent of the scheme audited and any elements excluded from the audit process due to lack of information;
- The client details;
- The names and employers of the Audit Team together with the Audit Team qualifications, the names of any other specialists including police officers involved in the Road Safety Audit process;
- When the Road Safety Audit and any site visits (including night-time visits) were carried out, the weather and traffic conditions at the time of the visit;
- The terms of reference for the Road Safety Audit (for example the IHT Road Safety Audit Guidelines, a local highway authority policy or HD 19/03); and
- The precise details of all drawings and documents submitted with the Audit Brief, including any declared Departures from Standard.

Problem/recommendation section

The credibility of the Road Safety Audit Report and the degree to which the recommendations are implemented depend on how well this section is written. Each road safety issue that has been identified requires a separate "problem[iii]" and "recommendation" description, and the location of each point needs to be clearly identified for ease of reference by the designer and client.

Descriptions in the problem/recommendation section should be as succinct as possible, with a one line summary of the risk to the road user, followed by a more detailed description of what could happen, and why. This should then be followed by a recommendation to address the issues identified.

The location of the issue can be described using a plain language description, or through highlighting the relevant paragraph number in the report on a location plan. The use of a plan is very helpful for clients not familiar with the Road Safety Audit process, and also should be used on complex schemes where plain language descriptions of locations could be confusing or misleading.

[iii] Some Road Safety Auditors prefer to use the term "comment" instead of "problem"

Example - Part of plan showing locations of issues raised in Road Safety Audit Report



The order in which the report is written can vary. The report can adopt a template based on reporting a series of issues in turn. HD 19/03 suggests general issues, local alignment, junctions, non-motorised users, signs and road markings, then lighting issues. Another way of writing the report is to start at one end of the scheme and progress (say north to south, or east to west), and deal with locations (and issues within locations) one by one. Whilst both methods are acceptable, the second tends to follow a more logical process. Road Safety Audit describes problems for road users, who travel schemes from one point to another, rather than "jumping about" between fixed locations with specific engineering features.

Each problem/recommendation should address one road safety issue only. Road Safety Auditors should avoid compiling composite problems with multiple recommendations as this could lead to confusion for clients, and to some clients simply adopting one of a number of recommendations and ignoring the remainder.

It is however acceptable to describe generic issues that occur at multiple locations within one problem/recommendation, as shown below.

Example

Location 2.6 – General – Splitter island bollards

Summary: potential vehicle loss of control collisions

During the night visit it was noted that none of the refuge bollards were illuminated. At night-time and in poor weather conditions drivers may not see the islands, leading to potential vehicle loss of control type collisions.

RECOMMENDATION

The bollards should be repaired and lit so that drivers are made aware of the splitter islands.

The Road Safety Audit Report should address unresolved issues from previous Stage Audits. The road safety concerns identified in previous Road Safety Audits should be repeated, where still appropriate. Recommendations can change, to acknowledge the Stage of the scheme, and the constraints that apply, especially where such constraints have been previously acknowledged through Exception Reports.

Road Safety Auditors should strive to generate recommendations to all of the problems identified. In the rare situations where this is not possible, the problem should be stated, without a recommendation.

Report writing style

The Road Safety Auditors are not designers and the language used within the Road Safety Audit Report should reflect the role of the Road Safety Auditor as a specialist advisor to the design process.

Recommendations should be phrased with the word "should", or "it is recommended that", rather than "must". The use of the word "must" implies an instruction, which the Road Safety Auditor is not in a position to give, as overall responsibility for the scheme remains with the client at all times.

The use of phrases containing words like "consider" are too weak, and may be ignored by some clients. Similarly advising clients to simply "monitor" part of a scheme is only effective if timescales and other specific details are recommended for the monitoring task, together with actions to be taken should the monitoring reveal specified outcomes.

Audit Team Statement

Each Road Safety Audit Report should include an Audit Team Statement signed by the Audit Team Leader to certify that the Audit has been carried out in accordance with the terms of reference. Other specialist staff, including police, involved with the process should be recorded, but they should not sign the report.

A form of words suitable for the Statement is shown below:

Example
ROAD SAFETY AUDIT TEAM STATEMENT

I certify that the terms of reference of the Road Safety Audit are as described in Norchester County Council's Road Safety Audit procedures.

AUDIT TEAM LEADER: (author of report)

Christine Dwyer, BSc, IEng, MIHIE, MILT;
Senior Engineer, Norchester County Council

signed.....

date.....

AUDIT TEAM MEMBER:

Raj Patel, BSc (Hons), MIHT;
Engineer, Norchester County Council

(Stage 3) Others present during the daylight / night-time examination were:
Sgt. Keith Moon, Norchester Traffic Police Unit
Bob Hatton, Area Inspector (West),
Norchester County Council

(Stage 1 or 2) Others present during the site visit/consulted during the Road Safety Audit were:
Hilda Gudgeon, Traffic Signals Engineer, Norchester County Council

Appendices

Design stage Road Safety Audits should include a list of all of the drawings (specifying revision numbers where appropriate), and other information supplied by the client. The report may also include a location plan showing safety issue paragraph numbers marked on the plan.

Stage 3 Road Safety Audits can include, as appendices, photographs of the hazards identified.

What not to include

The Road Safety Audit Report should not include CVs of Team Members, checklists, the Audit Brief, previous Audit Reports, any details of departures from Standard or other design background details.

3.3.7 Monitoring (Stage 4) Audit Reports

Monitoring reports differ significantly from those carried out at previous stages. These should be arranged by the client 12 and 36 months after the scheme has been opened, the Stage 3 Audit has been completed, and the appropriate collision data is available. The monitoring report should include reference to any injury collisions that have taken place since the scheme opened, compare these to the collision situation prior to the scheme, and refer to any relevant outstanding issues arising from the previous Road Safety Audit and Exception Reports. The 36-month report provides the opportunity for a detailed collision investigation report to determine whether any collisions are occurring as a result of new elements introduced by the scheme.

The report should recommend any remedial measures to address identified road safety issues.

3.3.8 Client liaison

It is important throughout the Road Safety Audit process that the client and particularly the Design Team is encouraged to maintain contact with the Road Safety Audit Team, where appropriate. This liaison can take a number of forms:

- Direct contact to clarify the scheme brief, to discuss issues within drawings, to request further information;
- Meeting designers/client on site as and when required;
- Undertaking Interim Audits or providing Safety Advice when requested;
- Attending post-audit meetings to clarify issues raised in Road Safety Audit Reports;
- Undertaking Road Safety Audit as part of a "Quality Audit" process – described in more detail in Section 7.2.

It is important, however, that this liaison does not compromise the independence of the Road Safety Audit.

Road Safety Auditors should not remove or change Road Safety Audit problems and recommendations from reports unless liaison with the client has revealed that the Road Safety Audit comment was based on the Road Safety Auditor being misinformed. In this scenario it may be appropriate to amend the report.

3.3.9 Ensuring consistency

Where a number of Road Safety Auditors are working for the same organisation, an issue may arise in relation to the consistency of problems or recommendations made in Road Safety Audit Reports. Whilst each scheme is different, and therefore requires a unique assessment on behalf of the community who

will use it, it should be expected that certain issues are dealt with in a similar way. In addition a consistent level of hazard identification should be maintained.

Road Safety Audit Teams in larger organisations should be encouraged to interchange team personnel and organise meetings to discuss typical problems/ recommendations. Such in-house training workshops offer an ideal forum to exchange experience and work well when led by experienced facilitators. In addition, analyses of previous Road Safety Audits carried out, organised by scheme type, can prove very instructive in terms of the type of comments raised, and assist with the production of local checklists for this type of work[32].

Consistency between Road Safety Auditors from different organisations can also be an issue. Organisations should deal with this by ensuring that Road Safety Audit staff are kept up to date with road safety developments through attending training courses and seminars, and through undertaking personal research. Road Safety Audit staff should also have an ongoing participation in collision studies.

3.3.10 Staffing complex or innovative schemes

It is important for organisations to acknowledge Road Safety Auditor experience in relation to type and complexity of certain schemes. Major highway schemes, for example, may require Road Safety Audit staff with a degree of design experience. Innovative schemes, for which little control data is available, are most appropriately undertaken by experienced Road Safety Auditors with the expertise to avoid making "risk averse" comments that identify large numbers of relatively insignificant hazards that could make it difficult to proceed with a scheme. In these situations it is important that Road Safety Auditors understand scheme objectives, for example where schemes are designed with reduced sight lines to deliberately reduce vehicle speeds close liaison is needed between client and Road Safety Auditor, with the design rational clearly explained within the scheme brief.

Case study - Protective Security

In response to terrorist threats to the public and to key infrastructure, certain sites have anti-ram protective security measures installed to protect them from vehicle-borne attack. These measures include bollards (static and retractable), planters, walls or structures concealed within common streetscape items such as shelters, cabinetry, signposts and lighting columns. For protection reasons their position is usually optimized as far from the vulnerable asset as possible, typically at the existing or revised kerb edge.

If designed to be permeable by pedestrians then the spacing between structures will be no more than 1.2 metres apart such that vehicles cannot encroach through the gaps and so that mobility impaired users are not inconvenienced.

Although designed to blend in to the architecture and streetscape in an urban area, these measures are designed to resist forced attack by using special materials and foundations and, as a consequence, they are not frangible or likely to bend if accidentally hit. In rural areas, measures such as ditches and mounds may be used in the verge area alongside a long perimeter fence-line.

Road Safety Auditors should check issues such as the skidding resistance in advance of these locations to reduce the chances of loss of control collisions, consider any gaps and potentially slippery surfaces when automated security measures are retracted flush in the surface (particularly relevant for two wheeled vehicles that need to traverse them), check the effect the security features may have on visibility splays, and check that the intended routes for public access and pedestrian desire lines are clearly indicated.



Bollards within the Whitehall Streetscape Scheme near the Treasury building.
Photo source: Paul Forman

3.4 How to "benchmark" Road Safety Audit

3.4.1 Relation between design standards and 'safety'

There is a view that suggests that if roads were all built or improved to modern design standards they would be safe and there would be no requirement for Road Safety Audit. However, collisions do occur on new schemes after opening, and it was this issue that led to the establishment of Road Safety Audit in the UK in the early 1980s. There are a number of reasons why collisions take place on roads that are built to Standard:

- The Standards themselves are a compromise between safety and other factors such as traffic capacity, environmental impact and cost implications;
- Combinations of features that are individually designed to standard can cause problems, as illustrated below:

Example – Design Standards and Safety



The distant approach to a new roundabout constructed offset to the right on an existing straight. Although street lighting was provided, the national speed limit applied. The approach radii, deviation and approach angles at the give-way line were to standard.



The scene at night. Note the see-through across the roundabout in which the lighting columns and the headlights of the approaching vehicles which are beyond the roundabout mask the presence of the roundabout



The outcome of a collision in which a vehicle failed to negotiate the approach curve during the hours of darkness and collided with the lighting column on the approach to the give-way line.



To maximise the conspicuity of the roundabout, verge marker posts or chevron boards should be provided on the approach to the give-way line. In addition it would be possible to construct a landscaped and planted mound on the widened nearside perimeter of the roundabout to minimise the see-through across the roundabout.

Photo source: Stewart Paton

- "Real world" collisions are not always covered by standards. Until recently the 'standard' treatment for the end of safety fence was a turned down end section – which led to a particular type of launch collision. This situation has now been addressed within impact protection standards.



The lamp column has been struck by a vehicle "launched" off the ramped down end

- Design standards tend to be aimed at satisfying vehicular movements and often do not take account of vulnerable road user requirements;
- On local roads, particularly in urban areas, it is often impossible to maintain design standards, and at the same time construct schemes within land and budget constraints. However, Road Safety Audit can suggest measures that mitigate the risks arising from these constraints;
- The concept of safety as sometimes understood within design standards relates to how engineers design roads as opposed to how road users use them. Road width, forward visibility, visibility splays, size and location of signs and protection of street furniture all relate to the design speed on a new road. However, if for example drivers perceive the road to be 'faster' than the design speed (or the posted speed limit), they will drive it as such, sometimes leading to inappropriate speeds and high severity crashes. It is important to remember that individual road users can make errors through misreading or misinterpreting highway features, which can lead to collisions.

3.4.2 The importance of control data

Many roads that are "built to standard" have a subsequent poor collision record, and conversely some roads with poor standards have relatively low collision records. It is therefore somewhat surprising to find that some Road Safety Audit Reports continue to describe 'problems' in terms of sub-standard design elements rather than road safety issues.

Example - a minor road approach to a "T" junction is situated on a gradient with substandard visibility to the right at a T junction. A scheme is proposed to develop land beyond the wall on the right.



The Road Safety Audit Report might state:

Problem

Summary: sub-standard Y distance visibility The visibility to the right is below that recommended in DMRB. A minimum 70m visibility is required for a 30mph road.

Recommendation

Improve visibility to DMRB requirements.

Reports of this nature can limit the potential benefits of a Road Safety Audit. The Audit Report should concentrate on those highway features with the potential to cause injury, and describe the likely collision scenario that could occur.

Example - A more appropriate way to write the above report that concentrates on road safety issues would be:

Problem

Summary: risk of vehicle collisions Drivers at the side road give way with limited visibility to the right (less than 45m), and emerge up a hill. Despite the 30mph speed limit on the main road, 85%ile speeds are around 41mph, as the 30mph speed limit boundary is located 80m to the right of the junction. Vehicles that emerge slowly due to the hill could be struck by fast moving traffic on the main road, leading to occupant injury.

Recommendation

Speeds on the main road should be reduced. Visibility to the right should be improved.

It is important that there is a degree of realism about the type and severity of collisions that the Audit Team predict within their report. This realism should be 'benchmarked' through an awareness of the type and number of incidents likely to occur as a result of the issues described within the report. An unrealistic view of likely collision occurrence can lead to an overestimation of risk, again reducing the likely effectiveness of the Road Safety Audit.

For example, many innovative housing layouts, despite the adoption of "reduced" design standards, should have an inherently lower risk due to the low speed principles adopted within the design process, and low traffic flows within the developments.

Control data can take many forms. At a general level, an awareness of the number of collisions that occur on average at high-risk locations will establish a marker for how many collisions might occur if things go badly wrong at a site. Local data showing average numbers and type of collisions at specific junction types[33] is invaluable as control data, and helps to highlight those road users most at risk. The table below refers to collision risk at all sites in Greater London; this information is also available at an individual Borough level.

Data tends to be available at a macro level, and for familiar layouts. It is therefore more straightforward to derive collision types for differing forms of junction control, than it is with respect to the size of lettering on signs. More is known about collisions at roundabouts, than about collisions in shared space environments. It is much more difficult to benchmark innovative, or complex schemes, and virtually impossible to benchmark micro details, as the data to establish absolute risk levels is not available. In these situations Road Safety Auditors need to make more generalised estimates, based on road user role play and simple risk assessment techniques.

Road Safety Auditors should keep up to date with published research, and be able to discern robust studies from those that are anecdotal. For example, Manual for Streets contains the results of research into the relationship between visibility and speed which can be used to develop Road Safety Audit knowledge for certain types of schemes.

Example – Control data

		Collisions per site per year					
Feature	No. sites	All	Pedestrians	Non-dry	Dark	Right turn	2 wheelers
Zebras	2,473	0.74	0.24 (32%)	0.13 (18%)	0.21 (28%)		
Pelicans	2,557	0.55	0.20 (36%)	0.10 (18%)	0.16 (29%)		
Traffic signals	2,519	2.20	0.47 (21%)	0.38 (17%)	0.76 (35%)	0.53 (24%)	
Roundabouts	535	2.49	0.16 (6%)	0.48 (19%)	0.77 (31%)		0.66 (27%)
Mini-r'bouts	965	0.36	0.03 (8%)	0.08 (22%)	0.12 (33%)		0.10 28%)

Source: Levels of Collision Risk in Greater London, December 2006

3.4.3 Interactive checklists

When the concept of Road Safety Audits was in its infancy in the early 1980s, the need for checklists was to ensure that Road Safety Auditors, new to the process, considered all possibilities and situations where the new design may compromise road safety. The result was that early checklists were lengthy and it was difficult to achieve a compact checklist that catered specifically for the scheme that was being audited.

Since then, a great deal of experience has been gained from the scores of thousands of Road Safety

Audits that have been carried out, not only across the UK, but also around the world.

The rapid expansion of the Internet has opened up the possibility of providing Road Safety Auditors with an interactive checklist service built on past Road Safety Audit experience of specific road schemes. In addition, any facility that can be downloaded could be kept up to date, so that experience of situations such as new or innovative schemes could be added by experienced Road Safety Auditors. With these thoughts in mind an application was made through the Department for Transport's Road Safety Partnership Grant to develop such a facility. Led by Lancashire County Council, in partnership with TMS Consultancy and the IHT, development work has been carried out in tandem with these revised Guidelines.

At the time of its launch, the Road Safety Audit Interactive Checklist[34] had four elements available to any Road Safety Auditor who has access to the Internet. However, the site will be constantly reviewed and opportunities will be taken to improve the scope or quality of the information provided. The elements available at the time of writing are:

- A suite of checklists specific to a number of basic scheme types;
- Information on typical collision types that are known to occur at these types of installations;
- An aide-memoir of information and plans required to carry out each stage of Road Safety Audit; and
- A feedback facility to expand any of the above three elements.

The checklists have been developed from the experiences of a number of Road Safety Auditors who have analysed the type of comments they are repeatedly making for specific schemes. For example, research has been undertaken into the type of Road Safety Audit comments made at traffic signal junctions[35]. This found that in a study of 34 traffic signal schemes, a total of 47 different Road Safety Audit comments were made. Twelve comments were made on more than five occasions, the most frequently made comment referred to safety issues associated with limited forward visibility to signal heads leading to potential red light running collisions. Around half of the most commonly made comments could be 'benchmarked' from control data. The remainder were micro issues for which collision data does not exist, and the safety problems were based on an intuitive 'role play' or simple risk assessment approach.

The checklists and advice on how to use them can be found at www.lancspartners.org/safetychecklist/index.asp. The checklists should be used to assist the Road Safety Audit process, and are not seen as a replacement for the other skills that are required, and that have been described in this chapter.

Summary of how to undertake Road Safety Audit

- The Road Safety Audit Team needs to undertake a series of tasks, including reviewing all information supplied, undertaking appropriate site visits, writing reports, and undertaking client liaison;
- The key task is identifying road safety hazards. This can be undertaken through the use of checklists, the use of control data, and road user role play;
- The Road Safety Audit Report is a formal document, which should be signed by the Road Safety Audit Team Leader;
- Road Safety Audit Teams should take steps to ensure consistency in their approach to both problem identification and recommendation of improvements;
- A series of Interactive Checklists has been developed in parallel to these Guidelines and are available through the IHT web site.

04 ROAD SAFETY AUDIT OUTSIDE THE UK

4.1 International position

The first Road Safety Audit guidelines outside the UK were produced in 1993 in New Zealand. Austroads, the association of Australian and New Zealand road transport and traffic authorities, produced its most recent guidelines in 2002[36]. In Australia and New Zealand much is made of control data and the use of this information to assist Road Safety Auditors.

