

GUIDE TO ROAD SAFETY ROUTE TREATMENTS



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Glossary

ANPR:	Automatic Number Plate Recognition
APTR:	All-Purpose Trunk Road
ASEC:	Average Speed Enforcement Cameras
COBALT:	Cost and Benefit to Accidents – Light Touch
CSI:	Cycling, Safety and Integration
DMRB:	Design Manual for Roads and Bridges
EuroRAP:	European Road Assessment Programme
GTRSRT:	Guide to Road Safety Route Treatments
IAN:	Interim Advice Note
IDF:	Innovation Designated Fund
iRAP:	International Road Assessment Programme
KSI:	Killed or Seriously Injured
LTN:	Local Transport Note
NDORS:	National Driver Offending Retraining Scheme
MSIF:	Minor Safety Improvement Fund
PAR:	Project Appraisal Report
PoLAR:	Project Evaluation (POPE) of Local Management Network Schemes (LMNS) Analysis Reporter
PSV:	Polished Stone Value
POPE:	Post Opening Project Evaluation
RoSPA:	Royal Society for the Prevention of Accidents
RPS:	Road Protection Score
SAR:	Scheme Appraisal Report
SES:	Safety, Engineering and Standards
SRN:	Strategic Road Network
TRO:	Traffic Regulation Order
TSRGD:	Traffic Sign Regulations and General Directions
VM:	Value Management

Note: This document contains links to Highways England’s SHARE file management system. If you are unable to access SHARE please contact your Highways England Project Sponsor.

Foreword



Highways England's Strategic Road Network (SRN) is one of the safest in the world. We are passionate about road safety and have set ourselves a challenging long term vision that no one should be harmed whilst travelling or working on the SRN.

By 2020 we are committed to reducing the number of people killed or seriously injured on the SRN by 40%.

Our road safety strategy is underpinned by the Safe Systems Approach, a commitment to the principles of putting road safety at the heart of planning, design and engineering. This will be achieved by implementing evidence based treatments to reduce road safety risk and deliver reductions in collisions on the SRN.

We are also committed to ensure that the needs of pedestrians, cyclists and other vulnerable users are recognised and given appropriate priority.

The Guide to Road Safety Route Treatments is a key document in achieving these objectives. It provides guidance on treatments that can be adopted to improve road safety on routes on the SRN. It is based on the philosophy that routes treated in a consistent manner provide clear and unambiguous information to road users. These routes have the

potential to deliver substantial reductions in casualties together with high rates of return on investment.

MIKE WILSON
CHIEF HIGHWAYS ENGINEER

Executive Summary

The Guide to Road Safety Route Treatments is a toolkit of measures which aims to continuously improve road safety on the Strategic Road Network (SRN) by preventing incidents from occurring and reducing their severity by creating a more consistent and forgiving road network.

The Guide sits within the Operational Development Page of Safety, Engineering & Standards ([SES](#) [online](#)). It is a key document to help improve road safety, based on the Safe Systems Approach, by encouraging the use of interventions that promote Safer Roads, Safer Vehicles and Safer People. The Guide should be used when considering road safety route treatments to help achieve our strategic road safety targets as set out in the Regional and [National Incident Reduction Plan](#) and the Highways England [Delivery Plan 2015-2020](#).

The Guide aims to assist in the delivery of road safety treatments for routes with an identified collision problem, or road user behaviour issue and those recognised as a high risk route by their star rating score.

The document focuses on engineering measures to create a more intuitive and forgiving road network but also includes information on:

- **road safety education and information campaigns;**
- **enforcement measures; and**
- **compliance initiatives.**

The Guide emphasises that a consistent approach to implementing road safety route treatments is critical to the success of a scheme, as road users learn to anticipate the nature and degree of hazards along a route.

The Guide also provides information on road safety related methods, processes and procedures that can be used to successfully justify and deliver a route based safety scheme. This includes:

- **Data collection.**
- **Data analysis.**
- **Stakeholder consultation.**
- **Collision saving predications.**
- **Scheme appraisal and funding.**
- **Post scheme monitoring.**

To assist users of the Guide in preparing their own route based safety treatments, the document includes a range of case studies. These include examples where engineering measures, education / information campaigns and compliance / enforcement initiatives have been implemented.

Where possible, some of the case studies include details on delivery costs and actual personal injury collision savings as well as scheme description, justification and identification of the target audience.



1. Introduction

1.1. General

1.1.1. The Guide to Road Safety Route Treatments has been developed to provide guidance on applying route treatment techniques to road safety problems. It is specifically tailored for use on the Strategic Road Network (SRN) and reflects the latest policies and strategies of Highways England.

1.1.2. The document provides guidance on how to implement a wide variety of treatments, including:

- Road safety engineering measures.
- Road safety education and information campaigns.
- Road safety enforcement measures.

1.1.3. Guidance is provided on appropriate data sources that can be used to support the justification for route based road safety treatments.

1.1.4. The Guide also highlights the importance of engagement with other organisations throughout the development of a scheme to aid problem identification, derive appropriate solutions and to ease scheme delivery.

1.1.5. The Guide references information that will help those developing route based road safety schemes to estimate collision saving for input into the scheme appraisal process or business case. This includes

information on case studies many of which provide example scheme costs and actual collision savings.

1.1.6. The document encourages designers, when developing route based road safety schemes, to utilise evidence from historic scheme information. Following completion of a scheme, evidence of that scheme's performance should also be recorded to ensure that the evidence database is continuously updated ([see paragraphs 2.3.14 to 2.3.16](#)).

1.1.7. This Guide can be found at [SES online](#) and is accessible to our teams and their supply chain. [SES online](#) also contains other safety related documentation applicable to the Safe Systems Approach ([see paragraph 1.3.12](#)).

1.2. Structure of the Guide

1.2.1. The Guide to Road Safety Route Treatments is split into two distinct parts:

Part 1 - Principles of Road Safety Route Treatments. This includes sections covering:

- [Terminology.](#)
- [Highways England Policies and Objectives.](#)
- [Objectives of Road Safety Route Treatments.](#)
- [Key considerations.](#)
- [Benefits of Road Safety Route Treatments.](#)

- [When and where to use Road Safety Route Treatments.](#)
- [Methods of identifying Potential Road Safety Route Treatments.](#)
- [Justification of Road Safety Route Treatments Schemes.](#)
- [Stakeholder Engagement.](#)
- [Implementation of a Road Safety Route Treatment.](#)
- [The Role of Innovation.](#)

Part 2 - Route Based Road Safety Treatments. This includes:

- [Engineering measures.](#)
- [Education and information Campaigns.](#)
- [Enforcement measures.](#)
- [Compliance initiatives \(that utilise engineering, education and enforcement measures\).](#)
- [Case studies.](#)

1.3. Terminology

Route

- 1.3.1. In terms of this Guide, a route is defined as a length of road which has similar characteristics. It is likely to have a relatively consistent traffic flow along its length, be predominately either rural or urban, and be primarily either dual or single carriageway. There may be

cases where several lengths of a road form a route although the characteristics may vary. Examples may include:

- villages along a route with lower vehicle speeds (or lower speed limits) and higher levels of vulnerable road users than other lengths of the route;
- a route with much heavier vehicular flows on one length than on other adjacent lengths; and/or
- a single carriageway route with climbing lanes or short lengths of dual carriageway.

- 1.3.2. In these cases, the principles of road safety route treatment can be applied but care needs to be taken when assessing the benefits. For example, lengths of the route with different types of traffic, speeds or flows may need to be considered separately.
- 1.3.3. To the majority of road users, a route may well run between two large centres of population and whilst it may change in character along its length, it is viewed by the road user as one route length.

Road Safety Route Treatment

- 1.3.4. Road safety route treatments may be considered to address a known collision issue, improve the star rating score and / or to reduce road safety risk.
- 1.3.5. A road safety route treatment can comprise one or more of the following elements:

- A. Road safety engineering measures,
- B. Road safety education and information; or
- C. Road Safety enforcement measures.

A. Road Safety Engineering Measures

- 1.3.6. In an ideal situation the road geometry and environment would naturally inform the road user of the standard of road and the potential hazards likely to be encountered. However, this may only be possible where the road is fully designed and built to the current Design Manual for Roads and Bridges (DMRB) design requirements and advice. For roads not built to current alignment and cross-section requirements and advice the role of traffic signs and road markings becomes more significant to assist road users.
- 1.3.7. One aim of the engineering measures used in road safety route treatments is to offer road users a consistent messages at repeated features such as villages, junctions, carriageway pinch points or bends, so that road users recognise when to adjust their driving behaviour to suit the conditions. This consistency is the key to road safety route treatments.
- 1.3.8. To enhance a road user's perception of the route ahead, similar sites along a route should be treated with similar treatments, even if some of these sites have no collision history (however, [see paragraph 3.2.4](#) for situations where there is a unique collision problem).

- 1.3.9. In the case of cyclists, pedestrians and horse-riders, the aim of engineering measures is to create situations where conflicts between them and motorised road users are removed. Where this is not possible, appropriate measures should be used to minimise the potential of a collision.

B. Road Safety Education and Information

- 1.3.10. Where an issue involves a certain category of road user (e.g. young drivers or motorcyclists), engineering measures may not be the most appropriate treatment. In these circumstances a road safety education and information campaign may be more beneficial. Education and information campaigns can involve collaborative working with other organisations to bring together expertise, information and education from the most suitable resources. These campaigns can then be targeted at the specific road users. When developing an education and information campaign, designers should work with their Regional Road Safety Co-ordinators.

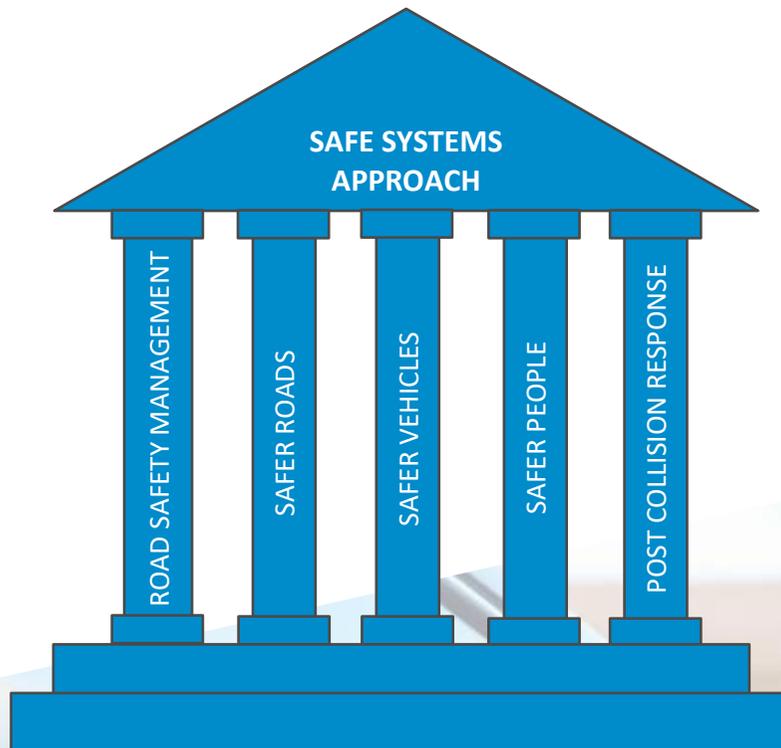
C. Road Safety Enforcement

- 1.3.11. Where an issue involves certain poor behaviours (e.g. speeding) that cannot or have not been changed through the use of other measures then the use of enforcement may be appropriate. This is likely to involve collaborative working with road safety partnerships and a commitment from the local police force.