In Canada, the Transportation Association of Canada (TAC) has been actively involved in Road Safety Audit guidelines and training. The instructors for the TAC program were the authors of the TAC publication on Road Safety Audits[37] and are all experienced Road Safety Auditors. The provinces of Alberta and British Columbia have also produced Road Safety Audit manuals. The Canadian approach to Road Safety Audit includes a subjective risk rating as well as suggested solutions. The subjective risk rating was requested by the recipients of the Road Safety Audits so they could have a priority in addressing the issues.



A disabled road user struggles with crossing facilities in poor weather in Vancouver

In the USA the Federal Highway Administration (FHWA) has been very active with Road Safety Audits. The FHWA has produced a Road Safety Audit Guide[38] and conducts training through the National Highway Institute (the FHWA's training arm). The Institute of Transportation Engineers (ITE), supported by the FHWA has also been active in Road Safety Audits. They maintain a website and have workshops at their annual meetings. However there has been some ambiguity in the USA with respect to Road Safety Audit with much work carried out on existing roads – now referred to as Safety Review.

Road Safety Audit is commonplace now throughout the world with Iceland and some South-East Asian countries having well-developed policies and procedures.

4.2 European position

The European Commission has proposed a Directive on Road Infrastructure Safety Management. The objective is to ensure that safety is integrated into planning, design, and operation of road infrastructure on the Trans-European Network. In June 2008 the European Parliament voted in favour of all Member States adopting the Directive. There are four elements to the directive:

- Road Safety Impact Assessment – a strategic comparative analysis of the impact of a new road or a substantial modification to the existing network on the safety performance of the road network;
- Road Safety Audits – a detailed systematic and technical safety check relating to the design characteristics of a road infrastructure project and covering all stages from planning to entry into operation;
- Safety development of the road network in operation – the reduction of future accidents by targeting remedial treatments to parts of the network where, respectively, accidents occurred most frequently during previous years and accident cost reduction potential is the highest; and
- Safety inspections –periodical routine visual check of features and defects that require maintenance intervention for safety reasons.

When implemented, the Directive will require Member States to enact legislation to ensure that the above activities take place on those parts of the Trans-European Road Network within their jurisdiction.

The training requirements for Road Safety Auditors include the need for pre-auditing experience, formal training, certification of competence, and periodic retraining. A EURO-AUDITS syllabus[39] has been produced to provide the basis for a Road Safety Audit training that could be adopted by Member States. In addition to the syllabus, the document comments on pre-training experience/qualifications, and also on certification of competence.

In a recent survey undertaken as part of the EURO-AUDITS project, around half the Member States surveyed stated that they have a requirement to carry out Road Safety Audits on all or part of their network. Denmark has had formal procedures for nearly as long as the UK.







Road safety issues in Italy. In the first picture the landscaping restricts visibility between merging vehicles, in the second pedestrians are exposed to risk due to an absence of facilities, and in the third there is a risk of occupant injury from loss of control collisions with the wall. Photo source: Raimondo Polidoro

4.3 Irish position

In 2008 the Irish National Roads Authority published its revised Road Safety Standard HD 19/08[40]. This Standard requires Road Safety Audits to be undertaken on all national road schemes in Ireland. Many Irish local authorities undertake Road Safety Audits on regional and local road schemes.

The Irish Standard has some important differences compared to the UK Standard with respect to communication, report writing and qualifications for Road Safety Auditors:

- Stage F Road Safety Audits are a formal part of the process in Ireland;
- At the draft report stage a discussion can take place between the Audit Team, Design Team and Project Manager, prior to the final report being produced. The purpose of the discussion is to clarify issues arising from the process and to minimise the requirement for Exception Reports by resolving differences at an early stage;
- risk assessment of safety issues is encouraged as part of this process, in order to help prioritise items within the report;
- A feedback form is used to enable the Design Team Leader to provide information to the Audit Team;
- there is no provision for Interim Audit;
- prospective Road Safety Audit Team Leaders can qualify from a Safety Engineering background by attending a three-day Road Safety Audit course, and undertaking a specified number of Audits;
- prospective Road Safety Audit Team Leaders can qualify from a Road Engineering background by attending a ten-day Safety Engineering course, a three-day Road Safety Audit course, and undertaking a specified number of Audits;
- prospective Team Members can qualify by attending a three-day Road Safety Audit course, and undertaking a specified number of Audits;
- Audit Team Leaders must have undertaken at least two Road Safety Audits of a similar stage and scheme type in order to be accepted for a project.



A two-lane roundabout exit with potential for sideswipe conflict in Ireland

Summary

- Road Safety Audit has become an established international road safety procedure, throughout Europe, and beyond;
- Guidelines produced by national governments include requirements for assessment of Road Safety Auditors, requirements for Road Safety Auditors to demonstrate previous experience of the type of scheme being reviewed, and guidelines for incorporating risk assessment techniques into Road Safety Audit.

05 ROAD SAFETY AUDIT WITHIN NATIONAL STANDARDS AND ADVICE

Guidance on Road Safety Audit can be found in various places, but there are two documents, affecting different parts of the road network, that are particularly significant for these Road Safety Audit Guidelines.

Firstly, the Road Safety Audit Standard HD 19/03 that applies to trunk roads and motorways sets out a prescriptive basis for carrying out Audits in those circumstances, as described in Section 5.1.

Secondly, the Manual for Streets, described in Chapter 6, which is the Department for Transport's Advice on local residential street layouts. It promotes a different view of Road Safety Audit than that described in HD 19/03, including recommendations to adopt risk assessment, and to set Road Safety Audit within a 'Quality Audit' framework.

5.1 UK Design Manual (DMRB) Standard HD 19/03

5.1.1 RSA as part of Design Manual for Roads and Bridges (DMRB)

The DMRB[41] is a series of Standards and Advice Notes to instruct designers how they should prepare highway schemes for trunk roads and motorways. The highways elements are based on a design concept that encourages designers to select a design speed, leading to the provision of requirements for horizontal and vertical alignment, road width, visibility splays, sign size, and impact protection.

Volume 5 of the DMRB includes advice on Assessment and Preparation of Road Schemes, and this includes how to carry out Road Safety Audits. HD 19/03 is thus as much a part of DMRB as any technical standard. Project Sponsors require a Departure from Standard should they not wish to use this Standard on any trunk road or motorway scheme.

Whilst all Standards within the DMRB are mandatory for use on trunk roads and motorways, they are not mandatory on local roads.

5.1.2 Application throughout the UK

HD 19/03 was prepared by the Highways Agency in England. DMRB Standards are also applied by national roads administrations in Scotland, Wales and Northern Ireland. The approach to its application in different parts of the UK is outlined below:

Scotland

The primary difference in the implementation of HD 19/03 in Scotland is that Transport Scotland place a greater emphasis on auditing of road works. The Term Contracts for the Management and Maintenance of the Scottish Trunk Road Network specifies that:

"Road Safety Audits shall be undertaken on all Schemes on Trunk Roads which involve permanent change to the existing Trunk Road layout and on temporary traffic management measures or installations where the Trunk Road layout shall be significantly altered even for short durations".

Wales

Road Safety Audit in accordance with HD 19/03 is carried out for all new highway construction on the motorway and trunk road network in Wales. The Welsh Assembly Government is exploring the potential for a more flexible and risk assessment based approach to Road Safety Audit, for its programme of minor maintenance works and signing schemes. The implications of any new policy, in regard to compliance with the current DMRB Standard, are being examined in full.

Northern Ireland

Like all national standards and guidelines, HD 19/03 is applicable to the entire road network within Northern Ireland and not just trunk roads. In the case of Road Safety Audits, this has placed an onerous and frequently unnecessary burden on the authority as the Standard called for all development work on or adjacent to the public road network to undergo Road Safety Audits, regardless of the potential road safety implications. Consequently, a Director of Engineering Memorandum (DEM) was developed and implemented to clarify the realistic application of HD 19/03 in Northern Ireland.

The DEM amends the Standard and provides for the facility for the Project Sponsor of all schemes with a capital improvement value of less than £250k to consider whether it is necessary for a Road Safety Audit to be applied or not. Where a Road Safety Audit is deemed unnecessary, the reasons for the decision have to be clearly recorded and guidance on such examples is also included. The DEM also modifies the training and experience requirements for Audit Team Leaders and Members.



HD 19/03 is applicable to all roads in Northern Ireland so a DEM has been developed to amend the Standard

Background to HD 19/03

HD 19/03 was produced following a research project undertaken on behalf of the Highways Agency to determine requirements for Road Safety Audit on national roads. It was produced nearly ten years after the previous standard, and is a combined standard and advice note, with mandatory sections highlighted in black boxes.

Whilst the document is written for use on trunk roads and motorways, Section 1.8 states that 'this standard is commended to other highway authorities', which includes local highway authorities. In the absence of any local policy to the contrary, HD 19/03 sets the national expectation for how Road Safety Audit should be carried out.

Summary of main issues from the standard

Chapter 3 provided a generic description of Road Safety Audit. This section lists the principal mandatory requirements set out in HD 19/03.

- Road Safety Audits should be carried out on **all** highway improvement schemes, a Departure from Standard is required if Road Safety Audit is not considered necessary;
- Road Safety Audit shall be carried out at Stages 1, 2, (or 1/ 2), 3 & 4;
- Road Safety Audit site visits shall be carried out at each stage, by all members of the Audit Team, and at the same time. At Stage 3 this will include a separate night-time visit;
- Project Sponsors will not accept Audit Teams who do not have the necessary training, skills and experience. Guidance on this is reproduced in Appendix 5;
- Audit Teams shall comprise at least one Team Leader and one Team Member;
- Audit Teams will submit CVs to the project sponsor to demonstrate their competency; they will be accepted on a scheme-by-scheme basis, and experience must be relevant to the scheme to be audited;
- The Design Team will prepare the Audit Brief, which will be approved and issued by the Project Sponsor.
- The Audit Team Leader is responsible for inviting the police and the maintaining authority to attend the Stage 3 Road Safety Audit;
- The Audit Report will include the items listed in Appendix 6; this includes a requirement to describe the nature of the problem and the type of collisions likely to occur as a result of the problem;
- The Audit Team Leader will send a draft report to the Project Sponsor, which may be discussed and any agreed changes made prior to a final report being issued. Stage 4 reports will be sent to the Overseeing Organisation;
- Non-safety items or any items outside the Audit Brief will not be included in the report. Such items, together with maintenance defects, will be reported separately to the Project Sponsor and Maintaining Agent respectively;
- The Project Sponsor will provide an Exception Report for each recommendation in the Audit Report that can not be implemented. Copies of the Exception Report will be sent to the Design and Audit Teams. The Director of the Overseeing Organisation will make the final decision if arbitration is required.

In addition to the mandatory requirements set out above, HD 19/03 provides guidance in the form of checklists, and by setting out templates for writing Road Safety Audit Reports.

Roles within HD 19/03

The key roles within HD 19/03 are shown below:

Organisation	Defined as	Key role	Main responsibilities in Audit process
Overseeing organisation	Highway Authority for England, Scotland, Wales or Northern Ireland	Director	Person with overall responsibility for the road scheme, arbitrates where required between Audit recommendations and Exception Report
		Project Sponsor (PS)	Person with direct responsibility for that scheme, approves and issues Audit Brief, commissions Audit Team, instructs Design Team to make changes, prepares Exception Report
Design Organisation	Organisation commissioned by PS to undertake design	Design Team Leader	Prepares Audit Brief, prepares and amends design in line with Audit findings and Project Sponsor's instructions
Audit Team	Organisation commissioned by PS to undertake audit	Audit Team Leader	Undertakes Audit and prepares Audit Report, invites police and others to attend Audit where appropriate
Specialist Advisor	person commissioned by PS to offer specialist advice		Assists Audit Team in areas of specialist expertise

5.2 How Road Safety Auditors have responded to HD 19/03

There have been a variety of reactions from Road Safety Auditors to HD 19/03.

The increased emphasis on road safety qualifications for Road Safety Auditors, together with the need for a report that spelt out the type of collisions that might occur was broadly welcomed. It was felt that reinforcing these two issues would lead to higher quality audits with a better prospect of identifying "real safety problems".

On the other hand there was a concern expressed by many local highway authority staff that the Audit Team resource requirements were too onerous to apply to ALL highway schemes, and that as a result, local authorities would be unable to deliver Road Safety Audits to this standard.

In addition, whilst HD 19/03 is a national Standard adopted through all parts of the UK, the trunk road network in Wales, Northern Ireland and Scotland is, at least in part, very different to that in England. Some Road Safety Auditors working on trunk road schemes in Wales, Northern Ireland and Scotland would like more flexibility in the way in which they are able to undertake Road Safety Audits on some schemes.

5.2.1 Questionnaire survey

In order to determine in more detail how local highway authorities and consultants were coping with the requirements of HD 19/03, a questionnaire was sent out to both local highway authority and consultancy staff undertaking Road Safety Audit work. The questionnaire is shown in Appendix 7.

5.2.2 Local Highway Authority response

A total of 60 different local highway authorities responded to the questionnaire, representing views from a broad range of authorities from throughout the UK.

Two-thirds of those who responded said they carried out Road Safety Audits in accordance or close to the HD 19/03 Standard. Each authority had an average of four staff undertaking Road Safety Audits, three of whom were "qualified" according to HD 19/03. However, many of the authorities who responded had issues with resources for undertaking Road Safety Audits, problems with developer-led Road Safety Audits, and issues with auditing innovative schemes.

5.2.3 Consultants' response

A total of 58 responses were received from a variety of organisations representing large consultants carrying out local highway authority work under externalised contracting arrangements, design consultants working on major schemes, smaller firms working principally on development type work, and specialist firms.

Most of those who responded said they carried out Road Safety Audits in accordance with the HD 19/03 Standard. Each organisation had an average of more than five staff undertaking Road Safety Audits, nearly all of whom were said to be "qualified" according to HD 19/03. However, many of the organisations who responded had problems with developer-led Road Safety Audits, and issues with auditing innovative schemes.

Summary of issues from the questionnaire

The survey suggests that local highway authorities have greater problems in implementing HD 19/03 than consultants. There is a desire for a more flexible approach to Road Safety Audit for some schemes, whilst at the same time maintaining the principle of identifying and mitigating those hazards that could lead to road traffic collisions. Section 7.1.3 looks at ways in which this might happen.

The responses to the Road Safety Audit questions are described in more detail in Appendix 8. The responses to the questions relating to Quality Audit and other road user audits can be found in Section 6.4.

5.2.4 Further comments from analysis of local procedures

A total of eighteen local procedures were obtained from respondents to the questionnaire, and have been compared with HD 19/03. The procedures were written in a number of different ways. Some were short notes highlighting where the local standard varied from HD 19/03. Others were re-writes of HD 19/03 with local definitions and lines of responsibility set out. Finally, some of the documents had little resemblance to the Standard, and set out specific guidelines to suit local need.

Very few of the local highway authorities set out to audit everything to HD 19/03. Variations include self-checks, single-person Road Safety Audits, lower qualifications for Road Safety Auditors, and less onerous site visit criteria.

A summary of the main points arising from an analysis of these documents is described in Appendix 8.

Summary of Chapter 5

- UK DMRB HD 19/03 sets out a rigid requirement for implementation of Road Safety Audit in terms of scope of scheme, management of the process, and Safety Audit Team requirements;
- Local highway authorities do not always have the resources to apply this standard in every situation. In some situations it may not be necessary or desirable;
- A questionnaire survey undertaken for these Guidelines has revealed large variations in terms of both local highway authority and private sector practice in carrying out Road Safety Audits on local roads;
- Section 7.1 sets out ways in which local highway authorities can vary their practices from those described in the UK DMRB.

06 ROAD SAFETY AUDIT ON LOCAL STREETS

Road Safety Audit on local streets needs to be seen in the context of advice published in the Manual for Streets. Once this document is understood there are a number of aspects that are relevant for Road Safety Auditors.

Background to Manual for Streets

The Manual for Streets (MfS) was produced by the Department for Transport in 2007. The document sets out principles of street design and technical guidance for the design of lightly trafficked residential streets. MfS supersedes previous guidance in the form of DB32[42] and Places, Streets and Movement[43]. MfS applies only in England and Wales, although parallel advice is being prepared in Scotland.

Whilst the scope of MfS is limited to residential streets, the principles are considered to be applicable to other streets. According to the MfS definition, many highways in built up areas can be considered streets. MfS makes clear that it is not to be applied to the trunk road network, but that conversely, the DMRB standards are inappropriate for local streets.

Other recent publications have reinforced the view that new design concepts may be required in high street environments[44] [45].

MfS starts from a position that streets are public spaces that must support a variety of uses and user types.

Accessible streets are not just a transport facility but can support community cohesion, active lifestyles and quality living environments. A key recommendation of the Manual is that appropriate emphasis should be given to the "place" function of streets, to distinguish the street from a road, where "movement" is the primary function. Accordingly it states that streets should not be designed solely with the needs and behaviours of drivers in mind. A prime consideration is that the needs of pedestrians and cyclists should be met. In addition to place and movement, streets need to accommodate access, parking, drainage, utilities and street lighting.

One of the key design principles that emerges from MfS is the importance of local distinctiveness and "place making". Standardised approaches are discouraged and this is, to some extent, in tension with previous guidance that has attempted to standardise highway designs in order to increase the predictability and consistency of the road environment.

At a network level, MfS places significant emphasis on "permeability", particularly for non-motorised users, and there is encouragement throughout the Manual for designs based on different grid patterns and the integration of new streets into existing street patterns. Innovative designs with a minimalist approach to street furniture, signs and markings are also encouraged.

The subject of road safety is addressed within the Manual, which acknowledges the concerns of local authorities with respect to innovative designs and the requirement to provide environments in which people are enabled to choose non-motorised modes. MfS states that risk should be managed by designing to clearly established objectives, and by using a "Quality Audit" process, described in more detail in Section 6.4 below. The fundamental principle behind Quality Audit is that the evolving design should be audited for consistency with the full range of objectives that have been established for that street.

Most new residential streets are designed by consultants on behalf of developers building new homes. Most of the developments will be subject to scrutiny by Highways Development Control (DC) Officers as part of the planning approval process. The MfS places a significant emphasis on the process of street design and recommends that Highways DC Officers are involved early and often in the development of street designs. Previous research[46] found that the late involvement of DC Officers was a factor that could result in designs being significantly amended to meet highway authority concerns around safety without reference to the broader objectives and design brief.

The majority of the streets will ultimately be adopted by local highway authorities under Section 38 agreements[47].

In some cases the developer's consultants need a Section 278 agreement[48] or Road Construction Consent agreement in order to carry out works on the existing highway. Local authorities can insist that these externally designed schemes are subject to a Road Safety Audit process, just as internally designed schemes are. Section 7.3.4 of these Guidelines describes ways in which this might take place.

Housing development and other street schemes constitute a comparatively small proportion of the total number of Road Safety Audits undertaken. There are five main issues raised in MfS that have a potentially significant bearing on Road Safety Audit:

- Appropriate use of streets;
- Visibility and stopping distance;
- The use of signs, markings and street furniture;
- Quality Audit; and
- Risk assessment.

6.1 Appropriate Use of Streets

The fundamental starting point of MfS is that streets need to provide functional public spaces as well as corridors for access and movement. Accordingly uses such as children's play, informal socialising and sitting 'watching the world go by' are positively encouraged by MfS. This is in line with historical uses of streets but to some extent subverts previous recent thinking that streets are fundamentally for moving vehicles and that other uses are inappropriate and to be discouraged, or prevented if possible, through segregation, prohibition or advice. Thus vulnerable users have often been invited to cease their activity where they are in conflict with the other users of streets. This can be formalised for example through the use of pedestrian guard rails, or signs instructing 'Cyclists Dismount'.

Streets that are safe and feel safe are essential to giving people the confidence to use them as places. Road safety and Road Safety Audit are fundamental to achieving this. The function of road safety interventions however should be to enable street uses, not to restrict those that the Auditor may deem inappropriate or consider risky by virtue of the vulnerability of the user involved.

In considering possible road safety problems in the spirit of "who can be hurt in a collision and why?" Road Safety Auditors need to consider a wide range of possible events that reflect the range of possible uses that MfS encourages. The context of the scheme becomes a public space, not a highway with a limited number of user types with reasonably uniform characteristics. This increases the complexity of the Road Safety Audit task and the depth of the requirement for road user role play (See Section 3.3.4). Secondly it means that the role of the Road Safety Auditor should not be to adjudicate between 'good' and 'bad' street uses but to identify, quantify and mitigate the risks to street users, all of whom are legitimate.

How Road Safety Auditors should respond:

Road Safety Auditors looking at MfS-based schemes should be aware of what MfS aims to achieve. In particular they should:

- Recognise the full range of potential uses and users of a street, and pay particular attention to the needs of people with disabilities;
- Not apply value judgements about some uses being inappropriate, for example attitudes such as "streets are for driving, kids should find somewhere safe to play" are still common and are not helpful. The focus should be on those hazards that could arise and how they can be reduced while still facilitating the street use in question;
- Not assume that behaviour on roads will necessarily be displayed on streets. For example, experience of Road Safety Audit on some shared surface schemes suggests that drivers and pedestrians will negotiate priority within certain parameters and that a lack of defined priority leads to communication, not conflict, as might be the case where motor vehicle flows and speeds are higher;

Case Study - Shared use scheme in New Road, Brighton





Photo source: Phil Jones

The Stage 3 Road Safety Audit for New Road commented that "the nature and use of the street had changed completely....at the time of the Stage 3 audit pedestrians had claimed the street....motorists appear to behave as though they are intruders in the street....the nature of driving on this road has changed, with motorists giving way to pedestrians and accommodating their pace without pedestrians feeling threatened."

- In proposing modifications to the design, attempt to address risk at source rather than preventing some activity just because the protagonists are vulnerable;
- Consider the interface between the existing highway and the new development area, taking into account any traffic calming or speed reduction measures being proposed to set the scheme in context.

6.2 Visibility and stopping sight distance

MfS recommends a default 20mph design speed, although not necessarily a legal limit, in residential areas and the employment of geometric design and other features to encourage motorists to respect that speed. The TRL research that underpins MfS examines a number of issues including the effect of geometry on speed, and the appropriate and safe visibility requirements within residential areas.

With respect to speed, the two main geometric determining factors were found to be carriageway width and forward visibility. The research showed that narrow residential streets with lower levels of forward visibility reduced speed, and conversely wide streets with good forward visibility encouraged speed.





Contrasting styles of residential street have significant effect on vehicle speeds

The results for low speeds associated with limited forward visibility were derived both on links and on the approaches to junctions. Shorter Y distances at junctions were found to be associated with slower motor vehicle speeds on both minor and major junction arms.

The research also showed that there was no apparent correlation between low "Y" distance visibility and high numbers of collisions involving vehicles emerging from side roads into the path of main road traffic.

The basis for "Y" distance SSD was reassessed, and revised values put forward based on a reduction in reaction time, and an increase in deceleration. These new values change the "Y" distance from a DMRB value of 70m, to an MfS value of 45m, for 50kph. A maximum "X" distance set back within the junction of 2.4m is suggested for urban areas.

Example - Comparison of DMRB with MfS for calculating SSD

The formula for calculating SSD is:
$SSD = vt + v^2 / 2d$

Where v = speed (m/s);
t = reaction time (s);
d = deceleration (m/s^2)

	DMRB	MfS
Reaction time	2 seconds	1.5 seconds
Deceleration	2.45m/s² 0.25g	4.41m/s² 0.45g
SSD at 50kph	70m	45m
SSD at 65kph	105m	66m
SSD at 85kph	160m	101m

It is important to note that designers are encouraged not simply to adopt the MfS values, but to apply their own judgement to reaction time and deceleration, in order to design appropriate "Y" distances for specific circumstances.

Models based on the research data suggest that visibility at the level recommended by MfS will cause drivers to modify their behaviour such that their margin of safety between the available distance and their ability to stop (according to MfS assumptions) is approximately 100%. The research found that drivers do not appear to reduce their speed (and hence stopping distance requirement) at the same rate as reductions in visibility. Visibility below 20m therefore may result in drivers requiring greater stopping distance than is available. MfS recommends that if it is intended to provide visibility of less than 20m, other

methods should be employed to encourage speeds appropriate to the available stopping distance.

How Road Safety Auditors should respond:

Road Safety Auditors looking at MfS based schemes may have some concerns relating to designs with reduced visibility, particularly at junctions. The following issues should be considered whilst undertaking Road Safety Audits in such circumstances:

- Road Safety Audit should be concerned with determining likely collision types, rather than making sure that a scheme complies with either DMRB or MfS;
- MfS research shows that travelling speed is affected by geometry and environment. Speed in turn is one of a number of factors affecting safety. The Road Safety Auditor should assess likely travelling speeds and the consequences of conflicts between motor traffic, vulnerable road users and other motor vehicles;
- Road Safety Auditors should be aware that excessive visibility can induce higher motor vehicle speeds and hence increase risk for vulnerable users;
- Where the housing layout meets an existing road, particular attention should be paid to appropriate junction visibility if the main road is wide and straight, and has average speeds significantly in excess of 30mph. In such cases additional measures may be required to reduce speed on the main road;
- In the MfS research one area had to be removed from the analysis. Belgravia was considered to be a statistical outlier – due to its wide streets, higher speeds, and relatively high collision levels. Belgravia is a grid pattern, and particular attention should be made when auditing grid based schemes, with cross roads junctions;
- MfS research shows that parking on both sides of the road is associated with higher collision levels (but also has a speed reducing effect);
- MfS research shows that design features such as a block paving surface reduce speeds relative to blacktop surfaces;
- Low speed designs in accordance with Manual for Streets should inherently reduce collision risk. However it is possible that the relaxed guidance provided could be misused leading to increased risk through inappropriate design. Road Safety Audit should attempt to ensure that the application of these reduced requirements is as safe as possible for all road users; and
- Local authorities should consider undertaking research of existing and new housing estate layouts to compare speed and collision data in different situations.

Case Study – data analysis in Warwickshire

Analysis carried out from data in Warwickshire[iv] examined collisions on urban roads, in an attempt to produce some local "control data" for collisions relating to limited "Y" distance visibility. During the period 2002-2006 an estimated 325 injury collisions took place each year at urban 30mph "T" and "X" road junctions, around 17% of the collision total for the county.

Of these, an estimated 73 collisions each year involved vehicles emerging from the side road into the path of main road traffic. This represents 23% of the collisions at urban "T" and "X" roads, and less than 4% of all injury collisions.

The distribution of "pull out" collisions in terms of frequency per junction was as follows:

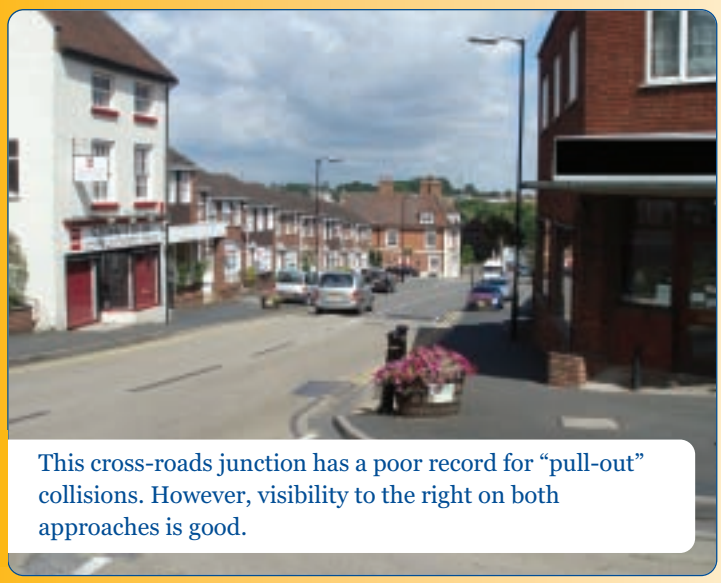
	No. junctions
>1 pull out collision each year	2
4 pull out collisions in 5 years	8
3 pull out collisions in 5 years	12
2 pull out collisions in 5 years	28
1 pull out collisions in 5 years	225
total	275 junctions

It is estimated that there are in excess of 10,000 "T" or "X" road type junctions on 30mph urban roads in the county. On that basis less than 3% of these junctions experience at least one "pull out" type collision every 5 years.

A more detailed investigation and site visits to the 22 junctions with at least 3 collisions in 5 years revealed than some of the pull out collisions at crossroads were overshoots, and therefore unlikely to relate to limited "Y" distance visibility. Furthermore, measurement of visibility at the 22 junctions showed that "Y" distance visibility did not correlate well with pull out collision types.

[iv] in 2007 just under 2,000 injury collisions were reported for the whole of the county





This cross-roads junction has a poor record for "pull-out" collisions. However, visibility to the right on both approaches is good.

- Road Safety Auditors should think laterally in order to recommend solutions to potential safety problems that respect the design objectives of the scheme. For example if an objective is to encourage walking and there is concern about conflict with vehicles at a given point, it is likely to be more appropriate to address driver behaviour than to attempt to deflect pedestrians from their desire line to a 'safer' point. Similarly the provision of features such as street trees can be intrinsic to the place making objectives in a street. It may be more appropriate to recommend re-location of trees, as opposed to removal, or to recommend additional measures to reduce vehicle speeds.

6.3 Use of signs, markings and street furniture

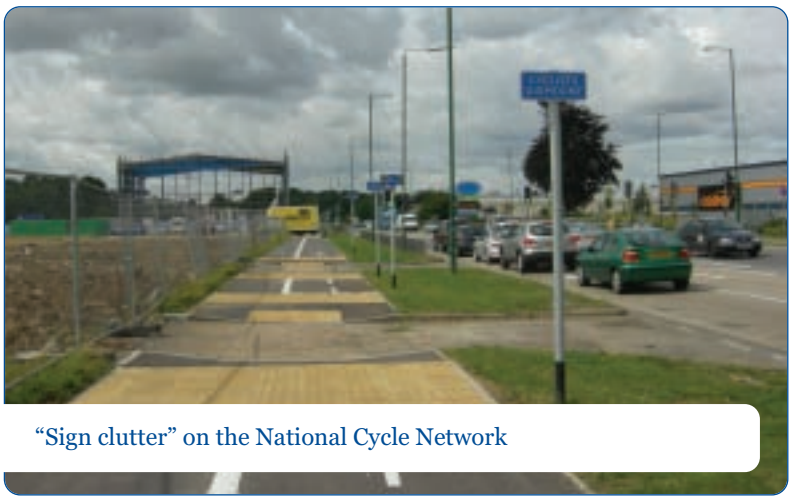
There is an emphasis within MfS on a minimalist approach to signs, markings and some street furniture.

> "Some streets feature few or no signs or markings. This may be appropriate in lightly trafficked environments." (9.1.7)
>
> "In residential areas, minimal signing can work well if traffic volume and speeds are low." (9.1.8)
>
> "Designers should start from a position of having no signs, and introduce them only where they serve a clear function." (9.2.2)
>
> "Excessive street furniture should be avoided." (10.2.1)

This advice reflects an objective to reduce street clutter, maintenance costs, and visual and physical obstructions. MfS encourages designers to provide signs and markings that are appropriate to the particular location, rather than merely using a set of standard details. MfS points out the distinction between the TSRGD[49], which is mandatory, and the TSM[50], which is advice. It also encourages designers to recognise the conditional nature of most signs in TSRGD – being required for example in situations where there are regulatory restrictions on use. MfS suggests that designers consider whether regulations are warranted in the context and likely to be enforced.

How Road Safety Auditors should respond:

- Manual for Streets promotes the concept of a self-explaining road which may result in designs which concern some Road Safety Auditors. However, the emphasis within Audit should be on trying to assess what types of collisions may occur, rather than on strict compliance with traffic signs convention;
- MfS also challenges designers and Road Safety Auditors to consider whether signing is the most appropriate measure to address behaviours that may originate from inappropriate geometries or other features. If the design achieves an objective of low travelling speed for motor traffic, coupled with low levels of conflict between users, then it is likely to be comparatively safe.



"Sign clutter" on the National Cycle Network



Absence of signs in Poundbury, Dorset

6.4 Quality Audit

MfS describes the Road Safety Audit process with particular reference to HD 19/03, commenting that the requirement for independence can leave road safety issues being considered in isolation from visual quality and place-making issues, and that this makes it difficult to achieve a balanced design through dialogue and compromise. There should be no intrinsic barrier to constructive dialogue between the Audit Team and Design Team. As described in this document (Section 3.1.3), informal dialogue between the two teams is both acceptable and generally desirable.

MfS recommends that Road Safety Audit is set in a context of "Quality Audit". Quality Auditing is seen as: "an integral part of the design and implementation process ... that inform this process and demonstrate that appropriate consideration has been given to all of the relevant aspects". MfS (3.7.3)

A Quality Audit is described as a series of assessments, carried out by various professionals using appropriate guidelines for each assessment. The following assessments are listed as potentially forming part of a Quality Audit:

- Audit of visual quality;
- Review of how streets will be used by the community;
- Road Safety Audit including risk assessment;
- Access audit;
- Walking audit;
- Cycle audit;
- Non-motorized user (NMU) audit;
- Community street audit; and
- Place-check audit.

MfS recommends that Quality Audit is carried out before planning approval and detailed design within the design sequence, following on from master planning/ scheme layout:

Policy Review

Objective setting

Design (including masterplan or scheme layout)

Quality Auditing

Planning Approval

Implementation

Monitoring

It is further recommended as an iterative process that can be applied at various stages in a scheme's development to test it against the full range of design objectives. The task is seen as being managed by the design consultant, but outputs are to be considered by the planning and highway authorities. Some form of Quality Audit is seen as being applicable to large and small developments, and to changes to existing streets.

In the questionnaire sent out to local highway authorities and consultants (Appendix 7) they were asked whether they undertook Quality or other audits in addition to Road Safety Audits.

- 15% of local highway authority respondents said that they had a Quality Audit process as suggested in Manual for Streets, a number of respondents stated that they carried out other audits in addition to Road Safety Audits – 23% do NMU audits, 20% do access audits, 28% do pedestrian audits, and 42% do cycle audits on some schemes.
- 28% of consultant respondents said that they undertook Quality Audits, a number of respondents stated that they carried out other Audits in addition to Road Safety Audits – 57% do NMU audits, 34%

do access audits, 40% do pedestrian audits, and 53% do cycle audits on some schemes.

How Road Safety Auditors should respond:

- There are issues in carrying out conventional Road Safety Audits prior to planning approval and detailed design in that there is frequently not sufficient information upon which to make detailed safety comments;
- A more appropriate safety intervention at this point could be a Road Safety Assessment as described in Section 2.5.4. This would allow comparisons of safety to be made for fundamental options within the design. In addition, comparisons of safety implications for different road users could be made. Within a Road Safety Assessment, there is scope for the use of risk assessment, as suggested in MfS, and as described in Section 6.5;
- More guidance on the relationship between Road Safety Audit and Quality Audit can be found in Section 7.2.

6.5 Risk assessment

6.5.1 MfS and Road Safety Audit

One of the concerns raised in MfS with regard to Road Safety Audit is that:

"RSAs may seek to identify all possible risks without distinguishing between major and minor ones, or quantifying the probability of them taking place. There can also be a tendency for auditors to encourage designs that achieve safety by segregating vulnerable road users from road traffic." MfS (3.7.11)

" It would therefore be useful if the RSA included an assessment of the relative significance of any potential safety problems. A risk assessment to consider the severity of a safety problem and the likelihood of occurrence would make it considerably easier for decision makers to strike an appropriate balance." MfS (3.7.12)

This criticism of Road Safety Audit goes to the heart of the issue of defining hazards and risks. A "hazard" is anything that can hurt someone, whilst a "risk" is the likelihood of the hazard being realised in the circumstances of use. So although there are there are a number of hazards associated with water, one of which is drowning, if the water in question is in a bottle on a table, and the use for which it is intended is pouring into a glass for drinking, then the risk of drowning is almost non-existent.

6.5.2 Risk assessment methodology

Risk assessment implies that we not only identify hazards, but that we evaluate their impact – in terms of the severity of outcome, and the likely frequency of occurrence.

This is carried out across the health and safety industry using conventional risk matrices as follows.

Severity	Frequency: Frequent	Probable	Occasional	Remote
Catastrophic	Very high	High	High	Medium
Critical	High	High	Medium	Medium
Marginal	High	Medium	Medium	Low
Negligible	Medium	Medium	Low	Low

By combining severity and frequency, the user is able to interpret risk in bands – from very high, to high, medium and low risk.

A 4 x 4 matrix is better than 3 x 3 or 5 x 5, as it encourages users to be more decisive about risk. An odd number of rows and columns can lead to users choosing the "middle ground".

A generic matrix, however, is not very helpful in terms of helping the user to define categories. What do terms like "catastrophic" and "frequent" mean? The interpretation of these terms is very different for the nuclear power industry, compared to road safety. A catastrophe in a nuclear power plant could result in scores or thousands of deaths, whilst a catastrophe on the roads rarely results in double figure numbers of casualties. A frequent occurrence in terms of a road location might be one with one injury collision per year, whereas a "frequent" incident in the nuclear industry would be less than one per generation.

It is therefore important to develop the matrix by interpreting these generic terms within the relevant industry. So for road safety, the matrix should be "benchmarked" to reflect realistic collision situations. For example, the following approach could be adopted.

Severity	Frequency of collision: more than one per year	one every 1-4 years	one every 5-10 years	less than one per 10 years
Fatal	Very high	High	High	Medium
Serious	High	High	Medium	Medium
Slight	High	Medium	Medium	Low
Damage	Medium	Medium	Low	Low

In this matrix severity refers to an injury outcome familiar to road safety engineering practitioners. Collision severity is likely to be affected by speed of the impacting vehicles, the relative vulnerability of the collision victims compared to the impacting vehicles, and the level of protection offered to the collision victims. Frequency can be benchmarked using collision records for similar situations (control data) where available. This can be supplemented or replaced by estimating issues such as exposure to risk of the potential victim, and the time victims may have to react to the conflict relating to visibility and other issues.

Within the matrix, the frequency scale will vary depending on local differences in collision occurrence. For example, certain types of collision occur more frequently in London than in Cumbria, and matrices should reflect this. However, once a matrix has been developed, it should be applied consistently by users.

The Road Safety Auditor would be responsible for using such a matrix to determine levels of risk. This information could then be passed onto the client.

6.5.3 Risk assessment uses

Risk assessment is increasingly used in a number of areas within road safety. Road Safety practitioners organising school crossing patrols, safer routes, walking buses, pedestrian and cycle training, and undertaking school travel assessments all use a form of risk assessment in their work[51].