Safe Systems Approach

1.3.12. The Safe Systems Approach puts safety at the heart of planning, design and engineering without sacrificing other operational requirements. Highways England has embed this approach across five pillars:

Figure 1: Safe Systems Approach Pillars



1.3.13. This Guide is a constituent part of the “Safer Roads” strand of the Safe Systems Approach but through its guidance on education, the dissemination of information and enforcement measures it also integrates with the “Safer People” and “Safer Vehicles” strands.

Figure 2: “Roads”, “Vehicles and “People” pillars



Source: [Innovation, Technology and Research Strategy Our approach \(Highways England, 2016\)](#)

1.4. Highways England Policies and Objectives

- 1.4.1. The key policies and targets in relation to the safety performance of the SRN are set out in our [Delivery Plan 2015-2020](#) published in 2014.
- 1.4.2. By 2020 one of the key objectives is to reduce the numbers of people Killed or Seriously Injured (KSI) by 40%. We will also ensure that the majority of those roads with a 1 or 2 star safety rating will also have improved to a 3 star safety rating based on International Road Assessment Programme (iRAP) Road Safety Model (2010).
- 1.4.3. This Guide is a key document in providing information and advice to assist road safety practitioners in identifying ways to introduce road safety measures that will improve road safety and help us achieve our targets.
- 1.4.4. The Guide will also help deliver the objectives of both the National and Regional Incident Casualty Reduction Plans. The casualty reduction target, included within the national plan, has been cascaded to the regional areas:

“Regional directors will be accountable for the 40% KSI reduction and working towards the long-term road safety vision that no one should be harmed whilst working or travelling on our network.”

Source: National Incident Casualty Reduction Plan (ICRP), (Highways England, 2016)

- 1.4.5. The National Incident Casualty Reduction Plan outlines our approach to improving safety based on the safe system, with interventions being delivered across Safer Roads, Safer Vehicles and Safer People. This plan aligns with and supports our wider [Health and Safety Five Year Plan](#). These plans and associated activities support government’s key priorities for road safety as set out in our [British Road Safety Statement](#).
- 1.4.6. The [Health and Safety Five Year Plan](#) establishes a road user safety aspiration for the future of the network, impacting all users of the SRN both motorised and non-motorised.
- 1.4.7. Our five year plan sets out the following goals:

- Our objective: No one should be harmed when travelling or working on the Strategic Road Network.
- Our approach: We will continuously improve road safety and invest in our road network to prevent incidents from occurring, whilst reducing their severity.
- Our target: We will achieve year-on-year reductions in those harmed across our network.

2. What are Road Safety Route Treatments?

2.1. Objectives of Road Safety Route Treatments

2.1.1. The objective of road safety route treatments is to address road safety performance on the Strategic Road Network (SRN) where route based safety problems or road safety risks have been identified.

2.2. Key Considerations

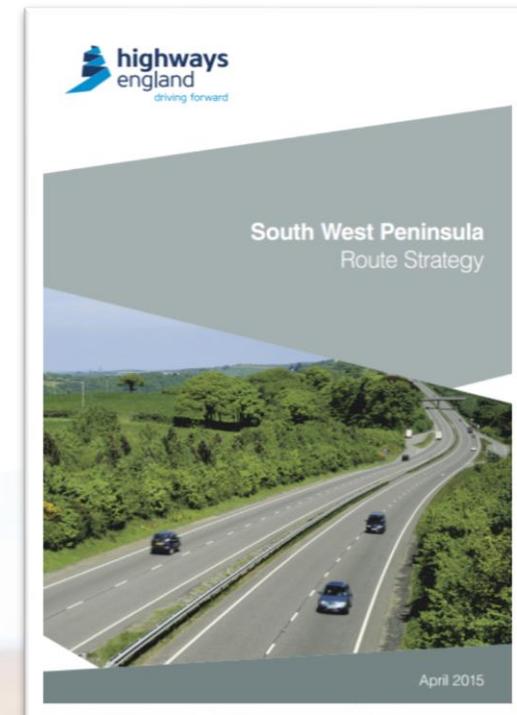
2.2.1. The first steps in the road safety route treatment process are to:

- identify the extents of the route;
- identify the star rating for the route;
- examine and compare the collision histories, rates, and severities;
- identify additional information to supplement collision data including comments from stakeholders; and
- prioritise routes or lengths of routes for road safety route treatments, according to need and feasibility.

2.2.2. Identification of routes where action may be required could include consideration of information and recommendations provided in the Route Strategy, along with the associated Evidence Reports. These reports summarise relevant safety performance information and

present it in a route based format, identifying where problem areas exist.

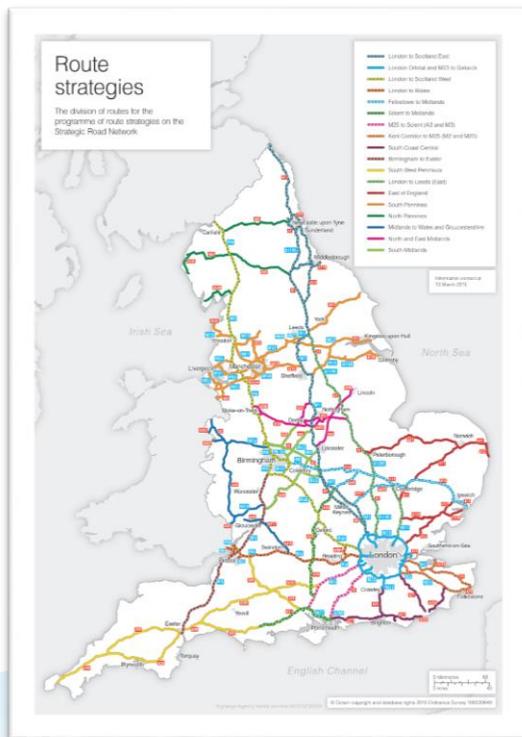
Figure 3: [Route Strategy for the South West Peninsula \(April 2015\)](#)



2.2.3. Route safety performance information should also be available in the [Annual Regional Safety Reports](#) prepared by the supply chain.

2.2.4. There are a number of other sources of road safety related data which can be used to supplement collision data when justifying a road safety route treatment. Further details of these road safety related data sources can be found in [Section 3.6](#) of this document.

Figure 4: The Division of Routes for the Programme of Route Strategies on the SRN



2.2.5. A road safety route treatment takes a holistic view of the route and recognises that road users experience roads as continuous lengths rather than as individual sites. It also recognises that collisions at different locations may share an underlying cause. Road safety route treatments also allow for a proactive approach to be taken, by assessing other sections of the route with similar characteristics (such as geometric features) which may carry a certain level of risk for road users even if there is not an identified collision problem. This may also assist in improving a route's star rating score.

2.2.6. Consideration of the route as a whole offers consistency for all road users, including cyclists, pedestrians and horse-riders. This helps those unfamiliar with the route, as well as local users to understand what is expected of them, for example, when negotiating bends, crossing junctions or passing through settlements. It also increases road users' awareness of hazards ahead by increasing the predictability of the road environment.

2.2.7. One feature of road safety route treatments is the uniformity of treatment associated with geometric elements irrespective of the presence or level of collisions. By treating all the sites with similar characteristics the same, the route as a whole becomes safer and provides an approach which combines both remedial and proactive (or preventative) treatment.

2.3. Benefits of Road Safety Route Treatments

Proactive Approach

- 2.3.1. Where individual sites along a route are treated there is a risk that the benefits of a reduced number of collisions at one site may be adversely impacted by an associated increase in collisions at other sites, in other words a migratory effect (e.g. the collision rate increases at untreated bends adjacent to a treated one). Treating all similar sites along a length, even those which do not have a collision problem, will make this less likely to occur.

First Year Rate of Return

- 2.3.2. Analysis of the safety and economics of schemes uploaded on our Post Opening Project Evaluation (POPE) database has shown that on average schemes result in 29% fewer collisions within the first year of operation. Schemes on the database on average cost £320,000 to implement. Based on the first year's performance these schemes typically are forecast to produce a scheme life collision saving of £7,600,000. On average this provides (with journey time benefits / costs factored in) a First Year Rate of Return of 62% and a Benefit Cost Ratio of 14.0.
- 2.3.3. Generally schemes recoup their cost in approximately 16 months. This evidence supports the theory that route treatments can achieve high rates of return, however, outcomes can be highly variable. It is also less certain whether some route treatments will provide large decreases in collision rates over long periods of time.

- 2.3.4. There are a number of key considerations that need to be taken into account when considering a road safety route treatment, these include:

Evaluation and Evidence

- 2.3.5. A route based approach is likely to incur higher costs than for site specific treatments. Assessment and justification for a road safety route treatment approach will be required, as greater benefits will need to be demonstrated and achieved from the higher cost, especially as the proposed treatments may include parts of the route where there are few or no collisions.

Temporary Traffic Management

- 2.3.6. Temporary traffic management during the installation of a road safety route treatment scheme may be more complex and may incur higher costs than a site specific scheme. Programming road safety route treatment schemes can also be complex due to the level of disruption these measures can cause during installation. Consequently, allowance for the impacts temporary traffic management may have on the scheme costs and road users should be considered when developing road safety route treatments.

Liaison with local highway authorities

- 2.3.7. Liaison with local highway authorities and the emergency services is critical both before and during construction to minimise problems on the surrounding road network. Consideration should be given to the

programme and phasing of the works over a period of time to minimise the cost and inconvenience to the public (for example working outside of peak traffic periods). Liaison with local highway authorities and the emergency services is often a key requirement when promoting education and information campaigns. Liaison with these key stakeholders can ensure that a consistent message is conveyed to a wider audience and can allow the sharing of resources.

Seasonality

2.3.8. Weather conditions, seasonal traffic trends and local events are all examples of issues which could have an impact on the operation of the route (and the surrounding network) both during construction and subsequent operation. Such factors would also in turn require consideration to ensure an effective and achievable programme of delivery.