A form of risk assessment is used by Transport for London (TfL) when undertaking assessments to determine the risk associated with removing pedestrian guardrails[52] on "streetscape" schemes. The Highways Agency has used a risk assessment matrix to assist in determining whether Departures from Standards should be permitted.

EURORAP use a risk assessment method as part of their road protection score, [53]the purpose of which is to determine some of the likely collision types on part of the existing road network, with a view to undertaking mass action safety programmes on that part of the road network.

Risk assessment has also been used within Road Safety Audit in some countries, including New Zealand and Canada, and by some UK highway authorities including Glasgow City Council and Lancashire County Council[54].

Within the original Road Safety Audit Advice Notes encouragement was given to Road Safety Auditors to prioritise their problem/recommendation statements by using a "star system" to indicate the most important problems. Although this suggests the use of risk assessment, no guidance was provided for:

- Evaluating the level of risk using consequence and frequency;
- How to reduce risk - there appeared to be equal emphasis on risk removal and risk mitigation, all problems were considered to be of sufficient importance to require action. Conventional risk assessment techniques encourage the use of a hierarchy to assess how much risk will be removed or reduced.

Example - Risk reduction hierarchy - from risk removal to mitigation

Risk elimination

Risk substitution

Engineering control

Safe systems of working

Personal protective equipment

The comprehensive research carried out prior to the publication of HD 19/03 included a section on the possible use of risk assessment within Road Safety Audit. Trials were carried out, but the idea was dropped, following an inconsistent result in the trial.

HD 19/03 therefore includes no mention of risk assessment. Road Safety Auditors are encouraged to include recommendations that are "proportionate and viable", in order to "eliminate" or "mitigate" the identified risks. All safety issues are therefore included, with no grading of risk or of the effectiveness of the recommendation. Without risk assessment, a Road Safety Audit can become a list of hazards.

In Ireland, the current Advice Note suggests that a Road Safety Auditor may sometimes comment on something with a small safety benefit but a large cost, and that Road Safety Auditors should therefore carry out an "informal risk assessment" for each problem, assessing both probability and severity of outcome. The Irish Advice note suggests that the post-Audit Team meeting involving all parties is a suitable forum for discussing such assessments.

6.5.4 Benefits of risk assessment

The benefits of undertaking risk assessment in Road Safety Audit are that it helps to focus on the priority safety issues, and will assist the client to make decisions about which problems are most serious.

An assessment of the problem, and a reassessment of the problem if the recommendation was adopted, could assist clients to evaluate whether to implement certain recommendations, as illustrated from the post-construction Road Safety Audit scenario described below.

Case Study – Risk Assessment



Problem
Summary: risk of vehicle collisions.
The minor road approach to the junction has a horizontal curve over a crest curve on the immediate approach to the give-way line. The conspicuity of the junction, the give-way line and the signage is poor. The give-way sign is offset too far to the left and the give-way line is obscured by the crest. The 'SLOW' marking gives the impression of applying to the curve and not the approach to the junction. These factors could lead to side-road drivers overshooting the give-way lines and colliding with main road traffic.
Risk Assessment: High (consequence – serious; frequency – 1 collision every 3 years)



Photo source: Stewart Paton

Recommendation
The 'SLOW' marking should be removed and the following improvements provided:
- Chevrons to define the deviation of the horizontal curve
- Advance give-way sign and distance plate
- Splitter island and bollards at the junction to define the location of the give-way line
- Move the nearside verge give-way sign away from the give-way line and into the line of sight on the approach
- Improve the centre line hazard markings on the curve

New Risk Assessment: Medium (consequence – slight; frequency – 1 collision every 7 years)

Undertaking risk assessment also helps Road Safety Auditors to focus on whether the issues raised during the Road Safety Audit are "real" road safety problems, and could assist in documenting why certain issues were not included in the report.

6.5.5 Some concerns with risk assessment

Because risk assessment is not a "pure science", some Road Safety Auditors have been reluctant to use what they see as being a very subjective tool. For many road safety problems it is difficult to judge which part of the matrix to use, as the control data needed to judge precise severity and frequency in that scenario simply does not exist. However experienced Road Safety Auditors should have sufficient knowledge of collision type, severity, and frequency to be able to make a risk assessment, particularly if they have knowledge of the likely use of the scheme by road users once it is open.

The subjective nature of risk assessment may lead to inconsistencies between Road Safety Auditors (though not necessarily greater inconsistencies than with an approach based on hazard recognition). Experience suggests that where risk assessment has been used, Road Safety Audit Teams find a consensus on most issues.

Some risk assessment processes could lead to Road Safety Auditors overstepping their responsibilities, and effectively instructing clients what to do. For example, the risk assessment technique suggested for use by Road Safety Auditors in the UK Highways Liability Joint Task Group report recommends that the highway authority may establish the following outcomes from a risk assessment:

Example – Risk Assessment
- **Risk Category 1**– recommendation must be heeded unless redesign avoids problem;
- **Risk Category 2**– implementation of recommendation strongly recommended unless redesign avoids problem;
- **Risk Category 3**– implementation of recommendation discretionary; and
- **Risk Category 4**– implementation of recommendation not critical to reasonable safety.

In this example a Category 1 risk has an outcome phrased in a way that impinges on the clients role. Road Safety Auditors should not instruct clients in a course of action.

Finally, there is a concern that some clients may use the risk assessment process to ignore some "low risk-

low cost" issues identified within a Road Safety Audit Report, for example issues relating to tactile paving. This would be less likely to happen within a Quality Audit process, where the client would need to address this issue as part of a wider context. However, on a small scheme where the only external input derives from Road Safety Audit, the rejection of the issue could lead to a lower quality environment.

Low risk-low cost



Cutting tactile paving to fit a chamber cover following a design stage Road Safety Audit that expressed concern for blind pedestrians stepping into the carriageway without realising



An example of tactile paving laid without any colour contrast – leading to a potentially confusing, and possibly unsafe layout for partially sighted pedestrians

How Road Safety Auditors should respond:

Because risk assessment is not suggested within HD 19/03, Road Safety Auditors should be cautious about using it when carrying out Road Safety Audits in accordance with that Standard. An HD 19/03 Audit Team Statement states that the work has been "carried out in accordance with HD 19/03", and this is clearly not the case if a risk assessment has been added in.

Risk assessment should not be used as a mechanism for instructing clients that they must implement Road Safety Audit recommendations.

However, risk assessments should be used to complement Road Safety Audit in a number of situations, particularly on local roads:

- On local road schemes where the authority has written procedures that vary from HD 19/03 and encourage the use of risk assessments. This may be appropriate on innovative schemes, for example those involving streetscape, shared use, home zones;
- On residential street designs where the client asks for a risk assessment in line with MfS advice;
- During an Interim Audit, or at a draft report meeting, it may be appropriate for a Road Safety Auditor to undertake a risk assessment of a particular road safety problem in order to assist a client to identify which issues to address first; and
- As part of a Road Safety Assessment (see Section 7.4) at the early stage of a scheme in order to compare risks between different options or road users.

Where risk assessments are carried out, the Road Safety Auditor should concentrate their assessment on the road safety problem, and identify the level of risk associated with that issue. The assessment is made in order to assist the client to judge the potential scale of the problem. The Road Safety Audit recommendation should then be proportionate and viable to the problem identified. The client can use the risk assessment to help determine an appropriate response – whether that involves accepting the Audit Team's recommendation, suggesting an alternative, or writing an Exception Report.

It is recommended that Road Safety Auditors obtain training and familiarise themselves with risk assessment techniques.

It should be noted by both Road Safety Auditors, and by those asking for Risk Assessments, that they add time, and therefore costs, to Road Safety Audit work.

Case Study - Lancashire

The Lancashire County Council Road Safety Audit Procedure states that each road safety problem identified should be referenced with the location of the problem, which road user is at risk, a detailed explanation of the problem, **a quantified level of concern,** a recommendation to mitigate or remove the problem and that each problem should be separately referenced and identified on a location map.

In order to assist with quantifying the level of concern, Lancashire provide an appendix with a risk assessment matrix similar to that shown in Section 6.5.2 above.

07 ISSUES FOR LOCAL HIGHWAY AUTHORITIES WHEN UNDERTAKING ROAD SAFETY AUDIT

7.1 How to respond to HD 19/03

7.1.1 Introduction to the issue

The 1988 Road Traffic Act places a duty on local highway authorities to take appropriate measures to reduce the possibilities of collisions occurring when new roads come into use. Road Safety Audit is an accepted national and international mechanism for fulfilling at least part of this duty, and the benefits of Road Safety Audit demonstrate its effectiveness as a collision prevention technique.

Local highway authorities are therefore advised that Road Safety Audits should be undertaken on new road schemes and on road improvement schemes.

In the absence of having their own local guide, it may be assumed that local highway authorities should undertake Road Safety Audits in accordance with HD 19/03. Although this Standard strictly applies only to trunk roads, it is commended to other highway authorities, and it is recognised as good practice in the UK.

However, HD 19/03 requires that all highway schemes are subject to Road Safety Audit, and that the audit is carried out in a particular way by staff with appropriate training and experience.

The research carried out for these Guidelines has shown that not all local highway authorities have the necessary resources to apply HD 19/03 to all schemes.

In addition it is acknowledged that the nature of HD 19/03 is not appropriate for all local schemes. A more flexible approach may be needed for many of the very small traffic and minor improvement schemes that are constructed, many of which have an inherently low risk of future collision occurrence. Large-scale innovative schemes may require a greater safety input at the feasibility stage than is allowed for in HD 19/03, and a Road Safety Assessment may be a more appropriate mechanism at this stage.

Furthermore, some national highway authorities may desire a more flexible approach to Road Safety Audit on some schemes on trunk roads.

This section of the Guidelines gives advice on where Road Safety Audits may be approached in a different way to the requirements set out in HD 19/03, in order to fulfil the objective of all authorities undertaking Road Safety Audits. The advice is based on a practical and reasonable response to the issues facing local highway authorities, and on experience gained from those authorities who have already made some departures from the national standard.

7.1.2 Some common principles

The review of Road Safety Audit practice carried out for this document suggests that there are a number of commonly held principles that should underpin any set of Road Safety Audit Guidelines or standards:

- Road Safety Audits should be undertaken on new road schemes and on highway improvement schemes on local roads;
- The work should be undertaken by suitably experienced staff;
- The staff should work in teams of at least two people;
- A formal Road Safety Audit should be independent from the design;
- The Road Safety Audit Report should be written in a clear, consistent manner that identifies potential road collision scenarios, and recommends ways of reducing that risk;
- The Road Safety Audit Report should be followed by a formal documented response;
- The Road Safety Audit is seen as advice provided within the design process, and the scheme "client" retains control over the scheme at all times;
- HD 19/03 does provide a high standard for carrying out RSAs, and provides appropriate guidance for many local road schemes. However it is not a legal requirement that local highway authorities undertake all (or indeed any) Road Safety Audits in accordance with HD 19/03;
- Local highway authorities are therefore entitled to depart from the standards set out in HD 19/03; and
- Where they do depart, they are advised to establish their own procedures and follow them consistently at all times.

7.1.3 Opportunities for local highway authorities to vary their practice from HD 19/03

Section 5.2 reported on the difficulties some local highway authorities have in meeting the requirements of HD 19/03. These issues are explored below, and opportunities for variation, where appropriate, are suggested.

Scope of Road Safety Audit

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority[v]
Which schemes should be subject to RSA?	All schemes that involve any change to existing layout	Yes, if resources do not permit all schemes to be audited, or if HD 19/03 is considered inappropriate for some schemes	Review schemes carried out by type, cost, and impact on the highway network. Differentiate internal schemes from development schemes designed outside the authority. Develop criteria for judging level of RSA required for different schemes. It may be appropriate to develop two categories of RSA – (HD CAT , and local CAT), and possibly a further category of safety checks with less onerous procedures

The issue of which schemes to audit is the most taxing for decision-makers in this area. In the IHT Questionnaire reported in Section 5.2, the issue of "not enough resources to audit every highway scheme" was the most commonly reported issue. Local highway authorities' policies reflect this and some carry out a "lesser" standard Road Safety Audit on "minor" schemes.

It is therefore essential that each local highway authority reviews its internal works programme, and its development schemes, and assesses the level of audit appropriate. The review should be summarised within the authority's Road Safety Audit policy document.

This assessment can include cost of scheme, but should not be restricted solely to cost. Issues such as the impact of the scheme in terms of traffic levels and mix, the status of the road within the road hierarchy, the exposure to risk for vulnerable road users, and the political sensitivity of the scheme should also be taken into account.

Following a review of this type, a local highway authority would be in a position to identify those schemes that should be audited in accordance with HD 19/03 (HD CATegory Audits), those schemes that could be subject to a different Road Safety Audit regime (local CATegory Audits), and possibly a further set of schemes that could be subject to a safety checking process.

Case Study - Lancashire

Two categories of Road Safety Audit, and two categories of scheme checks have been developed:

Safety Audit Level	Description
RSA – Grade A	Full RSA to HD 19/03
RSA – Grade B	RSA by Road Safety Auditors omitting several HD 19/03 elements
Road Safety Review(RSR)	Safety assessment by qualified highway traffic engineers
Safety Self- Certification(SSC)	Safety check of single element schemes by designers using safety check list

[v] This advice is offered generally as an example of how a local highway authority may vary from HD 19/03 in these areas. Local authorities should be flexible in their approach and make local decisions appropriate to their own situation.

For internal schemes the authority uses type of scheme and cost as a criterion for choosing Road Safety Audit type:

Type of Scheme	>£10k	£10k - £125k	£125k - £250k	>£250k
Major New Scheme	n/a	n/a	n/a	RSA/A
Local Safety Scheme	RSA/B	RSA/B	RSA/A	RSA/A
20mph, Traffic Man., Cycling, Pedestrian, SRTS, Bridge Protection, Special Maintenance	RSR	RSA/B	RSA/B	RSA/A
Quality Bus, Anti-skid, Gateways, Guardrail, Street Lighting, Visibility & Junction Improvements	SSC	RSA/B	RSA/B	n/a

For external schemes the authority uses an "impact criteria" to assess Road Safety Audit type:

Type of Scheme	Impact 1	Impact 2	Impact 3	Impact 4
Section 38 – New estate roads	RSR	n/a	RSA/B	RSA/A
Section 106 – Remote works	RSR	RSR	RSA/B	RSA/A
Section 278 – Highway access	RSR	RSR	RSA/B	RSA/A

Where:

- Impact 1: increased vehicle movements more than 500, and/or more than 100 VRU movements per day are predicted to be generated by the development, and there are less than 5 reported injury collisions in the last 3 years;
- Impact 2: increased vehicle movements more than 500, and/or more than 100 VRU movements per day are predicted to be generated by the development, and there are 5 or more reported injury collisions in the last 3 years;
- Impact 3: increased vehicle movements of between 500 and 5000, and/or between 100 and 500 VRU movements per day are predicted to be generated by the development; and
- Impact 4: increased vehicle movements of more than 5000, and/or more than 500 VRU movements per day are predicted to be generated by the development.

Road Safety Audit Team

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
What constitutes an RSA Team?	At least two members, all competency "qualified". Observers (RSA trainees) should also be qualified	Teams should always comprise a minimum two members. Competency could be reduced in some circumstances (see below)	Where local CAT audits are established, qualifications could be relaxed for second member, and for Observer
What does it mean to be independent?	The RSA Team should be independent from the Design Team but can be from the same organisation	No	RSA Team Members should always be independent from the Design Team

Resource restrictions have led some local highway authorities to carry out Road Safety Audit with one-person "teams". However, it is recommended that a formal Road Safety Audit is a task for two people, to be carried out independently from the Design Team.

Road Safety Auditors' competence

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
What experience in Road Safety Engineering is required?	four years for Team Leader, two years for Team Member,one year for Observer, recent experience desired	Not for Team Leader in most circumstances Some scope for others	For local CAT schemes the Team Member should have a minimum one year's experience, and the Observer may not need any initial experience Or The combined experience should add up to five years, with a minimum of one year for the Team Member
What experience in Road Safety Audit is required?	Five audits in last year for Team Leader, five audits in last two years for Team Member	No	Road Safety Audit Team: Leaders and Members should have Road Safety Audit experience. Recommended minimum experience before becoming a Team Member; an Observer on five local CAT audits in a twelve month period.
What Road Safety Engineering Training is required?	Ten days for Leaders, Members and Observers	Not for Leaders and Members	Observers on local CAT schemes should have at least two days training
What CPD is required?	Two days in twelve months for Leaders and Members	No	Road Safety Audit Team Members should keep up to date with developments in road safety

The competency requirements suggested in HD 19/03 were identified as the second most onerous issue in the survey of local highway authorities. Local policy documents reflect this, with some authorities relaxing the road safety engineering competence requirements for Road Safety Auditors.

For local CAT Road Safety Audits, these Guidelines are suggesting some relaxations in Road Safety Engineering experience, and a greater flexibility in the role of the Observer, to enable trainees to get

experience more quickly.

An option on local CAT schemes could be for the two-person team to have a combined road safety engineering experience of five years. This would lead to a situation where a Team Leader could have three years and Team Member could have two years experience.

Road Safety Audit stages

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
At which design stages should a Road Safety Audit be undertaken?	No Stage F carried out. Road safety should have been considered within a feasibility study on major schemes	Yes, Stage F Road Safety Audits or Road Safety Assessments may be desirable	The local highway authority should decide between a Stage F RSA and a Road Safety Assessment. Road Safety Assessments should be utilised where comparative risk analysis is required This study could contribute to a Quality Audit process on a development, and may involve risk assessment in some cases
	Stage 1,2 (or 1/ 2 on small schemes) and Stage 3	No	Independent RSA should be undertaken on at least one design stage and at post-construction stage
	Interim Audit permitted	Yes, this can be interpreted in a local context	Local highway authorities can take a more flexible approach to safety advice during design, without compromising independence, but notes of discussions should be maintained
	Stage 4 (monitoring)	Yes, local highway authorities carry out different forms of monitoring	HD CAT schemes monitored as in HD 19/03 Local CAT schemes subject to routine monitoring If some schemes exempt from audit or subject to self-checks, periodic assessment of these safety checks should take place Periodic assessment should take place on any external audits carried out

Some local highway authorities already assess road safety at Stage F within a scheme design. A decision should be taken to determine whether at Stage F a Road Safety Audit, or a Road Safety Assessment, is required. These Stage F inputs could form part of a Quality Audit process, and may require risk assessment if comparisons between scheme options or road users' safety is required.

Where a combined Stage 1 & 2 Road Safety Audit is to be undertaken, the level of detail provided by the client should be sufficient to carry out the work to a full Stage 2 requirement.

Many local highway authorities already carry out "Interim Audits" by offering road safety advice within design. It is advisable to maintain notes of this process.

Stage 4 (monitoring) Audits were a resource issue for local highway authorities according to the questionnaire response. These can be covered for local CAT schemes through routine monitoring. Periodic monitoring of collision records should be made by the scheme client for any schemes deemed to be exempt from Road Safety Audit, or for schemes subject to a Road Safety Check. Formal Stage 4 Audits should be referred to in Section 278 agreements where appropriate, so that the developer can be encouraged to complete any works prior to the end of the maintenance period. Monitoring the subsequent collision records of innovative schemes is particularly important.

Finally, if local highway authorities commission external Road Safety Audits, or if such studies are undertaken externally as part of development schemes, the local highway authority should periodically assess the quality of those Audits.