Maintenance

2.3.9. The effectiveness of road safety route treatment schemes can be compromised if they are not well maintained. Interim Advice Note [\(IAN\) 69/15 'Designing for Maintenance'](#) shall be taken into account during the scheme preparation process. It is important that the scheme is incorporated into the appropriate inspection schedule and subsequent rolling maintenance programme.

2.3.10. On highly trafficked roads, hardwearing materials should be used to minimise the frequency of maintenance, this should prove cost effective in the long term.

2.3.11. The maintenance costs and requirements of a scheme shall be considered during the design stage. This is to ensure that the treatments do not create an unnecessary maintenance burden and do not place operatives at unacceptable risk. It is recommended that this process involves the input of those responsible for the maintenance of any proposals to ensure unnecessary problems are avoided.

2.3.12. Below are a number of points to consider during the design of a road safety route treatment scheme:

- Choose materials appropriate to the anticipated life-span and traffic levels of the scheme.
- Identify any extraordinary maintenance costs and report these alongside construction costs.
- Ensure maintenance plant and personnel have convenient and safe access to all parts of the scheme and that the required traffic management is minimised.
- Use materials which may be re-used or re-cycled in the future.

2.3.13. Maintenance of any road safety route treatment shall be included in the consideration of its costs. In the case of road safety route treatments using more innovative products, costs may not be fully predictable.

Monitoring

- 2.3.14. Post construction monitoring is a crucial element of collision reduction schemes. In some cases this can be incorporated into the scheme budget, alternatively it may be funded centrally. In either case it is recommended that sufficient approved funding is identified to monitor the road safety performance of the scheme.
- 2.3.15. The results from monitoring of a scheme should be forwarded to Highways England Evaluation Group along with any associated Scheme Appraisal Reports (SAR) and outputs from Value Management (VM) workshops. This will enhance the available data for future road safety route treatments.
- 2.3.16. The scheme appraisal process, incorporating the SAR and VM workshops, is enhanced by reference to similar previous schemes, available from the POPE process and PoLAR Database (Project Evaluation of Local Management Network Schemes Analysis Reporter). Scheme performance and the associated SARs from the bid and completion stages should be forwarded to the appropriate team. Depending on how the scheme has been funded, it may be subject to Post Opening Project Evaluation and if so should be entered on the PoLAR database when complete.

Road Safety Audit

- 2.3.17. Whilst the aim of a road safety route treatment scheme is to improve the safety performance of a particular route or stretch of road, there is still a requirement for the scheme to be subject to Road Safety

Audits as detailed in [Design Manual for Roads and Bridges \(DMRB\) Volume 5, Section 2, Part 2, HD 19 Road Safety Audit](#).

Walking, Cycling and Horse-riding Assessment and Review

- 2.3.18. Road safety route treatments are also subject to the requirements of the Walking, Cycling, and Horse-riding process identified in [DMRB Volume 5, Section 2, Part 5, HD 42 Walking, Cycling, and Horse-riding Assessment and Review](#).

The Construction (Design and Management) Regulations (2015)

- 2.3.19. [The Construction \(Design and Management\) Regulations \(2015\)](#) will apply to all road safety route treatment schemes, both during the design and construction phase. The Principal Designer and Client shall ensure that consideration is given to the safe design, construction, operation, maintenance and eventual removal of traffic management during the scheme preparation phase, ensuring a design risk assessment is carried out and made available to the construction team.

Risk Assessment on the Strategic Road Network

- 2.3.20. [DMRB Volume 0, Section 2, Part 3, GD 04 "Standard for Safety Risk Assessment on the Strategic Road Network"](#) shall be applied to road safety route treatment schemes when designing, operating and constructing on the strategic road network.

3. Implementation of Road Safety Route Treatments

3.1. Introduction

3.1.1. The following section of the Guide provides advice on the implementation of Road Safety Route Treatments. It includes advice on:

- when and where to use Road Safety Route Treatments,
- methods of identifying potential Road Safety Route Treatments,
- justification of Road Safety Route Treatment schemes, and
- stakeholder engagement.

3.2. When and Where to Use Road Safety Route Treatments

Reactive

3.2.1. Personal injury collision analysis is undertaken in the same manner as for any other road safety scheme, following the guidelines set out on [SES online](#) and using best practice guidance such as Royal Society for the Prevention of Accidents (RoSPA's) Road Safety Engineering Manual.

3.2.2. Road safety route treatments will generally be applicable on sections of road found to have a higher number of collisions per kilometre than expected when compared to similar routes. Road safety route treatments may also be applicable where:

- collisions are distributed throughout the route as a whole, rather than clustered at a number of specific sites;
- there is a higher than expected rate of a particular type of collision; or
- collisions involve a particular type of road user; or
- there are higher than expected number of serious or fatal collisions.

3.2.3. Single site clusters may lie within a section identified as suitable for road safety route treatment. These locations should generally be treated in a consistent manner with the rest of the route treatment, although there may be a requirement for additional measures at the specific cluster site.

3.2.4. There may be situations where a specific cluster site has a unique collision problem that is not replicated at other similar locations on the route which require treatment. In such cases it may be appropriate to treat the site with site specific measures.

3.2.5. A road safety route treatment approach can be used to successfully address the following typical collision patterns:

- Loss of control collisions as road users fail to judge the severity of bends.
- Striking or avoiding objects located too close to the edge of carriageway (e.g. street furniture or vegetation).
- Overshoot / failure to stop collisions at similar junctions along a route.
- Inappropriate and dangerous overtaking.
- Nose to tail collisions as drivers fail to slow for congestion.
- High rate of night-time (dark) collisions.
- Turning manoeuvres to / from similar side roads creating a collision problem.
- Collisions involving cyclists.
- Collisions involving pedestrians.
- Collisions involving motorcyclists.
- Collisions involving horse-riders.

Proactive

3.2.6. A route may have been identified because it has a low star rating (a rating of 1 or 2). This could mean the routes characteristics have the potential to create a collision problem. Road safety route treatments

may help to reduce the potential for collisions therefore improving the star rating.

3.2.7. Road safety route treatments could be used as a preventative intervention in the following situations:

- A series of sub-standard bends with similar geometry.
- Persistent abuse of speed limits.
- Locations where persistent asset damage or damage only collisions have occurred.
- Confirmed issues raised by stakeholders.
- A high proportion of vulnerable user types.
- Issues involving poor driver behaviours.

3.2.8. The above list is not exhaustive and there may be other situations where a road safety route approach may be appropriate.

Selection of Treatments

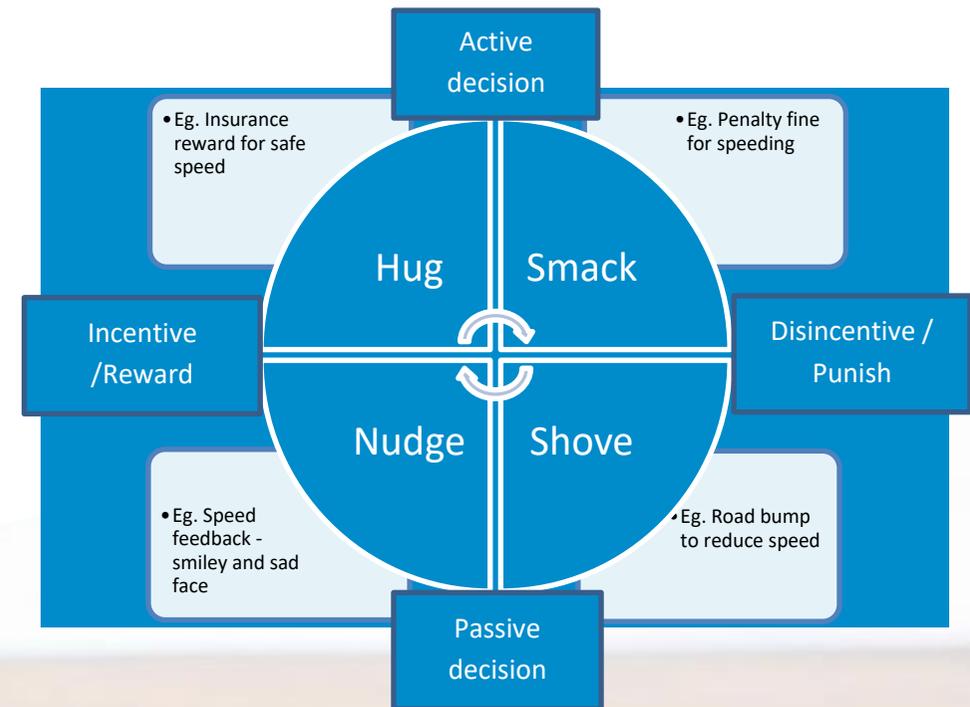
3.2.9. Where a need for intervention has been identified treatments for road safety route issues can comprise of the following:

Treatment	Description	Target Safety Issue
Engineering measures (see Section 6)	Ranging from low-cost traffic signs and road marking measures to more extensive highway geometry improvements.	Issues related to road geometry or route consistency (e.g. consistent treatments at bends and junctions)
Education and information campaigns (see Section 7)	Specific education and / or information for SRN users.	Targeting education and information to specific user groups identified as being disproportionately represented in route safety data.
Enforcement Measures (see Section 8)	Enforcement measures such as the various types of enforcement cameras.	Targeting road user compliance with regulations and influence good driving behaviours.

3.2.10. Designers could also consider a multi-faceted approach to addressing a particular route based issue that applies all three types of treatment. This could follow the ‘Hug, Nudge, Shove, Smack’ concept (see [Figure 5](#)) which utilises different interventions ranging from rewarding good behaviour to penalising poor behaviours.

3.2.11. This approach recognises that the vast majority of our customers are considerate and safe road users and instead concentrates on improving compliance and addressing poor road user behaviours.

Figure 5: ‘Hug, Nudge, Shove, Smack’ intervention concept



3.2.12. A key area of focus in this approach is engagement and education which can be supported through wider compliance and enforcement activities working collaboratively with our partners.

- 3.2.13. When selecting suitable road safety treatment for use on a route, one of the key considerations should be consistency. A consistent approach is intended to result in building up a drivers understanding of the route and increasing their perception of forthcoming hazards.
- 3.2.14. Where a number of routes within an area are scheduled for road safety route treatments, consistent treatment of the routes will provide the benefit of network consistency.
- 3.2.15. An inconsistent route or inconsistency between routes could potentially introduce road safety problems. For example, if a road user approaches a sharp bend along a route which is signed and marked in the same way as less severe bends, then the severity of the bend may be misunderstood.

3.3. Methods of Identifying Potential Road Safety Route Treatments

- 3.3.1. Initially, potential road safety route issues are likely to be identified through Annual Regional Safety Reports, Route Strategies, national safety reports, Regional Incident Casualty Reduction Plans, local network management observations, EuroRAP or Star Rating reports.
- 3.3.2. Following this initial identification of a potential issue, personal injury collision information should be analysed to confirm route based road safety problems. There are a number of other data sources ([see Table 1](#)) that can be used to supplement personal injury collision data.