Site visits [vi]

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
How should design stage site visits be undertaken?	All Team Members attend at each stage, together	Some scope for single-person visits	On local CAT schemes one person can visit alone as long as both Team Members review all plans and documents
How should Stage 3 site visits be undertaken?	All Team Members attend daytime and night-time visits together	Not for daytime visits, some scope at night	On local CAT schemes one member only needs to visit at night OR Both members can visit but not necessarily at the same time OR Local highway authority delegates decision on night-time visits to Audit Team Leader (in consultation with scheme client)

A commonly quoted issue within the questionnaire was a lack of resources to carry out two-person site visits, and particular concern was expressed about night-time visits. A discretionary approach is already taken to night-time site visits in some local highway authorities[vii]. For local CAT schemes it is suggested that one-person site visits during the design stage may be appropriate. For night visits at Stage 3 on local CAT schemes, a one-person visit may also suffice. Alternatively, the Road Safety Audit Team Leader (in consultation with the scheme client) should be able to decide whether a night-time visit is required in circumstances where no change has been made to night-time road conditions or road usage. Such decisions should be documented and recorded within the Stage 3 Road Safety Audit Report.

Road Safety Audit Report

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
How should the Road Safety Audit Report be written?	"Ambridge" style, with location, summary, problem, recommendation	No	The "Ambridge" style provides a universally consistent format that encourages the identification of safety issues and as such should be used A location plan at design stage, and photos at Stage 3, can be omitted by local agreement
How should the report deal with "non-safety" issues?	They should not be included in the report	Yes	For HD and local CAT schemes, they can be included in a separate section at the end of the report, as a series of non-safety "bullet" points

Despite the "Ambridge" style of report providing an excellent means of describing "who can be hurt and why?", a significant number of local highway authorities described problems with using this format within the questionnaire response. The recommendation is that this format should be used. "Non-safety" or "other" issues can be added to the end of the report, in a separate section.

[vi] It should be noted that all site visits should be undertaken in line with current legislation and advice regarding the relevant Health and Safety requirements.
[vii] In addition, some local authorities have been unable to resource night-time visits at all.

Management of the Road Safety Audit process

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
Who commissions the RSA?	Project Sponsor – person at HA responsible for that scheme	Yes, to the extent to which roles and responsibilities differ in each local highway authority	RSA should be formally commissioned. The role of scheme client (Project Sponsor) needs to be identified, including on developer led schemes. This person takes ownership of the scheme, and the design process, inc RSA
Who writes the Audit Brief?	Design Team, approved and issued by Project Sponsor	Project Sponsor and Design Team are often the same person	Scheme client (who may be the designer) writes the brief
Who organises the RSA Team and undertakes Audit?	Audit Team Leader, prepares report for Project Sponsor	No	Audit Team retain responsibility for their work
Who responds to the Audit and how?	Project Sponsor discusses Road Safety Audit with Design Team. Project Sponsor issues instructions to Design Team and writes any Exception Reports	Project Sponsor and Design Team are often the same person	The designer should complete a Designers' Response Form (Appendix 2) as a basis for an Exception Report
Who arbitrates any differences of opinion	Director of Highway Authority (e.g. HA)	Yes, to the extent to which roles and responsibilities differ in each local highway authority	Someone with responsibility for both RSA and design should be designated as Arbitrator on internal schemes Within Quality Audits, the arbitration process should be decided when setting objectives
How does any liaison between the RSA Team and others take place?	Project Sponsor can request meetings with Audit Team and Design Team following each Stage Interim Audits can be requested	Yes, a much less formal approach to scheme design already exists	The Audit Team may provide advice during design, and may be involved in Quality Audit on some schemes

Lack of appropriate information to carry out Road Safety Audit was a common issue within the questionnaire responses, highlighting the need for a clear Road Safety Audit Brief and well defined commissioning process.

The most important role in the process is that of the Scheme Client or Project Sponsor, and this person should be made fully aware of their responsibilities.

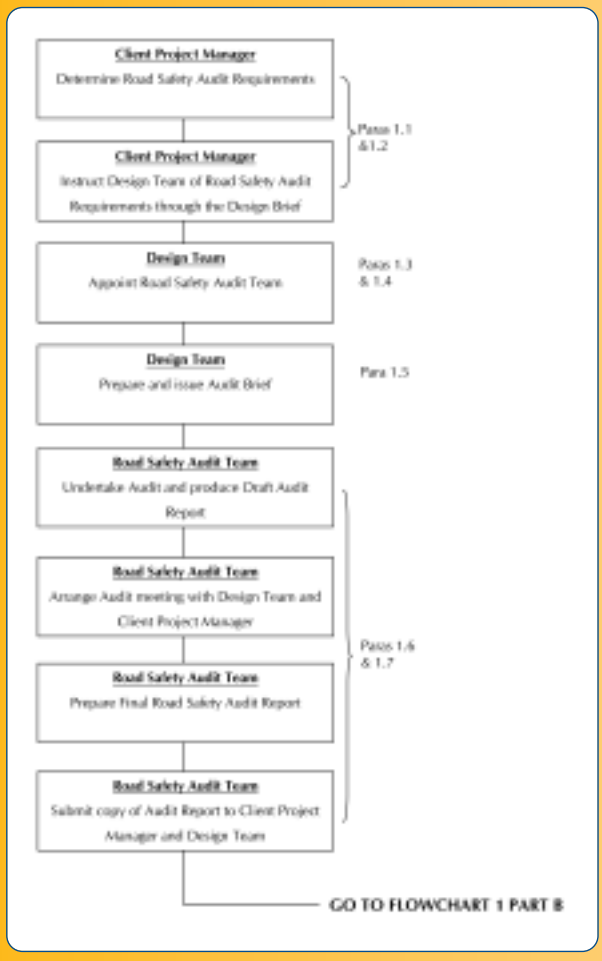
The roles and responsibilities within the Road Safety Audit process are more flexible in most local highway authorities, with some staff assuming a number of roles. It is important to establish who is responsible for each of the roles listed above, possibly by producing a flow chart to demonstrate the process.

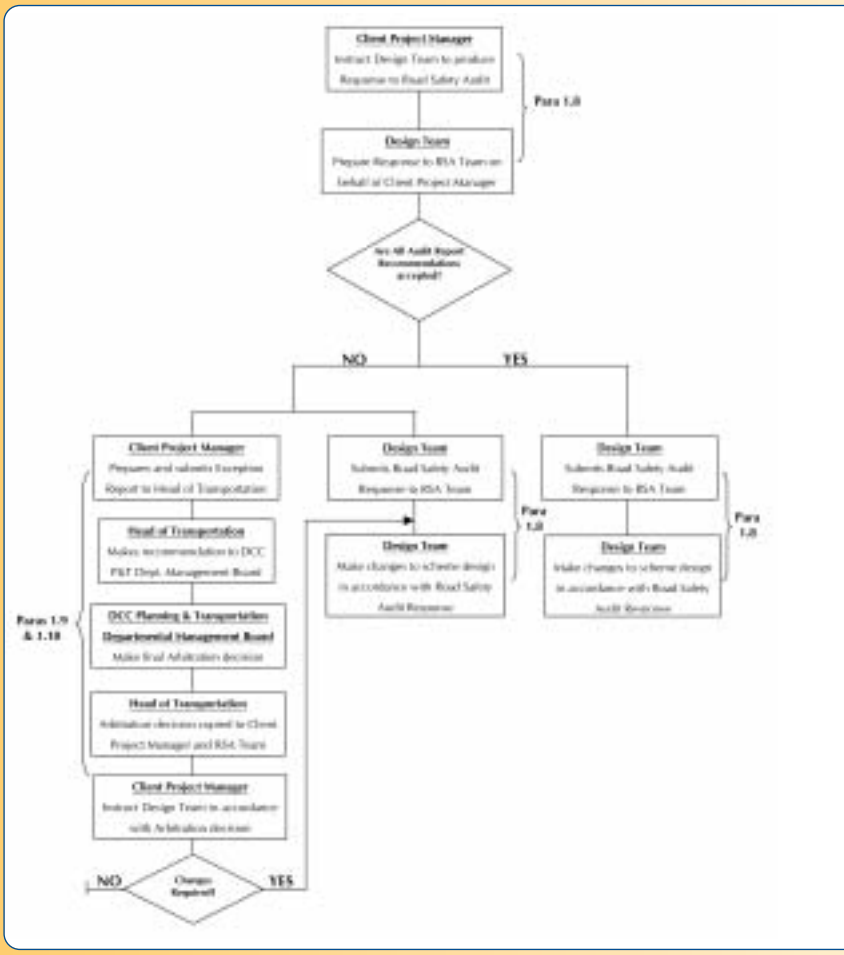
The importance of writing an Exception Report is stressed, and a Designers' Response Form should be used as the starting point for this, as currently undertaken by some local highway authorities.

The role of Arbitrator may not be necessary in most situations, particularly if an effective Exception Report process is in place.

Case Study – Dundee City Council

In Dundee, a flow chart has been produced that illustrates their management process for Road Safety Audit and refers to appropriate sections of text within the procedures.
Source: www.dundeecity.gov.uk/dundeecity/uploaded_publications/publication_259.pdf





Related issues

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
What is the role for Road Safety Assessment?	No formal role within HD 19/03; assessment could take place within a feasibility study	Yes, on Stage F schemes	For schemes requiring a Stage F, the local highway authority should decide whether a Road Safety Assessment is required instead of RSA
What is the role for Risk Assessment?	Precluded from Standard	Yes, on Stage F schemes, possibly at RSA meetings	Road Safety Assessments may well require comparative analysis of options or road user safety, risk assessment is required Risk Assessment may be used at RSA discussions between the Audit Team and Design Team Risk Assessment may be used as directed by the client within MfS, Streetscape, shared use and other schemes

A common theme within the responses to the questionnaire was that Road Safety Audit is sometimes "too restrictive" for use on innovative schemes. This often refers to the early stages of design, when a Road Safety Assessment may be more appropriate, using some form of risk assessment.

Road Safety Auditors may also wish to use risk assessment techniques within a meeting if discussing which issues within the report require most urgent attention.

Road Safety Audit of external developments

Road Safety Audit Principle	HD 19/03 advice	Can local highway authorities vary from this advice?	IHT Guidelines advice to local highway authority
How should RSA on development schemes take place?	The same process as other schemes	Most RSAs on HA schemes are externally commissioned, whilst local highway authorities often employ their own Road Safety Auditors. There may not be sufficient resource to audit external schemes, and RSA sometimes takes place too "late"	Local procedures can be divided into two sections – one for internal schemes, and another for development Need to identify Project Sponsor on developer-led schemes Stage F Road Safety Audits/Road Safety Assessments may be appropriate on developments Input to Quality Audit may be appropriate Need to assess quality of "external" Road Safety Audits

A substantial response to the questionnaire noted that conventional Road Safety Audit of development schemes often took place "too late" in the planning process, implying that planning consent had already been granted prior to the start of the Road Safety Audit process. The wording of Section 278, Section 38 and Road Construction Consent agreements is clearly crucial to a successful Road Safety Audit process in these cases.

This suggests that developers should be submitting early stage Road Safety Audits or Assessments with their planning applications.

Local highway authorities should write separate procedures for this part of the work.

7.2 How to develop a Quality Audit process

Section 6.4 of these Guidelines provides an overview of the Quality Audit process as described in Manual for Streets. Quality Audit is seen as a client-led process, whereby a series of discrete pieces of advice, including Road Safety Audit and/or Road Safety Assessment, are collected by the scheme client and given due consideration within the design process. This would be part of the master planning stage.

Road Safety Assessments should be undertaken when there is a comparative risk assessment to be made, for example between scheme options, or when comparing different roads users' safety requirements within a scheme.

Quality Audit is seen as coming before Planning Approval within the design process, although the MfS guidance is generic and it can also be applied at later stages in the design process. Quality Audit is seen as being appropriate for both large and small developments, and for changes to existing streets. It could become part of the Design and Access Statement required for submission with a Planning Application.

The responses to the questionnaire suggest that a small number of local highway authorities and consultants are already involved in Quality Audit processes, which include a road safety input. A higher proportion are involved in undertaking road user audits in addition to Road Safety Audits on some schemes.

Example - Atkins has introduced Network Management Planning in conjunction with TfL. This is an assessment tool which takes into account the physical attributes of the road, including the "place" value as well as traffic flows and collisions.

Road Safety Audit and Quality Audit should not be mutually exclusive. Road Safety is a fundamental aspect of scheme design, and will continue to be so. Integrating Road Safety Audit into Quality Audit on MfS schemes should not be seen as a problem, but should be addressed within a local highway authority's Road Safety Audit and Highways' Agreement (Sections 38 and 278) Procedures.

It is also recommended that local highway authorities set out a process for implementing and documenting Quality Audit, including procedures for resolution if various audits or assessments are in conflict. The

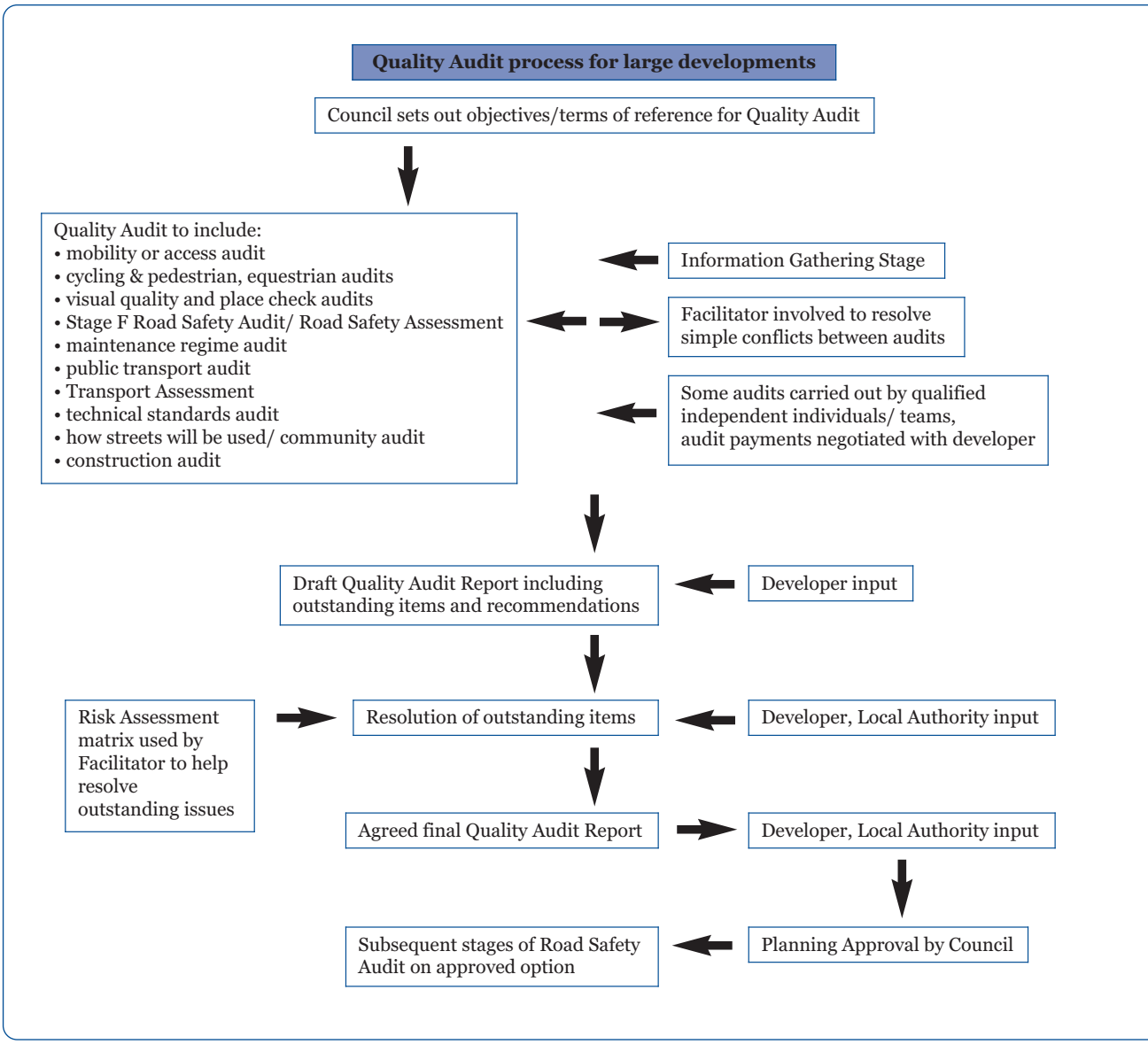
Arbitration process should be defined within the objective setting for the scheme.

For large housing or mixed development schemes[viii] it is recommended that the local planning or highway authority acts as the scheme client, and manages the Quality Audit process. Within this it would be possible to appoint an independent facilitator to carry out the Quality Audit management task.

The client should commission[ix] a series of appropriate discrete studies, including a Road Safety Assessment or Feasibility Stage Road Safety Audit, as part of the Quality Audit prior to planning approval, and perhaps as part of the master planning process.

On completion, the various reports should be brought together in order to resolve any conflicts arising.

Once planning approval has been granted, the scheme should be subject to further Road Safety Audit at design and construction stages as appropriate and in line with the local procedures developed by that authority. In order to enforce this process conditions may need to be attached to the planning approvals.



[viii] The size to be determined in terms of number of houses, traffic impact, environmental impact, political sensitivity, context and urban design

[ix] Although the audits may be paid for by the developer

Case Study: Quality Audit Process for North Arran Way High Street in Solihull

As part of regeneration in North Solihull a new village centre called North Arran Way is being built. The North Arran Way High Street is being designed around guidance in Manual for Streets.

In conjunction with its development partner, Inpartnership, Solihull MBC has developed a Quality Audit process which has review meetings at four stages of the design process to consider whether the emerging design is meeting the objectives of the street. The review stages are:

Outline design (pre-planning) – (user and professional audit);
Detailed design – (professional audit only);
Completion of construction - (professional audit only); and
After opening - (user and professional audit).

The objectives for the street identified the need for:

a. A high quality public realm that people want to be in, is enjoyable to be in and encourages social interaction;
b. The street to be acceptably safe from a highway and community point of view;
c. The street to be functional, so the needs of all users must be considered and catered for as far as possible.

The first stage of the Quality Audit was carried out at outline design stage before the planning application was submitted. Two review meetings were arranged. The first meeting was with invited representatives from user groups. The user audit was held close to the development site and representatives from the following groups invited: visually impaired, mobility impaired, other disabled users groups, school/children, local people including the elderly, pedestrians and cyclists and potential high-street shopkeepers, Solihull cycle campaign, the public transport operator, HGV drivers of delivery vehicles, and the emergency services.

Representatives of the Design Team presented the scheme and answered questions. Council officers from planning, transport and highways also took part. The original intention was that a series of questions would be worked through to identify any issues and conflicts. However, the user groups were so forthcoming that no questions were needed to facilitate discussion. Many safety issues were raised and discussed, in particular the challenges of the proposed shared space for visually impaired users. Many solutions were also offered to the Design Team. Structured notes of the meeting were taken and circulated to the Design Team and the officers from the Council.



Professional audit review meeting for North Arran Way. Photo source: Emily Walsh

The outline stage professional audit review meeting took place a week after the user audit. The Design Team again presented the scheme, this time to council officers who included: highway safety, transport planning, landscape, environmental maintenance, street lighting, cycling officer and planning.