- 3.3.3. These additional sources of data may also be beneficial in developing and justifying a route based road safety treatment. In particular, the star rating system, POLAR database and POPE assessment process may be useful to help justify a treatment for an identified problem.

Star Rating

- 3.3.4. We are currently using the iRAP Safety Rating Model (2010) to assess the whole of our SRN in terms of the infrastructure attributes that are known to have an impact on road safety. The assessment process will identify and catalogue roadside features, the road layout (including geometric parameters) to determine the likely impact they will have on road safety. This will formulate a star rating for that road. Features that will be assessed include:

- Vertical and horizontal alignment.
- Number of junctions/accesses.
- Road type (single, dual).
- Number of lanes.
- Speed limit.
- Street lighting.
- Roadside obstacles.
- Provision of Vehicle Restraint Systems.
- Presence of hardstrips.
- Presence of footways / cycleways.
- Adjacent land-use.

3.3.5. Star ratings are derived from road inspection data and these provide a simple and objective score of the level of safety which is “built in” to the road for all road users. The system being developed reviews individual risk for different road users and does not solely consider personal injury collisions. There are up to five stars that can be awarded. Five star roads are considered the safest and 1 star roads the least safe.

Figure 6: Highways England Star Rating system (examples only)

	<p>★★★★★</p> <ul style="list-style-type: none"> • Compliant alignment. • Grade separated junctions. • Concrete central reserve barrier. • Variable Speed Limits. • Variable Message Signs.
	<p>★★★★</p> <ul style="list-style-type: none"> • Compliant alignment. • Grade separated junctions • Hardshoulder • Vehicle Restraint Systems



★★★

- Compliant alignment
- High quality junctions
- Nearside and offside Hardstrips
- Vehicle Restraint Systems



★★

- Sub-standard alignment
- Numerous junctions and accesses
- No hardshoulder
- Restricted visibility
- Roadside obstructions



★

- Poor alignment
- Low standard junctions and accesses
- No hardshoulder or hardstrip
- Narrow lanes
- Poor visibility
- Roadside obstructions

3.3.6. Star rating information can be requested for selected roads and routes. Support can also be provided to assist in the interpretation of the data sets. Information can be requested from roadlayout@highwaysengland.co.uk

Use of EuroRap Published Information

3.3.7. The EuroRap programme in the UK researches the safety performance of UK trunk roads, and publishes reports providing information on the types, frequency and severity of collisions and provides a risk ranking. Information is provided for all roads including our SRN.

3.3.8. The key EuroRAP reports and documents which could be useful in considering and justifying road safety route treatments are:

- **Annual Mapping and Performance Tracking Reports:** The EuroRAP performance measures show trends and the distribution of road safety risk across the UK road network which can be understood by both the general public and policy makers. This information is published annually.
- **Guidance and Examples of Road Safety Practice:** Provides guidance on the use of EuroRAP protocols at operational level by road authorities showing examples of good practice.

3.3.9. EuroRAP, in collaboration with the 'Road Safety Foundation', releases annual British EuroRAP Results. Further information and

risk maps are available from the EuroRAP website (<http://www.eurorap.org/>).

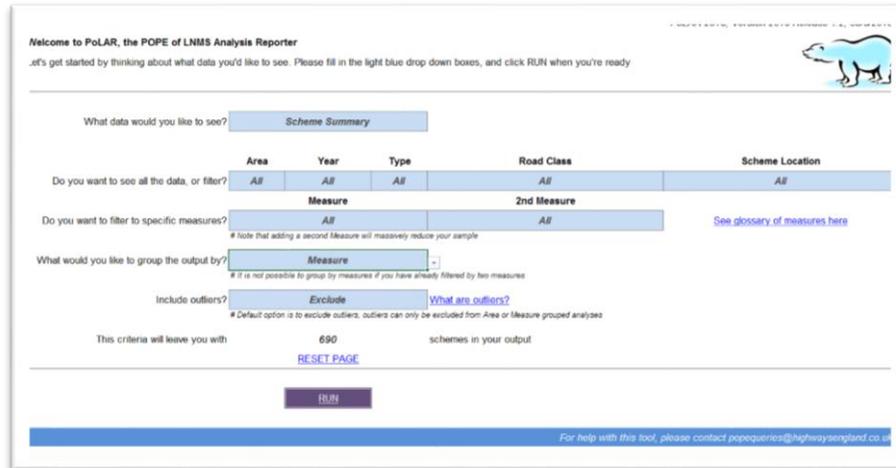
PoLAR database / POPE

3.3.10. We maintain a PoLAR database, which is an analysis tool that collates previous Local Network Management Schemes on the trunk road network. The PoLAR database contains over 700 evaluated schemes and approximately 50 new road safety schemes are evaluated and uploaded each year. The PoLAR database contains information on the justification and performance of a scheme, in the form of Scheme Appraisal Reports (SAR) (previously Project Appraisal Reports (PARs) and Post Opening Project Evaluations (POPE).

3.3.11. Some of the schemes within the database are justified on the basis of road safety improvements on routes, or sections of routes, that are similar in characteristics to the type of road safety route treatment schemes which this Guide promotes.

3.3.12. The database also includes examples of site specific spot treatments, although these may not be directly appropriate for road safety route treatments, they can provide valuable cost and collision saving information.

Figure 7: Extract from Highways England Database



Welcome to PoLAR, the POPE of LNMS Analysis Reporter
 .it's get started by thinking about what data you'd like to see. Please fill in the light blue drop down boxes, and click RUN when you're ready

What data would you like to see? **Scheme Summary**

Area	Year	Type	Road Class	Scheme Location
All	All	All	All	All

Do you want to see all the data, or filter?
 Measure: All 2nd Measure: All [See glossary of measures here](#)

Do you want to filter to specific measures?
 # Note that adding a second Measure will massively reduce your sample

What would you like to group the output by?
 # It is not possible to group by Measures if you have already filtered by two measures

Include outliers? **Exclude** [What are outliers?](#)
 # Default option is to exclude outliers, outliers can only be excluded from Area or Measure grouped analysis

This criteria will leave you with **690** schemes in your output

[RESET PAGE](#)

RUN

For help with this tool, please contact popoqueries@highwaysengland.co.uk

3.3.13. The PoLAR database can be used as a source for examples of treatments and combinations of treatments that have been used previously on the SRN. The information available includes details of how schemes were justified, scheme costs, cost / benefit information, value for money considerations and outturn cost and performance information.

3.3.14. However, care should be taken when using case studies to predict collision savings and scheme costs as schemes may have limited post scheme data and may not constitute a robust dataset. The scheme costs will be specific to the site in question at the time the

scheme was developed and may not be representative of current costs.

3.3.15. Analysis of the PoLAR database has provided some of the measure and case study information in [Part 2](#) of this Guide.

3.3.16. Access to the PoLAR database can be requested via Digital.Communications@highwaysengland.co.uk

3.4. Justification of Road Safety Route Treatment Schemes

3.4.1. Treatments can be justified using a variety of methods depending on the type of treatment being proposed. Typically highway treatments will be justified using a Scheme Appraisal Report (SAR) ([see Section 3.5](#)). Cycle treatments can be justified using the Cycling, Safety and Integration (CSI) SAR. Education / information and compliance treatments will typically be justified through the development of a business case ([see Section 3.6](#)).

3.4.2. Funding for treatments can be sought through two avenues:

- Cycling, Safety and Integration (CSI) Designated Fund.
- Minor Safety Improvement Fund (MSIF).

- 3.4.3. Both of these funds support targeted investments which deliver significant road user safety benefits. More specific guidance on how to apply for CSI funding can be found in the [CSI Fund Plan](#).
- 3.4.4. The Safety Designated Fund is aimed at delivering investment 'above business as usual' this programme primarily provides funding for investment on single carriageway All Purpose Trunk Roads, specifically targeting corridors with poor safety performance and introducing a route treatment of minor measures, i.e. signing / lining improvements, safer verges, banning turns etc. This programme also supports working with partners on compliance activities to achieve safety benefits.
- 3.4.5. The MSIF Fund will deliver targeted road safety interventions; this will largely focus on the All Purpose Trunk Roads (Dual) and motorway network and will support wider investments made through designated funds. The programme includes measures which seek to remove road user conflicts and create a forgiving network.
- 3.4.6. More information on both of these funding routes, along with guidance on how to apply can be found in the [CSI Fund Plan](#).
- 3.4.7. These funds support targeted investments which have significant road user safety benefits. Regions will be required to bid for funding in accordance with the latest application guidelines (contact the Designated Funds team if further guidance / advice is required). Although financial scheme benefits are important for justifying a scheme, Highways England are focused on improving single carriageway corridors and those routes with low star ratings and

therefore schemes that help deliver Highways England road safety objectives are likely to be prioritised.

- 3.4.8. For further guidance, email the designated funds scheme inbox: DesignatedFundScheme@highwaysengland.co.uk

3.5. Justification of Road Safety Route Treatment Schemes – Scheme Appraisal Report (SAR)

- 3.5.1. SARs are typically the tool used by Highways England to demonstrate justification for a scheme ([see paragraph 3.4.1](#)) Guidance on completing a SAR can be found within the SAR spreadsheet. Additional guidance is provided within the document titled '[SAR 2017: User Notes Scheme Appraisal Report Version 2017 Additional Information](#)' which can be found at (www.tamesoftware.co.uk/manuals).

SAR is an excel based tool which records the results of a WebTAG based appraisal of a highway improvement scheme (typically under £10m). For further information see: <http://www.tamesoftware.co.uk/sar/sar.html>

- 3.5.2. Justifying a road safety route treatment scheme may be harder than for a single site treatment as scheme delivery generally involves more works and therefore higher costs.
- 3.5.3. Locations within a route being treated without a history of reported personal injury collisions, means the costs are incurred without a quantified expected personal injury collision saving against which this can be balanced. Therefore the information provided in the SAR for road safety route treatment schemes needs to be as comprehensive and complete as possible to demonstrate justification.
- 3.5.4. The format of the current SAR process places additional onus on the supporting information needed to justify a road safety route treatment scheme. Personal injury collision benefits may be gained from a limited number of sites along the route, however, treatments are likely to be implemented throughout a route at all similar locations.
- 3.5.5. The primary metric to justify a treatment will be the expected number of personal injury collisions saved by the scheme and the monetary benefits this saving brings. However, treatments that help to deliver Highways England's road safety objectives will also be prioritised even if they have a more modest financial benefit. Other sources of information such as observations from traffic officer reports should be used to support the justification of a scheme ([see Table 1](#)).

Pre-scheme Personal Injury Collision Statistics

- 3.5.6. Pre-scheme collision statistics are required when completing the SAR. When analysing the collision history, analysis of the collisions

which have occurred within the specified time-frame (e.g. previous 5 years) and within the extents of the road safety route treatment scheme should be considered.

Predicted Opening Year Personal Injury Collision Saving

- 3.5.7. The predicted opening year collision saving shall be calculated by comparing the detailed collision history and proposed scheme treatments, together with any supporting information available on the expected effectiveness of the treatments.
- 3.5.8. Computer programmes such as [COBALT](https://www.gov.uk/government/publications/cobalt-software-and-user-manuals) (<https://www.gov.uk/government/publications/cobalt-software-and-user-manuals>) and [Junctions 9](https://trisoftware.co.uk/products/junction_signal_design/junctions_9) (https://trisoftware.co.uk/products/junction_signal_design/junctions_9) can be used to assess the effectiveness of road safety route treatments. Alternatively, information on the success of similar previous schemes can be found via a number of sources such as:

- The Road Safety Observatory.
- The RoSPA Road Safety Engineering Manual.
- The PoLAR database ([see paragraphs 3.3.10 to 3.3.16](#)).
- Case studies included within this document.

Collision Reduction

- 3.5.9. The main advantage that road safety route treatments have over conventional collision treatments is that it can address collisions

which are dispersed along a length of road that may be difficult to target or justify with site specific measures. Many sites with a history of high collision rates are likely to have already received some treatment, meaning targeting measures to treat remaining collisions can be difficult without using a route treatment approach.

Star Rating

3.5.10. A road safety route treatment approach can improve the star rating of a particular route. Therefore justification for a road safety route treatment could be based on the improvement it makes to the star rating. This is particularly relevant to 1 and 2 star routes targeted for improvement as a key network safety deliverable to be met by 2020.

Qualitative Comments

3.5.11. The SAR provides an opportunity to demonstrate that the proposed road safety route treatment scheme has been well researched and assessed. The information sources, outlined in [Table 1](#) below, could be used as further evidence to support road safety collision data.

Cycling, Safety and Integration (CSI) SAR

3.5.12. The CSI SAR appraisal process is similar to that of the main SAR spreadsheet which is currently used throughout the Highways England and its supply chain. The CSI SAR has been adapted to allow factors more pertinent to cycling and walking to be taken into consideration. These SARs will form the basis of the business case for these types of schemes, however the limitations of this approach

are recognised and so this can be supplemented with a strategic business case if appropriate that identifies the wider case for investment at a particular location. Please contact the Designated Funds inbox for any further queries.

3.6. Justification of Road Safety Route Treatment Schemes – Business Cases

3.6.1. Education / information and compliance treatments will be justified through the development of a business case which will typically include information on:

- **Background** – this should identify the road safety problem that the treatment is aiming to address.
- **Scope of the treatment** – this should clearly set out the aims and objectives of the treatment that is being proposed, who the target audience will be and how the treatment will address the road safety problem or potential issue.
- **The strategic context and how the treatment will fit with the Safe Systems Approach** – this should clearly set out how the treatment fits with national policy (e.g. 40% reduction in KSIs) as well as any route based / local area safety targets and objectives.
- **How the scheme could be implemented** – details of how the scheme will be implemented and what agreement with key stakeholders will be secured.

- **Costs to deliver the treatment** – the whole life cost of delivering the proposed treatment including any specific maintenance requirements not deemed to be routine.
- **Estimated benefits** – an estimate of the number of personal injury collisions potentially saved by the proposed treatment and the monetary value of this saving, and / or details of the improved compliance the scheme is likely to achieve.
- **Benefits Realisation Monitoring** – After scheme monitoring of personal injury collision occurrence, improved road user behaviour and compliance should be undertaken to verify estimated scheme benefits.

Table 1: Sources of Additional Data to Supplement Personal Injury Collision Data

Additional Information	Description	Data Source	Further reading
Asset Maintenance Records	Highways England area teams maintain a database of routine inspections that could highlight both injury and damage only collisions with our assets along a route.	Area Teams	Highways England Network Management Manual - Part 2 Asset Management Records
Compliance Monitoring Tool	At the time of publication the compliance monitoring tool was still in development. It is envisaged that the tool will provide information on road user compliance including information such as use of dynamic hard shoulders, Red X lane use, and adherence to variable speed limits. It should be noted that the data is presently limited to Smart motorways and therefore only covers a small proportion of the SRN.	-	-
Conflict Studies	Conflict studies can be a useful technique where there have been a limited number of reported personal injury collisions and drawing clear conclusions about problems and solutions is difficult due to a lack of observed factors. Conflict studies align with the Safe Systems Approach and can be considered a proactive method to help identify road safety issues. However, it should be noted that there are some reliability and validity concerns with this method. In the UK there is little information on the correlation between conflicts and personal injury collisions.	Area Teams	A method for undertaking conflict studies can be found in RoSPA's 'Road Safety Engineering Manual'.
Damage Only Report Forms	Damage Only Report Forms are used by Highways England Traffic Officers in order to record damage to street furniture and minor damage to vehicles not resulting in casualties on the SRN. They could be used to highlight collision issues along a route.	Highways England Traffic Officers	-
EuroRAP Data	See paragraphs 3.3.7 to 3.3.9 of this document.	http://www.eurorap.org	Road Safety Foundation
Highways England Customer Contact Centre (CCC)	Highways England encourages road users to provide feedback on the operation of the SRN. The Highways England Customer Contact Centre is the first point of contact for all public enquiries. Feedback ranges in topic but could provide customer views on a specific location or length of road.	mailto:www.info@highwaysengland.co.uk	Complaints Procedure
Highways England Control Works Data	The Highways England Control Works database is an incident management system. The database captures the details of any impact on the carriageway impact, the effects of the impact on both the network and people involved, and the actions taken to resolve the incident.	A work order request form must be sent to the Highways England Performance Analysis Unit team in order to retrieve Control Works Data. mailto:PAUOperationalPerformance@highwaysengland.co.uk	-

Table 1: Sources of Additional Data to Supplement Personal Injury Collision Data

Additional Information	Description	Data Source	Further reading
Highways England Witness Statements	In the event of a fatality, coroners may request a witness statement from Highways England. These may detail whether the road conformed to standards/guidance at the time of the collision.	Area teams	IAN 166/14 Highways Agency Road Death Investigation Manual (RDI) Guidance
Incident Report Forms	The Incident Report Forms (also known as Traffic Officer Forms) are used by Highways England Traffic Officers nationwide. The forms aim to record damage to street furniture and vehicles when there is an identifiable culprit / casualty.	Area teams	-
Operational Incident Data	Network / Regional Control Centre data is collected by MACs and ASCs to record information on network incidents. Records most commonly feature asset damage, lighting failures and road surface failures.	Area Teams	Highways England Network Management Manual - Part 2 Asset Management Records
Prevention of Future Death Reports (Coroners Reports)	A coroner will conduct an inquest into any unnatural or violent death in order to establish when and how the death occurred, including fatal collisions on the SRN. These reports will provide detailed interpretation about the causes of the collision.	https://www.judiciary.gov.uk	Courts and tribunals judiciary
Red / Green Claims	Red Claim – Road user compensation claim against Highways England, e.g. vehicle damage due to pot hole. Green Claim – Highways England compensation claim against a road user, e.g. negligent road user crashes and damages asset.	Area Teams	Highways England Network Management Manual
Road Death Investigation Reports	A Road Death Investigation (RDI) is undertaken by the police in order to establish the circumstances which have led to a road fatality.	Appropriate Police Authority	Road Death Investigation Manual 2007 IAN 166/14 Highways Agency Road Death Investigation Manual (RDI) Guidance
Road User Safety – Safety Performance and Monitoring Reports – Blank Calculating Tables	The Blank Calculating tables are used by our Service Providers to work out the value (casualty rate or KSI) for each link on the Strategic Road Network (SRN).	The latest table can be found here .	-
Stakeholder Engagement	See Section 3.7 of this document	-	-
Star Rating	Star rating based on the International Roads Assessment Programme (iRAP) Safety Rating Model (2010) can be requested for specific roads and routes.	mailto:roadlayout@highwaysengland.co.uk	-

Table 1: Sources of Additional Data to Supplement Personal Injury Collision Data

Additional Information	Description	Data Source	Further reading
Traffic Speed / Flow Data	Speed data and traffic flow data are considered to be a secondary data source to be used when analysing a route safety record. Speed data and traffic flow data on the SRN is widely available and road safety engineers are likely to be aware of how to use such data in order to justify schemes.	Highways England network journey time and traffic flow data	Highways England network journey time and traffic flow data user guide
Watchman Reports	Watchman reports detail and analyse numerous network characteristics, including safety, congestion, length of road closures and planned growth. Network safety is often evidenced using STATS 19 PIC data. Area managers have access to these reports.	Area Teams	Network Management Manual

3.6.2. The additional information highlighted in [Table 1](#) can typically be added to the 'Traffic and Accidents' Worksheet in the SAR and as attachments to the submission. Qualitative comments derived from the above data sources can be used in the SAR to help demonstrate that a route safety treatment scheme has been well researched and assessed. Comments can include information on:

- Traffic levels.
- Traffic composition.
- Asset damage.
- Observed conflicts.
- Claims.
- Damage only incidents.
- Road user complaints.
- Compliance issues.

3.6.3. An outline of the scale and nature of the pre-scheme collision problem shall also be included, as well as a description of how the proposed treatments will address these problems. Alternatively, this information could be included within a short technical note appended to the 'Attachments' worksheet in the SAR.

3.6.4. There is also an opportunity to highlight any additional or non-monetary benefits which the SAR does not include a designated field for which may result from the installation of the scheme (for instance economic, environmental, social and journey quality). Information from road user complaints, observed conflicts and damage only

incidents can also inform the 'travellers stress' section of the Journey Quality' worksheet.

3.6.5. Several worksheets within the SAR include free text fields to allow the author to enter road safety related qualitative supporting statements. Qualitative supporting evidence can be inserted in the following SAR worksheets:

- 'Scheme Details'
- 'Traffic & Accidents'
- 'Public Accounts'
- 'VM Non-webTAG'
- 'Transport Economic Efficiency'
- 'Physical Activity'
- 'Journey Quality'
- 'Accidents'
- 'Security'
- 'Severance'

3.6.6. The following excerpt is taken from the qualitative comments set out on a submitted SAR and provides a good example of how to include supporting information. It clearly indicates what the existing problems are and how the proposed treatments will be effective in addressing the problems.

'The additional traffic signs will emphasise road characteristics and the hazard ahead.' *'More than half of the collisions at the junction with the B390 are connected with right turns from and onto the A36, colliding with southbound vehicles. These collisions indicate a problem with southbound drivers on the A36 failing to identify the locations of junctions. The Vehicle Activated Sign (VAS) will emphasise the junction ahead for the drivers. At the Upton Lovell junction, VAS will improve identification of the location of the junction and reduce the number of collisions connected with vehicles turning on to the A36. The additional chevron signs at Knook and Stockton Bends will help drivers negotiate the bends.'*



3.6.7. In contrast, another example from a real SAR shown below gives no information:

'There is a predicted reduction in collision rate'.