In addition to the Design Team and council officers, two independent reviewers were invited to act as 'independent challengers'. A Road Safety Auditor who had not been involved in the design was invited and also the 'design champion' for North Solihull. Their role was to challenge the design for their areas of interest i.e. highway safety and public realm quality. The Design Team and council officers then agreed a response to each point raised. It had been agreed prior to the meeting that if necessary a risk assessment approach would be used to help resolve any areas of tension, but the need for this did not arise.

The results of the user audit were worked through in addition to comments raised by council officers and issues raised by the 'independent challengers'. The discussion and agreed decisions were minuted and action points for the detailed design agreed.

Further professional audits are planned at the detailed design stage and on the completion of construction. These audits will also include the 'independent challengers' looking particularly at highway safety and public realm quality.

A final user audit will then be carried out when the scheme is completed and opened.

For smaller developments, and for improvements to existing streets, it may not be necessary to commission a Road Safety Assessment, and a conventional Stage 1 Road Safety Audit may suffice at the pre-planning approval stage within the Quality Audit. Again, following planning approval, subsequent Road Safety Audits should be carried out in line with local procedures.

7.3 Road Safety Audit within development control

A significant element of highway improvement and construction is funded through the development of existing and new sites. There are a number of essential differences between these works and local highway schemes.

First, development schemes are designed by consultants working for the developer, as opposed to design sections within the local highway authority (or contracted to the authority). Typically this is carried out within a Design Team including an architect, urban designer or landscape architect.

Secondly, these schemes are submitted for planning approval to the local planning authority (which in two-tier authorities is not the highway authority). In those cases where the development has highway implications the highway authority should be consulted.

Finally, the schemes are often subject to Section 278 or Section 38 agreements which permit the developer to work on the public highway, and enable the local highway authority to ultimately adopt the new works as public highway. (In addition Section 106[55] agreements may enable the authority to obtain money from the developer for works away from the development site itself.) In Scotland Section 21 of the Roads (Scotland) Act[56] provides for a Road Construction Consent process to allow developers to carry out work constructing a new road. Section 56 grants permission to carry out work on or adjacent to the existing public road.

The nature of developer-led schemes is therefore different to local highway schemes, in terms of funding, and client/ designer roles and responsibilities. These differences pose a number of issues for a local highway authority that is trying to establish consistency in the application of Road Safety Audit, Quality Audit, or the Design and Access Statement submitted in support of the Planning Application.

7.3.1 Prior to planning approval

At the pre-planning/master planning stage of the development process the local highway authority may simply be a consultee to the planning authority. However it is at this stage that fundamental questions affecting safety such as junction type and layout are often decided. Therefore the input of Road Safety Auditors can play an important role at this early stage.

In some circumstances time limitations may limit the response to the application to a pre-planning meeting of local authority development control officers together with Road Safety Auditors. However, wherever possible a Road Safety Assessment and/or Stage F Road Safety Audit will assist the Planning Authority in its assessment of the application. In some situations a full Stage 1 Audit may be necessary prior to planning approval, in particular where “fundamental” safety issues are affected by “fundamental” design issues such as land-take.

Planning Authorities should therefore be encouraged to require a formal consideration of the safety aspects of schemes through a Road Safety Assessment and/or Stage F Road Safety Audit. A Road Safety Assessment could be contained in a Transport Assessment or scoping study.

In Scotland at pre-planning stage a transport assessment may be carried out - which could include a Road Safety Assessment. In addition an operational assessment is undertaken by Road Engineers who may examine some safety issues. This assessment establishes the principles of junction form and other fundamental aspects of design.

7.3.2 Post planning approval

In order to provide clear guidance for developers and to ensure safety is adequately addressed, local authorities should ensure that the requirement for Road Safety Audit is included in their local Section 38 and Section 278 or Road Construction Consent agreement templates. Many authorities provide a “developer pack”. This should contain details of the various procedures the developer will need to be aware of, provides an opportunity to clarify the requirements of the Road Safety Audit process, advises on any local policies and variations, and describes the arbitration process to be followed.

Unlike internal schemes the distance which can be created between the parties during the development process can sometimes make the smooth operation of a Road Safety Audit process hard to achieve. This will be minimised if all sides know what will be required and this can best be achieved if clear guidance is available to the developer.

In Scotland following planning approval the developer seeks Road Construction consent. A condition of that consent could be that the developer arranges Road Safety Audits, or a self check, depending on the size of the scheme. This is the first time that Road Safety Audit takes place in a formal sense. If the Road Safety Audit identifies fundamentally “unsafe” features within the design the Road Construction Consent could be refused, though this is rare.

7.3.3 Issues for the Road Safety Auditor

There are a number of issues of detail for Road Safety Auditors dealing with some development schemes. Some of these are related to the quality of the design. As there is often pressure to complete these Audits within a short period of time the Road Safety Audit Team Leader is faced with a choice – whether to reject the commission due to insufficient information or to work on the information provided and point out the deficiencies.

Some of these problems arise because the developers' consultant is unfamiliar with the Road Safety Audit process, and see it as some form of "design test" that must be "passed", whereby they receive a report that pronounces the scheme as "safe". Audit Teams are advised to take a lead by explaining the process and suggesting to Design Teams the items that should be included for Road Safety Audit, including the appropriate level of detail for drawings, schedules, collision data and so on. Audit Teams should be encouraged to liaise with designers, and ask for more information where required. A proactive Road Safety Audit Team can therefore help to minimise some of these issues:

Example – Issues for Auditors

- Poor quality design – the Road Safety Audit Team end up pointing out design errors as well as safety issues, although these errors should not feature within the main body of the report unless they are likely to lead to road user injuries;
- The use of outdated schedules/regulations/standard details;
- A lack of design for vulnerable road users - poor pedestrian facilities, incomplete cycle facilities, and a lack of provision for people with disabilities;



Confusing pedestrian aspects and "see through"

- The overuse of mini-roundabouts as a form of junction control;



Mini-roundabout with no deflection on the major road

- Poor roundabout alignment, with the roundabout designed off-line or with very fast entry paths.



Example of development roundabout offset to the left with a potential for vehicles to travel to the right of the roundabout

A proactive Road Safety Audit Team can provide a major contribution to developing places to be proud of and that have exemplary safety records. However, one of the key roles for such a team is to ensure that it remains independent from the design, and that the client retains overall control of the scheme.

Finally, on many development schemes it is important to define clearly what the boundary of the scheme is. Safety issues at the tie-in with the existing road network can be very important, especially where the development will change road use beyond the scheme limits. For example where children are encouraged to walk to school from a new housing development beyond the access provided.

7.3.4 Outline of Road Safety Audit process within development

It is recommended that the following principles are followed by local highway authorities when examining procedures for Road Safety Audit within development control.

Pre planning approval, local highway authorities should:

- Establish a good working relationship between the local highways and planning departments, ensure that Road Safety Auditors understand development issues and planners understand road safety issues, and incorporate them into the planning application process;
- Ensure that developers submit a Road Safety Audit and/or Road Safety Assessment with their Transport Assessment or Design and Access Statement as part of the Planning Application, and that the Audit is reviewed by all relevant officers within the planning and highway authorities;
- Ensure that Road Safety Audits are carried out not just where the cost of the scheme is high, but also where the road safety impact of the development is likely to be significant; and
- Decide which schemes should be subject to Road Safety Assessment at Stage F.

Pre planning approval, those commissioning Road Safety Audits should:

- Ensure that where the Road Safety Audit has identified safety problems the developer should submit a covering letter with the Road Safety Audit Report to describe how the design will be revised in the light of the Audit comments; and
- Ensure that the Road Safety Audit Report clearly identifies who the client is for that particular stage of the design (developer or highway authority).

Post planning approval, local highway authorities should:

- Identify local Road Safety Audit policies and procedures, and include a requirement for appropriate stages of Road Safety Audit in the highway authority's Section 38 and 278 or Road Construction Consent agreement templates, as shown in Appendix 9;
- Consider the retention of "bond" money from the developer until after the 12-month Stage 4 Road Safety Audit has been completed;
- Decide who should carry out the Audits. If it is an in-house team then the developer should pay commercial rates for the work. If it is an external scheme decide whether the local highway authority wishes to recommend specific Audit Teams or allow the developer to decide;
- If Road Safety Auditors are external establish a policy for assessing the Audit Team's CVs, and the quality of external Road Safety Audits. This could include a review of a sample of Road Safety Audits, providing developers with lists of "approved" Audit Teams, or providing one of the Team Members from the local highway authority;

Case Studies – Suffolk and Warwickshire

One method of working used by Suffolk County Council is to place one of their Road Safety Auditors as an Observer within the external Road Safety Audit Team. Suffolk also insist on checking the CVs of external Road Safety Audit Team Members

Warwickshire County Council require the Director of external organisations supplying Road Safety Audits to state that "I certify that I have personally satisfied myself that XXXX and XXXXX (the persons who have signed the audit above) are experienced safety engineers and are competent to carry out safety audits in accordance with DfT standard HD 19/03."

- Establish a clear process to arbitrate conflicting scheme inputs.

Post planning approval, those commissioning Road Safety Audits should:

- Ensure that the Road Safety Audit Report clearly identifies who the client is for that particular stage of the design (developer or highway authority); and
- Try to retain the same Audit Team (or at least Team Leader) throughout the Road Safety Audit process.

7.4 Guidance for using Road Safety Assessments

Section 2.5 of these Guidelines discussed the differences between a Road Safety Audit and a Road Safety Assessment. Section 6.5 has examined situations in which it is appropriate to use risk assessment techniques. One of these situations is when carrying out a Road Safety Assessment.

7.4.1 When to use Road Safety Assessments

It is recommended that Road Safety Assessments are used in the following situations:

When to use a Road Safety Assessment

Scenario	Scheme stage	Decision
When there is a choice between design options, e.g. different by-pass routes, different junction type. The client wishes to know which option is "safer"	Feasibility	Road Safety Assessment of each option followed by Road Safety Audit at design and post construction stages for preferred option
Comparative risk assessment of road user safety, e.g. an examination of elderly pedestrian road safety compared to cyclist safety in a shared use street. The client wishes to have a overview of how "safe" this will be for all road users	Preliminary Design, occasionally detailed design	Road Safety Assessment of road user safety in addition to Stage 1 (or 2) Road Safety Audit

7.4.2 How to undertake Road Safety Assessments

Road Safety Assessments should be undertaken by Road Safety Audit Teams that satisfy the appropriate national or local experience and qualification requirements set out in Section 7.1.3.

A brief should be drawn up by the client and agreed in advance with the team carrying out the assessment.

At least one member of the team should visit the site as part of the assessment.

The assessment should be undertaken by reviewing the drawings and other information supplied with the brief. The road safety issues identified from the assessments should be risk assessed, using techniques described in Section 6.5.

The report should include a statement that makes an objective comparison of risk, in relation to the brief, between scheme options and/or road users.

The client should respond to the Road Safety Assessment, through a Quality Audit process, or through a specific response should a Quality Audit process not be in place for that scheme.

Once the preferred scheme details have been determined, they should be submitted for formal Road Safety Audit.

Case Study – Tidworth High Street

In Tidworth, Wiltshire, a new supermarket development and shared use High Street has been constructed. The main access to the supermarket was through a priority junction adjacent to the shared use scheme. A Road Safety Assessment was carried out to compare the effects on road user safety of a number of options for this junction. A form of risk assessment enabled the assessment team to determine the "safest" option, on balance, for all road users.

The results of the Road Safety Assessment were fed into a Quality Audit process managed by the local authority and contributed to by the developers' consultant. The Quality Audit process helped to shape the final option, which was then submitted for a formal Stage 2 Road Safety Audit, and subsequent Stage 3 Road Safety Audit.

Photo source: Phil Parker



Junction in advance of new shared use High Street.

At the main desire line along the store frontage pedestrians waiting to cross are often beckoned across the informal crossing point by drivers that give way.



08 HOW TO DEVELOP A LOCAL PROCEDURE AND POLICY

This section describes the items that should be included in a local Road Safety Audit procedure, outlines the management issues involved in putting a procedure together, and refers to case studies from specific local highway authorities.

It is recommended that all local highway authorities draw up Road Safety Audit procedures relevant to their own requirements and available resources. These procedures should be presented to local politicians to enable their formal adoption as council policy.

Private sector organisations undertaking Road Safety Audits should establish their own procedures covering the practical aspects of Road Safety Audit, and the competency of their own internal Road Safety Audit Teams. Those private organisations commissioning Road Safety Audits should also establish procedures for dealing with management of the Road Safety Audit process. The procedures should be sufficiently robust to accommodate local authority requirements for Road Safety Audit.

8.1 Items to include in a local Road Safety Audit procedure

The document should set out:

1. Definitions – descriptions of roles and responsibilities and phrases used within the document. These should include local definitions of the Scheme Client, Audit Team, Design Team, Arbitrator, and set out the meaning of terms such as Exception Report and Designers' Response;
2. Scope of Road Safety Audit – the types of scheme which are to be subject to Road Safety Audit;
   In putting together a procedure, is recommended that the authority develops separate procedures with respect to schemes generated internally and externally. For each type of scheme an appropriate level of Road Safety Audit should be derived.
   For development-led schemes it is recommended that the process is discussed with colleagues in the Planning Department responsible for planning approval.
3. A clear understanding of the difference in categories of Road Safety Audit that may be carried out, for example HA CAT audits as distinct from local CAT audits. Where a third category of "safety check" is introduced, this should be clearly defined and distinguished from formal Road Safety Audits;
4. Stages of Road Safety Audit, and how site visits should be carried out by whom at each stage. How the authority intends to deal with Stage 4 (monitoring audits);
5. Who carries out the Road Safety Audit, their competency requirements, who else can be involved (e.g. police) and their roles. How the authority intends to check the competence of any external Road Safety Auditors;
6. The format of the Road Safety Audit Report, including appropriate report templates to be used;
7. A process for commissioning the Road Safety Audit, preparing the Audit Brief, responding to the Audit, and action following Audit. This should include reference to timescales and costs where appropriate;
8. An arbitration process for resolving differences between the Audit Team and the Design Team/Scheme Client;
9. The relationship between Road Safety Audit and other road user audit/assessments carried out, including reference to the local Quality Audit process where that exists;
10. Situations in which a Road Safety Assessment is appropriate. Reference to any risk assessment techniques to be used in Road Safety Assessments or Road Safety Audits;
11. How the authority intends to monitor the quality of Road Safety Audit Reports and the consistency of issues raised, particularly if Road Safety Audits are to be undertaken on local schemes by a range of (external) Road Safety Auditors; and
12. Reference and examples of any checklists used by Road Safety Auditors, documentation requirements, and pro formas. Flowcharts to describe roles, responsibilities and processes are very useful.

Examples of useful pro formas can be found in many local highway authority procedures, including those from Transport for London, Sheffield City Council, Lincolnshire County Council, Lancashire County Council, Kent County Council, Dundee City Council and Devon County Council.

8.2 Management issues

There are some important management principles that should be adopted when putting a local highway authority Road Safety Audit procedure together.

First, the procedure should be relatively straightforward, and easy to communicate both internally and externally.

Second, the effectiveness of the procedure will be judged on how widely it is adopted – the main objective must be a consistent approach to Road Safety Audit throughout the authority. It is vital therefore that the procedure does not overcommit colleagues, so

that it becomes disregarded and falls into misuse. The best way to ensure this is to consult widely whilst drawing up the procedure. Whilst most staff in highways type functions will be aware of the potential benefits of Road Safety Audit, more awareness is likely to be needed with colleagues in Planning and in specialised design areas such a Streetscape and Public Realm. Nevertheless their support is essential if the authority is to move forward in this area. It may be necessary to hold a series of one-day Road Safety Audit seminars to promote awareness of the need for Road Safety Audit, and to launch the procedures, as an integral part of the consultation process.

Finally, once the procedures have been written, and management approval has been gained through the internal consultation process, it is again essential that the procedure is taken to the authority's politicians for their approval. Once this has taken place, the procedure becomes a policy, and therefore has a greater standing if challenged at an enquiry or within a litigation case.

8.3 Case studies

Eighteen local Road Safety Audit procedures were examined in putting these Guidelines together. The format of these local guides fell into three categories:

- Those with a brief statement describing where local policy varied from HD 19/03 (e.g. Nottinghamshire County Council[57], Warwickshire County Council[58];
- Those based on a recognizable HD 19/03 format with local variations written straight into the text (e.g. Transport for London[59], Wigan MBC[60]); and
- Those with a detailed policy in a unique in-house style (e.g. Lancashire CC, Dundee CC[61], Devon CC[62]).

A small number of Road Safety Audit procedures are available to examine on the web, for example Dundee City Council.

Once local highway authorities have developed their policies they should be posted on local websites, in order to inform the public, and so that best practice can be easily shared with others.

Local highway authority Road Safety Procedure checklist

Have you:

- Decided which schemes should be subject to Road Safety Audit and to what standard?
- Considered those schemes designed by external organisations and discussed implications with colleagues in Planning?
- Decided who should carry out the Road Safety Audit and what their competency should be?
- Determined the roles and responsibilities of all those involved in the Road Safety Audit process?
- Developed a standard report-writing template and some useful pro formas to assist the process?
- Set out how clients should respond to Road Safety Audits?
- Considered how you will monitor Road Safety Audit quality?
- Gained widespread awareness, acceptance and support from all your colleagues?
- Gained political support to turn your procedure into a local policy?

8.4 Road safety checks

In some situations local highway authorities have decided that schemes do not require a formal Road Safety Audit, and that a "safety check" is sufficient. Examples of authorities using checks for some schemes include South Lanarkshire[63], Luton BC[64], Lancashire CC, Hampshire CC[65], Devon CC, and Dundee CC.

In these instances the designer checks his/her own scheme from a generic checklist prepared by the Road Safety Audit Team. In most situations, either at the discretion of the Road Safety Audit Team Leader, or the designer, the scheme can be referred to the Audit Team for a formal Road Safety Audit.

It is stressed that such a road safety check is NOT a Road Safety Audit. It lacks independence, and is probably undertaken by staff without specialist road safety knowledge, training or experience. It may be an appropriate way to ensure some safety input to schemes that would otherwise not have a Road Safety Audit due to scarce staff resources.

It is recommended that those authorities that use road safety checks should develop a monitoring process specific to these schemes, to ensure that any collision problems are not "slipping through the net".

Case Study – Devon County Council, part of self- check form

SAFETY SELF-ASSESSMENT - AS BUILT STAGE CHECK LIST

This checklist is intended as an aid or prompt to ensure that no potentially unsafe design elements or practices are carried forward to the next stage or into the scheme as constructed. It is important to note that the checklist is only a prompt and is not exhaustive, so it should not be used to assess by rote. Each scheme will have its own locally distinctive problems and the checklist should only be used after an initial assessment of the scheme has been undertaken.

AS BUILT STAGE	YES	NO	N/A
Has the scheme been constructed in accordance with the previously approved design and previous assessment recommendations actioned?	☐	☐	☐
Is the scheme as constructed free from any inherent safety defects?	☐	☐	☐
Have the needs of the young, elderly or disabled been addressed?	☐	☐	☐
Have the needs of pedestrians, cyclists, motorcyclists and equestrians been addressed throughout the scheme as a whole?	☐	☐	☐
Can pedestrians, cyclists and equestrians cross safely at junctions, pelican/zebra crossings, refuges and other locations?	☐	☐	☐

If any "NO" box has been ticked above, recommendations for amending the scheme should be made or specialist advice sought from the HQ Road Safety Team

An alternative to the designer carrying out a road safety check from a generic check list pro forma is for a single Road Safety Auditor to undertake the work. Whilst this has the advantage of independence and specialist knowledge, it is still not a formal Road Safety Audit, as the work has only been carried out by one person, as opposed to a team.

09 LEGAL IMPLICATIONS OF ROAD SAFETY AUDIT

9.1 Introduction to legal implications

Local authorities are subject to the criminal law and can be prosecuted, for example, for obstructing the highway, in the same way that an individual can. In addition, highway authorities have certain statutory duties with respect to highway maintenance and road safety and they are subject to the civil law of negligence. If a road user suffers loss as a result of a highway authority's failure to fulfil its statutory duty or its negligence, they might seek compensation through the civil courts.

Furthermore, following fatal road traffic collisions, the police often carry out investigations on behalf of the Coroner's or Sheriff's Court to establish the cause of the collision, as well as an investigation into whether, and by whom, any criminal offences have been committed. Any highway factors that may have contributed to the collision will be carefully examined.

An important distinction arises when comparing criminal courts with civil courts. In a criminal court, a conviction will lead to punishment, normally in terms of a fine or a term of imprisonment. In a civil court, a claimant is seeking to prove a civil 'tort', or wrongful act or omission, such as negligence or breach of statutory duty in order to derive financial or other compensation for loss or damage arising from the act or omission. Consequently, the standard of proof in a civil court is lower than in a criminal court. A civil court merely requires proof "on the balance of probabilities", whereas a criminal court requires proof "beyond a reasonable doubt".

Nevertheless, it is an onerous task to demonstrate to a court that negligence has occurred. Negligence is committed where a person or corporate body which has a legal duty of care to another person acts in breach of that duty and thereby causes 'foreseeable' loss or harm to that other person. In order to prove this, the claimant needs to demonstrate, amongst other things, that on the balance of probability, there is a causal link between the alleged breach of duty and their injury or loss.

In the case of road traffic collisions, this is quite hard to do. Although there is often something "wrong" with the road, it is more difficult to demonstrate that this "defect" was a significant contributory factor in the collision. Section 1.2 of these Guidelines refers to the multi-factor "chains of events" that lead to most collision scenarios, rather than isolated single factors.

Whilst people have rights as roads users, such as the entitlement to use the highway provided under the Highways Acts, they also have responsibilities in respect to the way in which they use it. Higher courts in the UK have often emphasised the responsibility of road users for their own actions, as described in Section 9.2.4.

Despite this, the number of claimants suing local authorities has risen dramatically[66]. Up to £500m is spent each year by highway authorities in managing claims, and there was an 88% increase in claims between 1993 and 2003. Whilst the most frequent claims involve trips relating to alleged poor maintenance of footways, there are a number of high-cost fatal and serious injury claims as well, some of which relate to alleged design defects.

This increase in claims, coupled with a fear of having to provide statements and give evidence in court, has led some staff working in the highways design and construction field to become increasingly defensive of their work. This can lead to a stifling of innovation, with a fear that "we shouldn't try something new in case a collision happens".

However, it is not the innovation itself that invites problems, but the inconsistent application of procedures, coupled with poor documentation of actions taken, that leads to difficulties should litigation commence.

The next section refers to the Statutory Duties of highway authorities. In addition to these duties staff working in this area should be aware of the Freedom of Information Act[67], and the Data Protection Act[68]. The Freedom of Information Act entitles members of the public to obtain information, including e-mails, from public bodies. The Data Protection Act restricts the circumstances in which organisations can reveal personal details of members of the public to other organisations or individuals.

9.2 Statutory duties of highway authorities

9.2.1 Highways and Road Traffic Acts

The two most important pieces of legislation on this area are the 1980 Highways Act[69], and the 1988 Road Traffic Act. The Scottish equivalent of the 1980 Highways Act is the 1984 Roads (Scotland) Act.

Section 41 of the 1980 Highways Act states that:

"The authority who are for the time being the highway authority for a highway maintainable at the public expense, are under a duty ... to maintain the highway".

This places a statutory duty on highway authorities to maintain public highways.

In addition, local highway authorities have statutory road safety duties. Section 39 of the 1988 Road Traffic Act, states that each authority:

"... in constructing new roads, must take such measures as appear ... to be appropriate to reduce the possibilities of such accidents when the roads come into use."

Undertaking Road Safety Audits on new roads would be one way of complying with this legislation.

Interestingly, whilst the Highways Act "binds the Crown", and is therefore applicable to trunk roads as well as local roads, the Secretary of State responsible for trunk roads and motorways is not bound by the duties imposed

on highway authorities by the Road Traffic Act. This leads to the anomaly that whilst trunk road agencies are not required to "prevent accidents" on new roads by the Road Traffic Act, they are required by HD 19/03 to undertake Road Safety Audits. At the same time local highway authorities have a statutory requirement to take measures to reduce the possibility of collisions on new roads, but HD 19/03 is merely "commended" for their use.

9.2.2 Corporate Manslaughter and Corporate Homicide Act 2007[70]

In 2006 the Government introduced new statutory offences to the House of Commons, which were intended to replace elements of the existing Common Law on Manslaughter. The new legislation is intended to allow corporate bodies, such as highway authorities, to be more easily prosecuted for the criminal offence of Corporate Manslaughter. The new legislation means that an organisation, which owes a duty of care to any person, can become liable to criminal sanctions if that person is killed as a result of a senior management failure that falls far below what could reasonably be expected. The legislation effectively applies the concepts of civil negligence claims to the criminal courts.

In 2001, ACPO (Association of Chief Police Officers) and ACPOS (ACPO Scotland) introduced the Road Death Investigation Manual[71], which was updated in 2007[72]. The original document was intended to standardise police investigations into road deaths, whereby all fatal road collisions would be treated as "unlawful deaths" until proved otherwise. The document stated that:

"the highway authority should be able to show that it took reasonable measures to ensure that the safety of the road user was not compromised".

Where highway faults have been alleged or identified during these criminal investigations, police investigators have interviewed highway authority staff as witnesses, and seized working documents and computers as evidence. Police Officers who attend Road Safety Audits should be mindful of the implications of the Road Death Investigation Manual when making their contributions, in order to minimise any potential future conflict of interest.

The 2007 version of the Manual has omitted some of the references to the role of the highway authority within road death investigations, and it is not certain whether a consistent national approach to these investigations will be maintained.

Local highway authorities are advised to discuss procedures for dealing with fatal road collisions with their local constabulary.

9.2.3 Other relevant legislation

The Disability Discrimination Act 2005 was introduced to remove the transport exemption provided by the 1995 legislation. It makes it illegal to discriminate on the ground of disability with respect to the exercise of public functions, such as planning and highways. Highway authorities must not fail or refuse to provide services to disabled people that are provided to other members of the public. They should also make "reasonable adjustments" that enable disabled people to use services. This means that disabled people must be taken into account within all new highway schemes.



Have the needs of pedestrians with sight impairment been fully considered?

Section 2.4 showed that there is a clear distinction between mobility or access audits and Road Safety Audits. However, Road Safety Auditors are required to examine the road safety implications for all road users – including those with disabilities. This legislation sharpens the need for Road Safety Auditors to be aware of safety implications for all disabled people, including those with sight impairment, mobility difficulties, hearing loss, and learning difficulties. Specific schemes, such as those with shared use, are seen by some to have particular concerns for some disabled users.

HD 19/03 makes it clear that the Design Team, not the Road Safety Auditor,

"shall be responsible for reviewing and amending any design risk assessments required by health and safety legislation".

This section was inserted to make clear the responsibilities in this area, and is in keeping with the concept that the Auditor offers advice, rather than takes on responsibility for design. The CDM Regulations 2007[73], made under the authority of the Health and Safety at Work Act 1974[74], require designers to undertake risk assessments of their designs, in order that they can be built, maintained and used safely. One way of helping to comply with these regulations is to ensure that Road Safety Audits are undertaken within a consistent and competent framework.

9.2.4 Litigation scenario and case law

Given the increasing number of claims, it is not surprising that Road Safety Audit Reports and procedures are scrutinised by solicitors and experts in potential litigation cases, and by judges in some court cases.

In addition the concept of "foreseeable harm" within the definition of negligence fits quite well with what happens in Road Safety Audit. A Road Safety Auditor looks into the future when carrying out a Road Safety Audit and tries to "foresee harm" to road users. Because of this, a view has developed that undertaking Road Safety Audit actually increases the possibility of litigation after a collision has occurred on a new road scheme. A contrasting view suggests that carrying out Road Safety Audit in line with established procedures reduces the chances of being found liable, because safety will be shown to have been added to a scheme through the Road Safety Audit process.

Following a road collision involving substantial loss, a claimant may bring a civil case against a highway authority, alleging, for example, negligence or a breach of statutory duty. They may allege that a Road Safety Audit was not undertaken when it should have been, or that the Road Safety Auditors failed to identify a problem that resulted in the collision, or that the scheme client failed to implement a Road Safety Audit recommendation that would have prevented the collision from occurring.

In order to counter the claim, the local highway authority will need to demonstrate that it acted reasonably. Section 58 of the Highways Act 1980 provides a defence to a claim under s.41. It states that,

"... it is a defence ... to prove that the authority had taken such care as in all the circumstances was reasonably required to secure that the part of the highway ... was not dangerous for traffic".

The defence is therefore based on demonstrating that the actions taken by the authority were indeed reasonable, given the circumstances that occurred around the time of the collision. With respect to Road Safety Audit, it is important to be able to show that the work was carried out in accordance with the current best practice.

Relevant case law demonstrates an approach by the courts that it is sympathetic to highway authorities' reasonable attempts to balance competing priorities. For example, in Gorringe v Calderdale[75], Lord Steyn stated that:

"The courts must not contribute to the creation of a society bent on litigation, which is premised on the illusion that for every misfortune there is a remedy."

In the same case, Lord Hoffman stated that

"People must accept responsibility for their own actions ... (they must) take necessary care to avoid injuring themselves or others ...users of the highway (are) expected to look after themselves ... (and that) drivers of vehicles must take the highway network as they find it."

In the case of King v DETR[76] the Road Safety Audit Reports were scrutinised in both the High Court in Maidstone and the Court of Appeal.

Case Study – King v DETR

Tommy Francis King was riding his motorcycle along the A229 slip road at 2.00am on 2nd July 1994. As he approached a roundabout he failed to give way and rode straight into the central island in the roundabout and collided with one of the "turn left" signs. The roundabout was lit and subject to a speed limit of 50mph. There were direction signs on the approach and give-way lines across the road at the entry to the roundabout. The road widened from two to three lanes along the approach road.

Mr. King brought a case against the Department of the Environment, Transport and the Regions (DETR) that they had negligently designed and built the roundabout and that this negligence had caused the collision. The case was heard at the High Court.

Mr. King made a number of criticisms of the design of the approach road and the roundabout most of which were rejected by the judge. The item that led the judge to find in favour of Mr. King related to the entry angle of the approach. The entry angle was found to be 65^0 whereas the advice given at the time of the design was that the entry angle should be "between 20^0 and 60^0".

Two Road Safety Audits had been carried out on the scheme. The Stage 1 Audit pointed out that

"Both of the roundabouts have some high speed approaches with little deflection and although they may meet the national design standards, our experience is that they will give safety problems".

The Stage 3 Audit (produced after the collision happened) picked up that

"The approach to the roundabout give-way is currently delineated as three lanes and is relatively square to the circulatory carriageway ..."

The judge at the High Court found in favour of Mr. King but found him contributorily negligent to the extent of 50%.

The DETR appealed against the judgment and the case was referred to the Court of Appeal (Civil Division) where it was heard by three law lords.

By a two-to-one majority the appeal court upheld that there was

"no negligence on the part of the Department of which Mr. King can complain and that his unfortunate accident was not caused by the design adopted by the Department".

However the dissenting judge said that

"... Mr. King was found to have driven into a trap which greater vigilance would have enabled him to avoid".

The case illustrates that Road Safety Audits will be used in similar circumstances and that the comments made in reports will be carefully scrutinized. It also illustrates that it is difficult to prove design liability.

Case law in high-cost injury cases demonstrates that whilst claimants are sometimes successful in lower courts, the higher courts frequently uphold appeals in favour of public authorities. The principles established by the courts are that:

- Highway authorities may be liable for failing to maintain the highway and for creating new dangers on the road;
- Highway authorities should avoid creating a "trap" for road users, and should not act irrationally;
- There is a statutory defence available to those highway authorities that have acted reasonably; and
- Road users are largely responsible for their own safety and should therefore take the road as they find it.

Despite the robust attitude of the courts, the number of claims continues to increase, possibly because we live in a society in which people are increasingly unwilling to take full responsibility for their own actions. The consequence of this is that many staff working in this area will find that they will have to defend their work at some stage, and spend time searching for documents and preparing witness statements, often referring to work carried out many years previously.

In some cases it may be found that poor design, or ineffective Road Safety Audit, has contributed to collision occurrence. The next section looks at what might go wrong, and how to minimise the risks of that happening.

9.3 Implications for Road Safety Audit

9.3.1 What might go wrong?

The main concern for the Road Safety Auditor is that he or she fails to identify an issue that later leads to a collision, which then becomes the subject of litigation. However, there may be a number of reasonable explanations for this:

- The safety problem was discussed but not submitted in the Road Safety Audit Report. It may have been submitted as a problem at a previous stage of Road Safety Audit and rejected in a corresponding Exception Report;
- The safety problem affected part of the scheme that was considered to be outside the Road Safety Audit Brief;
- Road safety knowledge has changed since the Road Safety Audit was carried out. At the time of the collision it would have been unreasonable to foresee that type of problem;
- The "safety" problem was considered, but thought to be a "non-safety" issue by the Road Safety Auditors, or one with a very small chance that a collision would occur;
- The collision that took place may have resulted mainly from human error or from a vehicle fault.

The scheme client also has some concerns following a collision on a new or improved road scheme:

- No Road Safety Audit was undertaken, maybe despite procedures being in place that recommend Road Safety Audit, or common practice demonstrating that others would carry out Road Safety Audit in similar circumstances;
- The Road Safety Audit Report "predicted" the collision that is now being scrutinised, and made recommendations for improvement. However no evidence exists of any response to the audit, and no changes were made to the design;
- The Road Safety Audit was carried out by incompetent Road Safety Auditors.

9.3.2 What can be done to minimise the risk of litigation?

In order to minimise not only the potential for successful litigation, but also to reduce the possibility of a claim being made in the first place, the following steps should be taken:

- Local highway authorities should ensure that Road Safety Audits are undertaken. The law acknowledges that resources are scarce and need to be allocated according to priorities. Therefore it is acceptable to develop reasonable local procedures that vary from HD 19/03. However these procedures should be adopted as policy, and followed consistently by practitioners – they will be scrutinised if problems arise;
- Local highway authorities should show their draft procedure and policy documents to their legal departments for comment prior to publication;
- The Road Safety Audit process should be well documented. Road Safety Auditors need to be able to show how they carried out the Road Safety Audit so notes of their deliberations and team discussions could be very useful in explaining why certain issues were not included in the final report. Documentation of precise drawing numbers, Audit Briefs and scheme boundaries are very important;
- Road Safety Auditors should ensure that safety issues raised and recommendations made at earlier stages are repeated at subsequent stages if still relevant, even if an Exception Report has been written that explains why the recommendation was not being adopted. It may be possible to suggest alternative recommendations at subsequent stages, whilst the road safety problem remains constant;
- Road Safety Auditors should be careful about the language they use in a report. The word "must" in a recommendation effectively issues an instruction, and implies that the Road Safety Auditor is assuming a client responsibility for the scheme

rather than an advisory role. The word “should” is more appropriate;

- Clients should ensure that they commission Road Safety Audits from competent Road Safety Auditors, who can demonstrate that they are suitably experienced to undertake the task. Clients should obtain satisfactory Exception Reports in line with their local procedures for these issues;
- Local highway authorities should decide how long to keep records of Road Safety Audits, including the scheme drawings. In theory, an infant involved in a collision can wait until they are adult to make a claim, and Road Safety Auditors have been asked to reveal reports from 15 years past[x]. However practical resource considerations would suggest that it is not unreasonable to dispose of hard copy details after 7-9 years. Some authorities microfiche records beyond that time.

Summary

The main reason for undertaking Road Safety Audit is to minimise the risk of injuries once the scheme is open to road users. It is therefore important that this task is carried out with that objective firmly in mind. If Road Safety Auditors are fearful of the consequences of litigation they can sometimes make risk adverse comments simply to “cover their backs”. This can add unnecessary time and cost to a scheme, and thwart the true objective of the Road Safety Audit.

This chapter has outlined some practical steps that can be taken to minimise the risk of litigation, to encourage Road Safety Audit to take place within a road safety culture in which its true objectives can be met.

[x] TMS Consultancy has been asked to reveal details of a Road Safety Audit carried out in 1991

APPENDICES

01 APPENDIX: AUDIT BRIEF CHECKLIST

FBI ASSOCIATES

INFORMATION REQUIRED FOR EACH AUDIT STAGE

(Please tick if available and return with audit instruction)

STAGE 1 AUDIT (PRELIMINARY DESIGN)

Audit Brief (reasons for project, background information, any departures from standard)
Location plan of site
General arrangement drawing
A3 or A4 drawing of scheme (to be marked up by audit team to show locations of problems identified, and attached to audit report)
Minimum three-year accident data
Traffic flow data

STAGE 2 AUDIT (DETAILED DESIGN) OR COMBINED STAGE1/2 AUDIT

Audit Brief (reasons for project, background information, any departures from standard)
Copy of Stage 1 Audit (if not carried out by FBI) including designers' responses and exception reports if appropriate
Location plan of site (if Stage 1 not carried out by FBI)
Detailed drawings (full set of contract drawings if available), showing:-
- Signs
- Road markings
- Lighting
- Drainage
- Pavements
- Kerbing (including any tactile paving)
- Construction Details
- Other information

A3 or A4 drawing of scheme (to be marked up by audit team to show locations of problems identified, and attached to audit report)
Minimum three-year accident data
Traffic flow data

STAGE 3 AUDIT (POST CONSTRUCTION / PRE-OPENING)

Audit Brief (reasons for project, background information, any departures from standard)
Copies of Stage 2 Audit (if not carried out by FBI) including designers' responses and exception reports if appropriate
Location plan of site and general arrangement drawing (if Stage 2 not carried out by FBI)
Contact details of people who should attend audit, normally:
- Police
- Highway Authority Representative
- Any other interested parties

02 APPENDIX: DESIGNERS' RESPONSE FORM – ROAD SAFETY AUDIT STAGE X

Audit reference:

Audit Team :

Scheme :

Date Audit completed :

Paragraph No. in Safety Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Alternative measure (describe)	Audit Team response to alternative
2.1				
2.2				
2.3				
2.4				
2.5				
2.6				
2.7				
2.8				

Please return to:

03 APPENDIX: FBI CONSULTANCY SAFETY AUDIT COMMENTS

Page 1 of

Scheme Name

Stage

Auditor

Date

Plan No.	Comment	Comment discussed	Included in report	Reason not included in report

04 APPENDIX: 1996 IHT ROAD SAFETY AUDIT CHECKLISTS

Checklist for Stage F - Feasibility

General

Consistency of standards with adjacent road network, especially at tie-ins;
Secondary effects on surrounding road network;
Where a preferred scheme is being chosen, relative safety performance of options.