3.6.8. The above statement could portray a sense that the scheme has not been properly researched or assessed and may leave the assessors with little confidence that the scheme will be as successful as it claims. With limited supporting information it is less likely the scheme will be promoted in a Value Management workshop and therefore the scheme would stand little chance of being approved for implementation.

3.7. Stakeholder Engagement

3.7.1. Stakeholder Engagement is likely to be more important for road safety route treatments than it is for single site treatments given the implications of route length and the need to secure support for specific scheme objectives and understanding of the route treatment concept.

- 3.7.2. It will often be necessary to consult with a wide range of people and organisations (see Figure 8). A route may pass through several Local Authority areas (County, District, and Parish Councils) which will require engagement to ensure that potential cross-boundary implications are clearly understood and addressed at the earliest opportunity. Where local roads are likely to be affected, it is essential to consult the local highway authorities.
- 3.7.3. The level of consultation and spectrum of stakeholders will be dependent on the nature of the scheme and the design stage. However, the relevant police authority for the route under consideration and motorcycle, cyclist, pedestrian and equestrian groups can be key stakeholders on road safety route treatment schemes.

Stakeholder Engagement Techniques

- 3.7.4. More traditional approaches to consultation include notifications and self-completion questionnaires delivered within the scheme extents which may be useful to ensure statutory notification procedures have been satisfied. However, other 'face-to-face' techniques may also offer opportunity for greater engagement particularly with 'harder to reach' groups and also to raise awareness and encourage scheme 'buy-in' as early as possible. The use of periodic forums through the course of the scheme involving representatives of the key stakeholders is one approach which could be adopted, using these representatives to then disseminate information to a wider audience.

Figure 8: Potential Stakeholders for Engagement



- 3.7.5. Designers should familiarise themselves with our procedures and policies on stakeholder engagement and consultation prior to engagement with stakeholders.
- 3.7.6. It may be more efficient and effective to bring a number of groups together to a single information / consultation session rather than individual meetings with separate groups. This can allow collaborative thinking, and ensure understanding and balancing concerns of different groups. It is also easier to stage a full demonstration of the proposals if this can be done for a larger group.

Stakeholder Engagement Considerations

- 3.7.7. Any consultation exercise or stakeholder engagement needs to be mindful of the need to ensure ease of access and be held at convenient times and locations to ensure maximum attendance and participation.
- 3.7.8. A series of consultation exercises along a route may be considered to minimise the distance consultees might be expected to travel.
- 3.7.9. The anticipated costs of stakeholder engagement should also be considered at the planning stage of the project to ensure that sufficient funds are available to undertake the appropriate level of consultation.

Publicising the Scheme

- 3.7.10. For schemes which will significantly affect road users directly (e.g. changes in capacity, disruption during installation, parking etc.)

publicity for the scheme may need to include involvement of local media, both through paid advertising and via press notices which are intended to generate editorial comment. Leaflets to individual households and exhibitions in local centres (schools, libraries, town/village halls) may also be necessary.

- 3.7.11. A cost effective solution to get public feedback can be to publicise schemes on social media, such as Facebook and Twitter. However, care shall be taken not to alienate those without access to, or understanding of online digital media.
- 3.7.12. Publicity for a scheme should not be exclusively reserved for the period before implementation of the scheme. Keeping the stakeholders and the public informed throughout construction and then explaining what has been done and the reasons for it can also be very beneficial in preventing adverse publicity and increasing the likelihood that the scheme will operate successfully.

3.8. Implementing a Road Safety Route Treatment

- 3.8.1. Road safety route treatments may involve relatively simple installations at any one particular site. However, the treatment of a number of sites along a route will inevitably result in a greater level of disruption.
- 3.8.2. In order to ensure the effective delivery of a road safety route treatment with minimum disruption to road users throughout the implementation period a detailed schedule of works needs to be developed at the earliest practicable time.

- 3.8.3. The phasing of implementation will require detailed consideration of local circumstances at the outset and management throughout the scheme to minimise and manage the level of disruption.
- 3.8.4. Consultation with those responsible for implementation and operation should be a standard stage of the introduction of a road safety route treatment scheme to ensure unnecessary problems are avoided.
- 3.8.5. The type of treatment to be implemented may also have an impact on the programming of works. The application of some treatments may be dictated by weather conditions and in turn, can only be installed when the road surface is dry and free from winter maintenance. Financial year constraints may also be a consideration in programming of works.
- 3.8.6. Some measures implemented in a road safety route treatment scheme will require a Traffic Regulation Order (TRO) to enforce new regulations such as parking, speed limits or banned manoeuvres. Early contact with the appropriate regional traffic order team should be made to ensure that the TRO can be implemented in line with the project timescales. The procedures for making a TRO are set out in the following documents:

- [The Local Authorities' Traffic Orders \(Procedure\) \(England and Wales\) Regulations 1996](#)
- [The Secretary of State's Traffic Orders \(Procedure\) \(England and Wales\) Regulations 1990](#)

- [The Road Traffic \(Temporary Restrictions\) Procedure Regulations 1992](#)

- 3.8.7. Key considerations when implementing a route based road safety scheme should include:

- Traffic flows and timing of peak flows
- Seasonality of traffic flows
- Implications of weather on ability to install measures
- Local events
- Funding

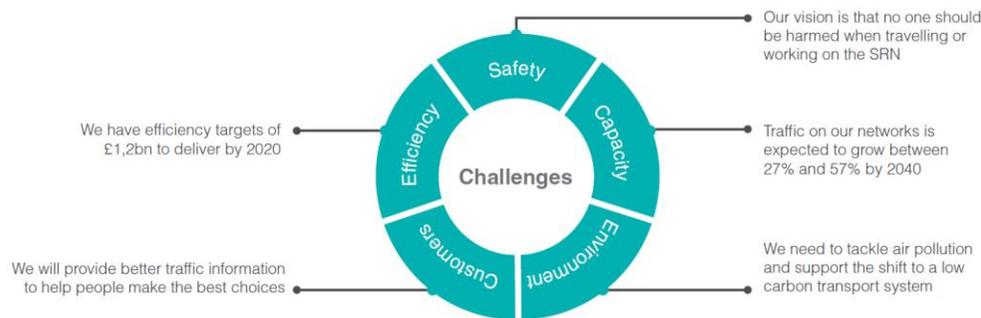
4. The Role of Innovation

4.1. General

- 4.1.1. Road Safety route treatments should have a robust evidence base in terms of their past performance on the SRN or roads with similar characteristics. However, Highways England encourages innovation and therefore users of this document may want to investigate innovative road safety measures.
- 4.1.2. Highways England’s approach to innovation is set out in our [Innovation, Technology and Research Strategy](#) document published in April 2016. This strategy document sets out how Highways England will deliver the £150 million worth of investment from our Innovation Designated Fund, on improving the Strategic Road Network through innovation between 2016 and 2021.

- 4.1.3. To allow for actions beyond business as usual, as part of our wider portfolio of [designated funds](#), the Road Investment Strategy sets out designated funding to support innovation. The total funding available is set at £150 million, with a £30 million allocation for 2020 to 2021.
- 4.1.4. There are different innovation themes including safety, data and information, improving our infrastructure, new and emerging technology and support to sustainable operations.
- 4.1.5. In May 2018, we launched our Innovation Portal <https://highwaysengland.co.uk/innovation-hub/>. This is our digital innovation implementation plan, outlining our innovation activities and processes, and the key challenges we face as we plan for the future. Through the portal, you will also be able to connect with us about our innovation.

Figure 9: Innovation Designated Funds



GTRSRT PART 2 – Route Based Road Safety Treatments



5. Road Safety Route Treatments

5.1. General

5.1.1. Road Safety Route Treatments can comprise of:

- Road safety engineering measures.
- Road safety education and information campaigns.
- Road safety enforcement measures.

5.1.2. The treatments presented in this document are typically low-cost which helps to off-set the economic dis-benefits when treating long sections of road. They also help in providing a consistent safety message along a route and thereby enable justification for the scheme as a whole.

5.1.3. [Section 6](#) of this guide includes information on engineering measures and details of where they can be effectively used. Also included are example case studies where the measures have been successfully implemented.

5.1.4. [Section 7](#) of this guide includes information on education and information campaigns and where they can be effectively used. The section also includes a selection of case studies which are provided to help readers to develop their own education and information route treatments.

5.1.5. [Section 8](#) includes information on enforcement measures and how these can be used to influence road user behaviour.

5.1.6. [Section 9](#) of this guide includes information on compliance measures.

5.1.7. The development of treatments utilising education, enforcement or compliance initiatives will need to be undertaken with the Regional Road Safety Coordinators and where appropriate Regional Enforcement Coordinators.

6. Engineering Measures

6.1. Engineering Measures

6.1.1. The engineering measures included in this guide are not exhaustive, but are intended to provide a selection of the most commonly used and effective remedial measures. Other road safety treatment measures can be included in a road safety route treatment scheme if they are used consistently throughout the route. The section on engineering measures includes the following details:

- Measure description.
- Target Collision Type.
- Case Studies.
- Associated Technical Documents.
- Potential impact on star rating.

6.1.2. A summary matrix is included which cross references the engineering measures identified in the Guide against example case studies. The matrix also identifies the types of road safety problem that can be treated by the engineering measures identified. It also provides an indicative cost of each measure to allow an initial comparison of options.

6.1.3. Example case studies of engineering measures are provided in this section of the guide to give an indication of the costs and benefits of constructed schemes, along with details of the associated treatment measures that are most commonly used together. However, as many of the case studies incorporate a number of treatments, it is difficult to quantify the benefit of a single measure in isolation.

6.1.4. Each measure is accompanied by a 'heat bar' as illustrated below which gives an indication of how the measure may impact on the star rating of the road.

Figure 10: Star Rating 'Heat Bar' Example

High Impact



Low/Medium Impact



Legend

Indicative Cost	
£	£1 - £50,000
££	£50,000 - £100,000
£££	£100,000 - £200,000
££££	£200,000 - £400,000
£££££	£400,000 - £800,000
££££££	£800,000 - £plus

ENGINEERING TREATMENT MATRIX		COLLISION PROBLEM															
		Loss of Control / Misleading Alignment	At junctions	Manoeuvres	Temporary hazards (e.g. weather or debris)	Speeding	Night-time/dark collisions	Rear Shunts	Lane Discipline	Head-on	Cyclists, pedestrians and horse riders	Overtaking	Adverse Weather Conditions	Side Impact Collisions	Vehicles Leaving the carriageway	Involving Animals	Involving motorcyclists
A1	General Road Signs (see page 40)	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
A2	Bend Ahead and Chevron Signs (see page 41)	£						£					£		£		£
A3	Vehicle Activated Signs (see page 42)	££	££	££		££	££	££	££	££	££	££	££		££	££	££
A4	Variable Message Signs (see page 43)	££	££	££	££	££	££	££	££	££	££	££	££	££	££	££	££
A5	Reflectorised Marker Posts/ Bollards (see page 44)	£	£	£			£				£				£	£	£
A6	Countdown Markers on the approach to roundabouts (see page 45)	£	£			£		£				£					
A7	Reducing Sign Clutter (see page 46)	£	£	£											£		
B1	Carriageway text (see page 47)	£	£	£		£			£								
B2	Vehicle Separation Markings (see page 48)	£							£	£			£	£			
B3	Lane Separation Marking Width (see page 49)			£			£		£			£		£			
B4	Edge of Carriageway Markings (see page 50)	£	£				£								£		£
B4a	Edge of Carriageway Raised Profile Markings (see page 51)	£	£				£							£	£		£
B5	Central Hatching (see page 52)	£							£			£					£
B6	Transverse Yellow Bar Markings (see page 53)		£			£		£									
B7	Rumble Devices (see page 54)	£				£									£		
B8	Double White Lines (see page 55)	£					£		£			£					
B9	High Visibility Markings (see page 56)	££	££	££		££	££		££	££	££	££	££		££		££
B10	Village Gateways (see page 57)		£			£	£				£						
B11	Road Studs (see page 58)	££		££			££					££					
C1	New/ Improved Footways (see page 59)		£££				£££				£££						

ENGINEERING TREATMENT MATRIX		COLLISION PROBLEM														
		Loss of Control / Misleading Alignment	At junctions	Manoeuvres	Temporary hazards (e.g. weather or debris)	Speeding	Night-time/dark collisions	Rear Shunts	Lane Discipline	Head-on	Cyclists, pedestrians and horse riders	Overtaking	Adverse Weather Conditions	Side Impact Collisions	Vehicles Leaving the carriageway	Involving Animals
C2	Facilities for Cycle Traffic (see page 60)		£££							£££						
C3	Equestrian Facilities (see page 61)		£££							£££						
C4	Road Crossings and Road Crossing Islands / Refuges (see page 62)		££							££						
D	New/ Replacement Street Lighting (see page 63)					££										
E	New/ Improved Traffic Signals (see page 64)		£££									£££				£££
F1	Spot Cameras (see page 65)	££	££		££				££		££			££		££
F2	Average Speed Enforcement Cameras (see page 66)	£££			£££				£££		£££			£££		£££
G	Passively Safe Fixtures (see page 67)	££												££		££
H	Road Restraint Systems (see page 68)	££												££		££
I	Fencing (see page 69)									££					££	
J1	High Friction Surfacing (see page 70)	££	££									££		££		££
J2	Coloured Surfacing (see page 71)	££	££		££		££									
J3	Re-surfacing (see page 72)	££££						££££						££££		
K1	Slip Road Merge/ Diverge Improvements (see page 73)							££££££	££££££				££££££			
K2	Ghost Island Right Turn Lanes (see page 74)		££££	££££				££££		££££						
K3	New/ Improved Roundabout (see page 75)			££££££				££££££	££££££		££££££		££££££			££££££
L	Vegetation Clearance (see page 76)	£	£					£						£		£
M1	Single Carriageway Widening - No additional lanes (see page 77)	££££££							££££££	££££££	££££££			££££££		££££££
M2	Wide Single 2+1 Carriageway (see page 78)								££££££		££££££					
M3	Climbing Lanes (see page 79)								££££££		££££££					
M4	HGV Overtaking bans (see page 80)			££												
N	Lay-by Provision (see page 81)			£££												
O	Prohibition of Turns (see page 82)		££	££												
P	Narrowing / Lane Drop (see page 83)					£££		£££								
Q	Speed Limit Reduction (see page 84)	£	£			£	£	£		£	£	£		£		£
R	Where you look is where you go (see page 85)	££				££										££
S	Treatment Options for Deer (see page 86)														££	
T	Wrong Way Driving (see page 87)			££												

A1 - General Road Signs

Road Signs



Description

Road signs warning of features such as junctions ahead, emphasising a speed limit or locations where there may be unexpected queues ahead, can make road users better aware of the road environment and have a material impact on reducing the number of collisions along a route. Installing appropriate warning, regulatory and directional signs can reduce the number of collisions caused by road users travelling at inappropriate speeds, road users over-shooting Give Way or Stop lines, or road users braking late to turn into a junction.

When treating a route as a whole, a consistent approach to road signing, including the use of suitable 'x' heights and sign faces will enable road users to anticipate the nature of the oncoming hazard and encourage a change in speed or prompt a different manoeuvre.



Description (continued)

When installing new and consistent signing along a route, removing historic and redundant signs should be considered. A reduction of irrelevant or repeated information can assist in improving road user focus of other more important and relevant signs and improve the star rating.

Any new signs needs to be positioned to reduce the likelihood of them being struck by errant vehicles.

Target Collision Type

Loss of control on bends, failure to stop/give-way.

Case Studies

[CS 1 A595 Scalegill and Linethwaite Junctions Safety Improvements.](#)

[CS 7 A46/A452 Junction Improvements.](#)
Also utilised in many other case studies.



Associated Technical Guides

[Traffic Signs Manual, Chapters 2, 3, 4 & 7](#)

[Traffic Signs Regulations and General Directions](#)

[Interim Advice Note 144 - Directional Signs on Motorway and All-Purpose Trunk Roads - Grade Separated Junctions](#)

[Interim Advice Note 145 - Directional Signs on Motorway and All-Purpose Trunk Roads - At Grade and Compact Grade Separated Junctions](#)

Potential Impact on Star Rating



A2 - Bend Ahead and Chevron Signs

Road Signs



Description

Traffic signs warning of approaching sharp bends can have a significant effect in reducing loss of control and speed related collisions on bends that a driver might find difficult to negotiate as the severity of the bend cannot easily be identified. In addition, chevron signs can be used where the bend is considered serious enough that a more distinct visual aid is required and a bend warning sign alone is considered insufficient.

These measures combined can improve road users' perception of the severity of an approaching bend and guide them through the hazard safely.

To ensure consistency along a route, bend ahead and chevron signs should be applied to all sharp bends along a route.



Description (continued)

Where chevron signs are to be used and continued through a bend, the size of the sign face shall be suitable for the 85th percentile speeds of vehicles on the approach to the bend (see Traffic Signs Manual Chapter 4).

Chevron signs should be located away from the likely path of an errant vehicle if possible. Where this may reduce the effectiveness of the signing and potentially create a greater risk of injury, then the use of passively safe posts or passively safe versions of chevron signs that are designed to recover when struck should be considered.



Target Collision Type

Loss of control and speed related collisions on bends

Case Studies

[CS 6 A43 Barley Mow Roundabout](#)

[CS 18 M5 Junctions 1-2, Sandwell, West Midlands. Advisory Speed Limit Signing](#)

Associated Technical Guides

[Traffic Signs Manual, Chapter 4, Section 3](#)

[Traffic Signs Regulations and General Directions](#)

Potential Impact on Star Rating



A3 - Vehicle Activated Signs

Road Signs



Description

Vehicle Activated Signs (VAS) can be a very effective tool for highlighting permanent hazards on a route.

VAS are usually activated in one of two ways, firstly as a vehicle approaches the sign above a predetermined speed threshold, the VAS displays a sign and / or a warning message to the oncoming road user. Secondly, a VAS can be activated when a vehicle approaches a side road junction, the VAS then displays a warning message to road users on the main carriageway warning approaching drivers of the possibility of vehicles turning into or out of an adjacent side road junction.



Description (continued)

One of the benefits of VAS is that they provide 'real time' warnings for road users and can attract their attention more successfully than static signing. The signs can also be used in an advisory capacity as well as an application to reinforce speed limits. Another advantage of VAS is that they can be solar powered in rural locations where connecting traditional signs to electricity may have been considered too expensive.

Traffic Advisory Leaflet 1/03 states that VAS should only be considered when there is a collision problem that has not been satisfactorily remedied by standard signing and where a safety camera is not considered a cost effective solution.



Target Collision Type

Collision problems associated with inappropriate speeds and manoeuvres particularly at dangerous junction which have not been satisfactorily remedied by standard signing.

Case Studies

[CS 18 M5 Junctions 1-2, Sandwell, West Midlands, Advisory Speed Limit Signing.](#)

[CS 20 A456 Hagley Road](#)

Associated Technical Guides

[Further advice in Traffic Advisory Leaflet 1/03 – "Vehicle Activated Signs".](#)

[Traffic Signs Regulations and General Directions](#)

Potential Impact on Star Rating



A4 - Variable Message Signs

Road Signs



Description

Variable Message Signs (VMS) are predominantly used to highlight temporary or seasonal hazards on a route or to convey specific real time information to motorists regarding traffic management and warn of special events that may cause disruption to the highway network. The aim is to raise the awareness and allow road users to slow down, amend their driving style or re-route before they reach the hazard.

Messages presented on the signs should be as short as possible whilst being fully comprehensible to road users. They should in general not convey more than 8 words or six units of information. It is unlawful to display messages that require multiple displays ('paging') or utilise scrolling text.



Description (continued)

VMS can be considered a relatively costly option compared to static road signs and should only be used where static signing is ineffective or not appropriate. However, Variable Message Signs can in some areas save money; as less time is spent installing and removing Temporary Traffic Management signs on ground level. It is also worth considering the effects of Variable Message Signs use on road workers safety and consideration should be given to the positioning of the VMS to minimise any potential hazard.

Target Collision Type

Collision problems associated with temporary hazards such as areas prone to fog, debris in the road, events, seasonal issues or roadwork's.



Case Studies

[CS 5 A30 Penlan Mobile Variable Message Sign and associated Hardstandings – Eastbound Scheme](#)

Associated Technical Guides

[Traffic Advisory Leaflet 01/15 - "Variable Message Signs"](#)

[Interim Advice Note 179/14 - "Guidance on the Use of Vehicle Mounted High Level Variable Message Signs to provide advance warning of lane closures for Relaxation Works on Dual Carriageways with a Hard Shoulder"](#)

[Traffic Signs Regulations and General Directions](#)

Potential Impact on Star Rating



A5 - Reflectorised Marker Posts / Bollards

Road Signs



Description

Marker posts, placed in the verge, can be used to draw road users' attention to certain features and hazards as well as improving conspicuity of the road alignment. These measures are particularly effective in unlit areas as the reflectorised strips can provide a conspicuous outline of the carriageway extents and guide drivers through a changing or more hazardous road alignment. Marker posts may also be a cost effective way of discouraging road users from stopping in hazardous locations or providing warning of a segregation island located between the carriageway and a lay-by.

When used as part of a road safety route treatment scheme, the repetitive application of marker posts at similar features such as ditches, bends or accesses can increase a road user's anticipation and comprehension of the road conditions ahead.