Routes

Impact of standard of route, related to design flows and speed, on safety;
Overtaking opportunities;
Consistency of junction arrangements and access control;
Frequency of junctions (public and private) related to safe access;
Location of junctions in relation to horizontal and vertical alignments;
Horizontal and vertical alignments consistent with visibility requirements, both along the road and at junctions;
Facilities for pedestrians, cyclists and equestrians;
Provision for unusual aspects of traffic composition (heavy concentrations of particular types of road user), or environment (e.g. sunrise / sunset glare, fog, or wind).

Area Schemes

Designation of functions for different elements of the road hierarchy;
Scheme consistent with overall safety plan.

Checklist for Stage 1 - Preliminary Design

General

Review any previous Road Safety Audit in order to allow for subsequent design changes;
For major schemes, determine need for land-take for safety requirements.

Alignments and Sight Lines

Any elements of horizontal and vertical alignments which may produce hazards due to reduced sight lines, especially where these are combined and/or there are Departures from Standards;
Sight lines obstructed by bridge abutments, parapets, landscaping, structures or street furniture.

Junctions

Minimising potential conflict points at junctions (including numbers of private accesses);
Conspicuity of junctions on approach, and sight lines from minor road approaches and private accesses;
Control of approach speed, and layout of approach roads;
Provision for turning traffic;
Location and access of lay-bys.

Other

Impact of landscaping on visibility and road user perception;
Concept of road marking / signing for road user perception;
Provision for safety aids on steep hills;
Facilities for pedestrians, cyclists and equestrians;
Potential for flooding due to inadequate drainage;
Compatibility with adjacent network at tie-ins;
Servicing access and maintenance arrangements.

Checklist for Stage 2 - Detailed Design

General

Review any previous Road Safety Audit in order to allow for subsequent design changes;
Note: Scope for altering alignments or junction design is less extensive at this stage, so the Road Safety Audit will focus mainly on details of signing, marking, lighting, etc. and issues which affect visibility and drivers' perception of the road scene, and provide aids to safety.

Junctions

Appropriateness of corner radii or curvature in relation to approach speed;
Road users' perception of road layout.

Road Signs and Markings

Locations of signs and markings to aid, inform, and warn of hazards, without obscuring visibility or misleading drivers;
Consistency of signing and marking information.

Lighting and Signals

Consistency of lighting within the scheme and with the adjacent network;
Safe positioning of lighting columns, signals and operational equipment;
Confusion or conflict between lighting and traffic signals;
Positioning of heads for traffic and pedestrian signals

to ensure clarity to appropriate road user, and avoid confusion to others to whom they do not apply;
Safe access and servicing arrangements.
Facilities for Vulnerable Road Users
Location and type of crossing facilities;
Visibility;
Dedicated cycle or pedestrian facilities;
Provision of facilities for people with mobility impairments.

Landscaping

Potential obstruction to visibility from landscaping, taking account of future growth;
Potential for trees to become collision objects: choice of appropriate species;
Ability to maintain planted areas safely.

Protective aids

Positioning of safety barriers and guardrails to protect against vehicle conflicts or roadside objects (poles, columns, statutory undertakers' apparatus, etc.), without obscuring visibility;
Use of arrester beds.

Surface characteristics

Appropriate surfacing for high-speed roads, or locations (e.g. bends) which are potentially hazardous when wet;
Appropriate surfacing for approaches to junctions, and thresholds to villages or residential areas in towns, to encourage lower vehicle speeds.

Checklist for Stage 3 - Pre-opening

General

Review any previous Road Safety Audit in order to allow for subsequent design changes.
The main emphasis is to inspect the scheme from the viewpoint of the different road users, considering where appropriate the needs of pedestrians, cyclists, equestrians, public transport operators, and HGV drivers as well as car drivers.
Inspection at appropriate times of day, in particular in daylight and darkness.
Checklist for Stage 2 provides an appropriate aide-memoire.

05 APPENDIX: UK DMRB HD 19/03 GUIDANCE ON TRAINING, SKILLS AND EXPERIENCE REQUIREMENT FOR ROAD SAFETY AUDIT (PARA 2.59)

Audit Team Leader

A minimum 4 years' Accident Investigation or Road Safety Engineering experience. Completion of at least 5 Road Safety Audits in the past 12 months as an Audit Team Leader or Member. In order to become an Audit Team Leader the auditor will already have achieved the necessary training to become an Audit Team Member. However they should also demonstrate a minimum 2 days CPD in the field of Road Safety Audit, Accident Investigation, or Road Safety Engineering in the past 12 months.

Audit Team Member

A minimum 2 years Accident Investigation or Road Safety Engineering experience. Completion of at least 5 Road Safety Audits as Audit Team Leader, Member or Observer in the past 24 months. The Audit Team Member should have attended at least 10 days of formal Accident Investigation or Road Safety Engineering training to form a solid theoretical foundation on which to base practical experience. They should also demonstrate a minimum 2 days CPD in the field of Road Safety Audit, Accident Investigation, or Road Safety Engineering in the past 12 months.

Observer

A minimum of 1-year Accident Investigation or Road Safety Engineering experience. The Observer should have attended at least 10 days of formal Accident Investigation or Road Safety Engineering training.

06 APPENDIX: UK DMRB HD 19/03 REQUIREMENT FOR CONTENT OF RSA REPORT (PARAS 2.68-2.70)

Stage 1, 2 & 3 Audit reports shall include:

a) A brief description of the proposed scheme;
b) Identification of the audit stage and team membership as well as the names of others contributing;
c) Details of who was present at the site visit, when it was undertaken and what the site conditions were on the day of the visit (weather, traffic congestion etc);
d) The specific road safety problems identified, supported with the background reasoning;
e) Recommendations for action to mitigate or remove the problems;
f) A3 or A4 location map, marked up and referenced to problems and, if available photographs of problems identified;
g) A statement, signed by the Audit Team Leader; and
h) A list of documents and drawings considered for the audit.

The report shall contain a separate statement for each identified problem describing the location and nature of the problem and the type of accidents considered likely to occur as a result of the problem.
Each problem shall be followed by an associated recommendation.

07 APPENDIX: QUESTIONNAIRE TO LOCAL AUTHORITIES

Name of Organisation: _____

Question 1:

Do you undertake Road Safety Audits on any highways schemes?

Yes _____ No _____

If YES, please indicate which highway schemes out of the following list:

	Audited In-House	Audited by External Organisations
a. Major highways schemes[1]	_____	_____
b. Major development schemes[2]	_____	_____
c. Minor development schemes	_____	_____
d. Traffic management schemes	_____	_____
e. Road Safety schemes	_____	_____
f. Minor improvements	_____	_____
g. Highways maintenance	_____	_____

Question 2:

Do you carry out all Road Safety Audits in compliance with HD 19/03?

Yes _____ No _____

If 'No' please indicate which standard you use from the following list:

a. Internal standard (please quote title) _____

b. Other (please quote title) _____

Question 3:

How many staff in your organisation undertake Road Safety Audits? (Please specify number in the box) ☐

How many of these are 'qualified' according to HD 19/03? (Please specify number in the box) ☐

[1] Large-scale construction projects such as a new bypass, large roundabouts, grade-separated junctions
[2] Development schemes requiring a Transport Assessment

Question 4:

From the following list please indicate any difficulties you have incurred whilst using HD 19/03:

a. Not had any difficulties _____

b. Not enough resources to audit every highways scheme _____

c. Not enough resources to carry out 2 person audits _____

d. Not enough resources to carry out 2 person site visits _____

e. Auditors are not "qualified" according to HD 19/03 _____

f. Not enough resources to do night time visits _____

g. Reports not written in HD 19/03 "Ambridge" Sample Audit Format _____

h. Safety audit "too restrictive" for innovative schemes _____

i. Safety audit too late in planning process within highways development control _____

j. Lack of information – e.g. accident data, previous audit, Reports, exception reports _____

k. Other – please state _____

Question 5:

Do you have a "quality audit" process as suggested in Manual for Streets?

Yes _____ No _____

Question 6:

Out of the following list which other audits do you undertake in your organisation?

a. NMU Audit _____

b. Mobility Audit _____

c. Pedestrian Audit _____

d.Cycle Audit _____

e. Other – please state _____

Question 7:

Would you be willing to provide any case studies for inclusion in the new Guidelines?
(NB: These could be made anonymous should you wish)

a. Examples of good/ bad practice Yes _____ No _____

b. Examples of Road Safety Audit
Policy and or Procedure (please state) Yes _____ No _____

Please add any other comments here:

Please could you send your response direct to Lorna Garland at TMS by either post, email or fax:
TMS Consultancy, Vanguard Centre, University of Warwick Science Park, Sir William Lyons Road, Coventry, CV4 7EZ
info@tmsconsultancy.co.uk 024 7669 0274

08 APPENDIX: ROAD SAFETY AUDIT QUESTIONNAIRE RESPONSES

1. Local Authority response

A total of 60 different local authorities responded to the questionnaire, representing views from a broad range of authorities from throughout the UK.

The main findings were as follows:

- Around 60% of schemes are audited "in-house", the remainder are audited externally;
- In terms of scheme category, major highway schemes were most likely to be audited, and maintenance schemes least likely. Minor improvement schemes were most likely to be audited in-house, road safety schemes were most likely to be audited externally, if at all;

Most likely to be audited	Proportion audited in-house
Major highways schemes - 86[1]	56%
Major development schemes - 79	47%
Traffic management schemes – 76	66%
Minor development schemes – 71	61%
Minor improvements - 70	76%
Road safety schemes – 36	25%
Highway maintenance - 27	74%

- 54% of respondents said they carried out Road Safety Audits in accordance with HD 19/03, and a further 14% said that their own procedures were close to or adapted from HD 19/03;
- An estimated 240 staff are undertaking Road Safety Audits within the 60 authorities represented (average 4 per authority). Of these an estimated 166 (70%) are "qualified" according to HD 19/03;
- The questionnaire asked respondents whether they encountered difficulties carrying out Audits in accordance with HD 19/03. Difficulties were ranked as follows:
  - Not enough resources to Audit every highway scheme – 29 (48%)
  - Not enough resources to do night-time site visits – 29 (48%)
  - Road Safety Auditors not "qualified" according to HD 19/03 – 28 (47%)
  - Lack of information to carry out Audit – 23 (38%)
  - Road Safety Audit requested too late in planning process – 23 (38%)
  - Not enough resources to carry out two-person Audits/ site visits – 18 (30%)
  - Difficulty in writing the report in HD 19/03 format – 12 (20%)
  - Road Safety Audit "too restrictive" for innovative schemes – 12 (20%)
  - In addition a number of respondents commented that they did not have enough resources to carry out Stage 4 Audits

2. Consultants' response

A total of 58 responses were received from a variety of organisations representing large consultants carrying out local authority work under externalised contracting arrangements, design consultants working on major schemes, smaller firms working principally on development type work, and specialist firms.

The main findings were as follows:

- Around 65% of schemes are audited "in-house", the remainder are audited externally, presumably by other officers of the same organisation, or by independent Road Safety Auditors;
- In terms of scheme category, minor development schemes were most likely to be audited, and maintenance schemes least likely. There was a considerable degree of consistency in the level of auditing in-house;
- 86% of respondents said they carried out Road Safety Audits in accordance with HD 19/03;
- An estimated 320 staff are undertaking Road Safety Audits within the 58 organisations represented. Of these an estimated 277 (87%) are "qualified" according to HD 19/03;
- The questionnaire asked respondents whether they encountered difficulties carrying out Audits in accordance with HD 19/03. Difficulties were ranked as follows:
  - Lack of information to carry out Audit – 36 (62%);
  - Road Safety Audit requested too late in planning process – 20 (34%);
  - Road Safety Audit "too restrictive" for innovative schemes – 12 (21%);
  - Road Safety Auditors not "qualified" according to HD 19/03 – 9 (16%);
  - Reports not written in HD 19/03 format – 7 (12%);
  - Not enough resources to carry out two-person site visits – 6 (10%);

[1] Number of respondents saying they did this in house, externally, or both

- Not enough resources to Audit every highway scheme – 5 (9%);
- Not enough resources to do night-time site visits – 5 (9%);
- Not enough resources to carry out two-person Audits – 2 (3%).

3. Analysis of LA policy/ procedures

- Very few of the local authorities set out to audit everything to HD 19/03. Some use a cost cut-off, others a scheme definition cut-off to define "minor" schemes;
- "Minor" schemes are sometimes subject to a self-check by designers;
- Some authorities identify high impact schemes and audit them to HD 19/03;
- Some schemes are audited by one auditor only;
- Some Road Safety Auditors are not required to be "qualified" to HD 19/03;
- Some authorities do not require site visits for all schemes, site visits at all stages or site visits at Stage 3. Some authorities allow Stage 3 night-time visits to be carried out some time after the scheme is complete;
- The requirement for an Audit Brief, for an Audit Report similar to that described in the Standard, and for an Exception Report process was common to most of the local standards; and
- Interestingly some authorities ADD to the Standard in some areas, for example auditing major road works schemes, auditing major schemes at Stage F, introducing procedures for development schemes, and using risk assessment to prioritise issues.

09 APPENDIX: GENERIC PLANNING CONDITIONS

The development shall not commence (open) until the Road Safety Audit process has been carried out in accordance with XXX's Road Safety Audit Procedures.

The agreed recommendations from the Road Safety Audit process must be completed to the satisfaction of XXX Council, as the Highway Authority, before the public road hereby permitted is adopted by XXX Council (an alternative would be before the public highway….is opened to traffic).

Section 278 Agreements

No work on any Scheme shall commence (optional addition: and no contract for their construction shall be let) until:

- the Director has given written approval for the Scheme to be commenced and such approval shall not be given if the said plans, drawings, specifications, and other documentation have not been subject to Stages 1 & 2 of the Road Safety Audit process, and the recommendations that have evolved out of this process have been addressed to the satisfaction of the Director. The approval, if given, will lapse if the Scheme is not commenced within 12 months of the date of the said Director's approval.
- (NB Some authorities permit application of any new/revised design standards if construction has not commenced within three months of detailed approval. In addition there may be no contractual role if the scheme is let but cannot commence.)

On Substantial Completion of the Highway Works the Developer shall:

- Carry out a Stage 3 Road Safety Audit and fully comply with all recommendations arising thereunder, that the Director considers must be addressed, prior to the opening of the Highway Works to the public;
- Upon full Substantial Completion of each Scheme forming part of the Highway Works, including any additional work resulting from Stage 3 of the Road Safety Audit, to the satisfaction in all respects of the Director, the Director shall then issue a Certificate of Substantial Completion in respect of that Scheme to the Developer, provided that all costs and expenses owing to the Highway Authority have been paid in respect of that scheme;
- After the expiration of the period of (12 and/or 36 or X[1]) months from the issue of the Certificate of Substantial Completion the Developer shall carry out Stage 4 of the Road Safety Audit and fully comply with any recommendations arising thereunder as agreed or required by the Director.

The Developer shall pay to the Highway Authority:

- The reasonable cost to the Highway Authority of undertaking Road Safety Audits and also the cost of the safety checks of details submitted; or
- Pay the reasonable cost of an independent Road Safety Audit carried out in accordance with the Council's Road Safety Audit procedure.

[1] This may need to be less than 12 months due to expiry of the maintenance period

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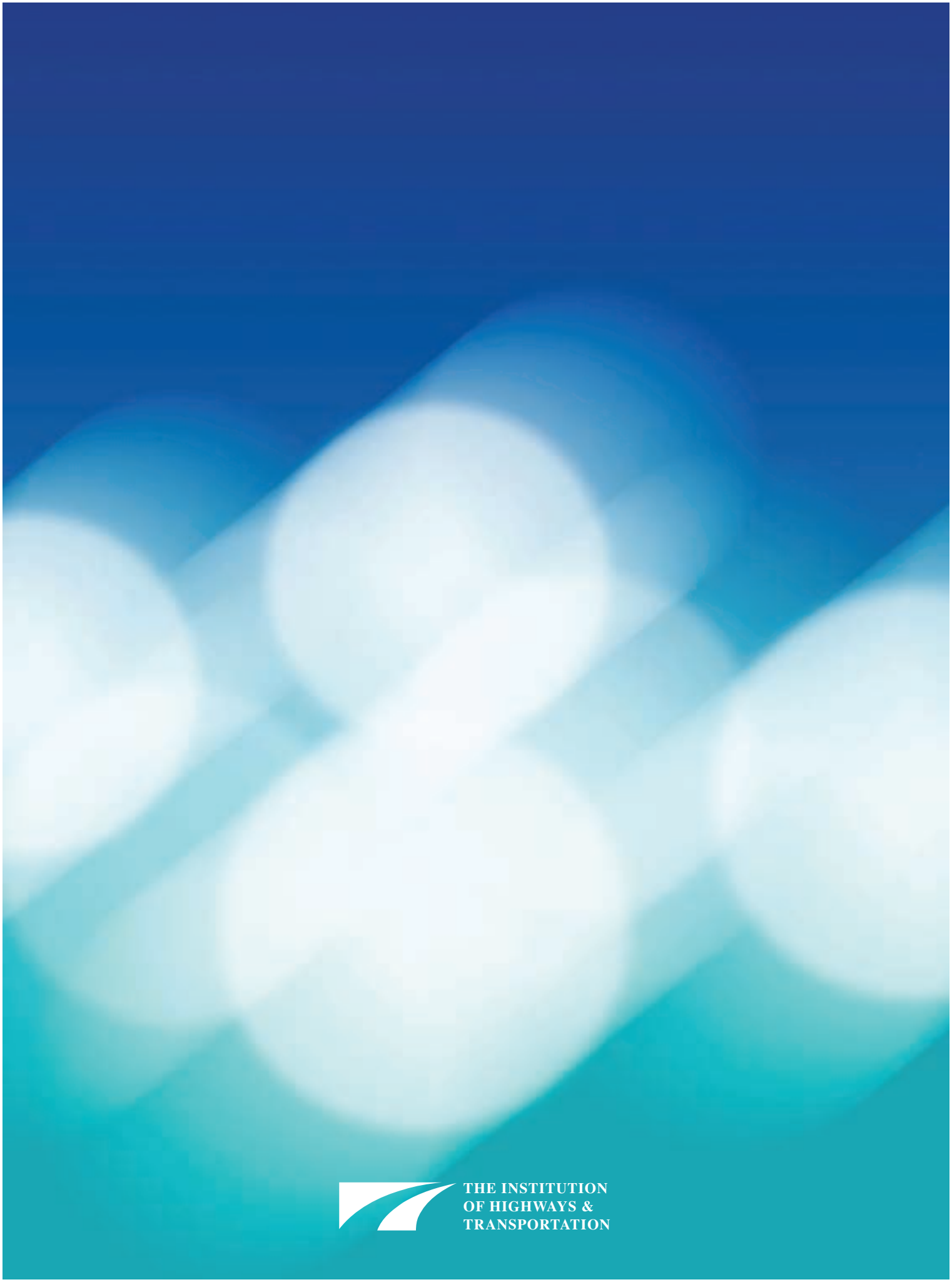
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