Description (continued)

Physical obstructions such as bridge structures can also be highlighted using black and yellow striped markers.

Designers shall give due consideration to the Passive Safety (see Measure G) and BS EN 12767 when proposing the installation of marker posts and bollards.

Reflector marker posts / bollards can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing street lighting.



Target Collision Type

Loss of control, misreading the alignment, night-time/dark collisions, discouraging stopping in hazardous locations and run-off incidents.

Case Studies

CS 1 A595 Scalegill and Linethwaite Junctions Safety Improvements

Associated Technical Guides

Traffic Signs Manual, Chapter 4. Section 16 "Hazard Markers"

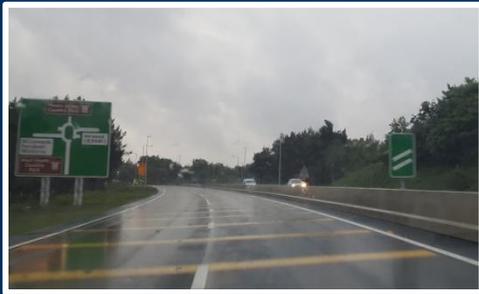
DMRB Vol. 6 TD 69 The Location and Layout of Lay-bys and Rest Areas

Potential Impact on Star Rating



A6 - Countdown Markers on the approach to Roundabouts

Road Signs



Description

Where further emphasis is needed on a high speed approach to a roundabout on dual carriageways, countdown markers may be sited 300, 200 and 100 yards respectively from the give way line. The background colour shall be green when used on a primary route, and white (with black symbols and border) on a non-primary route.

When a roundabout includes the provision of a Segregated Left Turn Lane, count down signs should only be provided on the approach to the roundabout when there is no risk of confusion between the distance to the commencement of the Segregated Left Turn Lane and the distance to the roundabout give way line

Countdown Markers can also be used in conjunction with Transverse Yellow Bar Markings (See Engineering Measure B6).



Target Collision Type

Shunt type collisions caused by a failure to stop.

Case Studies

[CS 35 A43 Whitfield Turn Signing Improvements](#)



Associated Technical Guides

[Traffic Signs Manual, Chapter 4, Section 2](#)

Potential Impact on Star Rating



A7 – Reducing Sign Clutter

Road Signs



Description

Street furniture is essential for communicating the road layout ahead to all road users. In particular traffic signs and road markings need to be simple and concise so as to be easily understood.

The appropriate use and layout of traffic signs and road markings is vital to their effectiveness.

Over-provision of traffic signs can have a detrimental impact on the environment and can dilute more important messages if they result in information overload for road users.

Non-essential street furniture also provides an unnecessary hazard to road user should they lose control of their vehicle and leave the carriageway.



Description (continued)

Traffic sign clutter can occur over time, where additional signing is provided without consideration of any existing signing. It can also occur where information to road users is unnecessary or excessively signed.

Good sign design can prevent clutter happening in the first place, and integration of signing requirements into the design stage of a scheme can help ensure the number of signs is kept to the minimum needed without compromising on the messages they need to deliver. Careful design of the signs themselves can also help to avoid clutter by reducing their size and by combining signs onto fewer separate structures.

Reducing sign clutter can have both road safety and maintenance benefits.



Target Collision Type

Collisions involving vehicles leaving the carriageway. Collisions involving driver confusion.

Case Studies

Associated Technical Guides

Traffic Advisory Leaflet 01/13 "Reducing Sign Clutter"

Potential Impact on Star Rating



B1 - Carriageway Text

Road Markings



Description

Carriageway text road markings are often applied in conjunction with lane separation road markings and road signs in order to provide guidance to road users as to:

- what lane they should be in, or;
- to warn of an approaching hazard.

The use of clear carriageway text in conjunction with lane separation road markings can encourage better lane discipline and reduce the occurrence of sudden lane changes.

The use of 'SLOW' road markings can be used to offer repeated warning to road users at locations with an existing identified collision problem or known hazards throughout the route length.



Description (continued)

To ensure that road users are aware of why they should slow down it is recommended that the text is used in conjunction with warning signs to explain why reduced speeds are appropriate.

Text road markings should where possible be located at least as far back from the junction as the longest peak hour queue to ensure stationary vehicles do not block the message. However, care shall be given to ensure that the message does not cause confusion with other junctions nearby.

Special care needs to be taken when using carriageway text at locations where it may present a hazard to motorcyclists such as on and on the approaches to bends, especially on adverse cambers.



Target Collision Type

Collisions where inappropriate speeds and / or lane discipline have been a contributory factor.

Case Studies

[CS 2 M61 Junction 9/ M65 Junction 2 Signing and Road Marking Improvements.](#)

[CS 1 A595 Scalgill and Linethwaite Junctions Safety Improvements](#)

[CS 12 A34 East Ilsley Safety Improvements](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[Traffic Signs Manual Chapter 5](#)

[DMRB TA 81 "Coloured Surfacing in Road Layout"](#)

Potential Impact on Star Rating



B2 - Vehicle Separation Road Markings

Road Markings



Description

Vehicle separation road markings are one measure that can improve road user behaviour on motorways by encouraging increased gaps to the vehicle in front. Typically, Vehicle Separation Road Markings are placed on the carriageway at 40m intervals.

It should be noted that “Keep apart 2 chevrons”, “Check your distance” and “Keep your distance” signs shall be also be installed as part of this measure (see Traffic Signs Manual Chapter 5 for full guidance).

The effectiveness of Vehicle Separation Road Markings on sections of motorway with very high traffic flows is unknown and therefore it is recommended that caution is exercised before installing these road markings. Successful trials occurred where traffic flows did not exceed 4000 vehicles per carriageway during the peak hours.



Description (continued)

Studies by TRL found vehicle separation markings had the biggest impact in reducing single vehicle collisions, despite the measures commonly being used to reduce collisions involving two vehicles. It is considered that this is due to the road marking making road users more aware of their speed and providing drivers with something that breaks up the routine and monotony of a route.

The potential risk to road operatives during the installation and maintenance of vehicle separation markings needs to be considered and mitigation measures put in place.



Target Collision Type

Loss of control and nose to tail collisions on Motorways associated with close following.
Single vehicle collisions

Case Studies

[CS 14 M5 Motorway Chevron Markings](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[Traffic Signs Manual, Chapter 5, Section 22](#)

Potential Impact on Star Rating



B3 - Lane Separation Marking Width



Description

An increase in the lane separation road marking width can be used to increase the prominence of the road marking and increase separation between vehicles on multi-lane roads or roads with a carriageway width of over 10 metres,

The TSRGD allows the use of a wider, 150mm lane separation marking in place of the standard 100mm wide road marking. The wider line is visible at a greater distance, and should be used where this might be beneficial, e.g. at particularly hazardous sites or for centre lanes on single carriageway roads with more than two lanes. On concrete roads the wider road marking can help improve the prominence of road markings.



Description (continued)

The use of enhanced luminance paint can also assist in making the road marking more distinct on concrete roads, particularly in wet conditions. However, this advice shall not render the carriageway incompatible with the TD 27 "Cross-Sections and Headroom's" standard for lane widths, as minimum lane widths shall be maintained unless a Departure from Standard is obtained. This requirement applies both to improvement and maintenance schemes, although different line widths should not be used for adjacent lanes.

Consideration should be given to the justification of the use of the wider road marking as its overuse will devalue its effect.

Road Markings



Target Collision Type

Locations where lane discipline has been a contributory factor in collisions, including incidents at night or in inclement weather.

Case Studies

[CS 2 M61 Junction 9/ M65 Junction 2 Signing and Road Marking Improvements](#)

[CS 1 - A595 Scalegill and Linethwaite Junctions Safety Improvements](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[Traffic Signs Manual, Chapter 5, Section 4](#)

[BS EN 1436 UK National Annex for luminance performance guide](#)

Potential Impact on Star Rating



B4 - Edge of Carriageway Markings

Road Markings



Description

A solid white road marking at the edge of the carriageway can help road users to distinguish the road layout ahead, particularly at night or during inclement weather. It can also improve road user positioning on the road by encouraging the adoption of a driving line closer to the carriageway edge which provides safer negotiation through a bend and therefore reduces the potential for head-on collisions.

At locations where the carriageway is particularly wide, a solid edge line located further from the edge of the carriageway can be introduced to form a hardstrip (see DMRB Standard TD 27). This can also improve road user positioning within the carriageway.

A broken white edge line road marking could be used on the edge of carriageway to highlight private accesses. This is particularly useful to increase conspicuity of an access.



Description (continued)

It is important to consider whether there is a need for enhanced performance road markings. Whilst these road markings require more capital cost, using enhanced measures can make road markings more durable, require less maintenance and provide additional road safety effects.

Edge of carriageway markings can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing street lighting where currently no street lighting is provided.



Target Collision Type

Loss of control collisions, head-on collisions on bends, collisions at night or in inclement weather, turning conflicts at side accesses.

Case Studies

[CS 26 A38 Watchorn Junction Phase 2 Safety](#)

[CS 31 A63 Hambleton to Monk Fryston Safety Improvements](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[Traffic Signs Manual Chapter 5, Section 4](#)

Potential Impact on Star Rating



B4a - Edge of Carriageway Markings - Raised Profile Edge Lines

Road Markings



Description

Raised profile edge lines consist of a continuous line (as described in measure B4) with horizontal ribs to create an effective tactile device to audibly assist with highlighting the edge of the carriageway. These road markings can be used on both motorways and all-purpose trunk roads and are effective at reducing fatigue and loss of control related collisions.

The road marking is typically constructed from specialist thermoplastic material and can also be used to enhance wet road surfaces during the hours of darkness.

In order to provide good surface water drainage, a drainage channel should be included within the continuous line at predetermined intervals.

Raised profile markings should be discontinued where pedestrians and cyclists may cross the road.



Description (continued)

Raised rib edge of carriageway markings can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing street lighting where currently no street lighting is provided.



Target Collision Type

Loss of control collisions, head-on collisions on bends, collisions at night or in inclement weather, incidents involving fatigue, turning conflicts at side accesses.

Case Studies

[CS 26 A38 Watchorn Junction Phase 2 Safety](#)

[CS 31 A63 Hambleton to Monk Fryston Safety Improvements](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[Traffic Signs Manual Chapter 5, Section 4](#)

Potential Impact on Star Rating



B5 - Central Hatching

Road Markings



Description

Central hatching introduces a degree of separation between opposing lanes on a carriageway. It shall only be used where the carriageway is wide enough to accommodate the hatching and still provide suitable lane widths for both directions (see DMRB Standard TD 27).

Some of the benefits associated with introducing central hatching are:

- it can give the visual effect of narrowing the carriageway, which can encourage reduced vehicle speeds,
- it can improve lane discipline and discourage overtaking,
- it can improve negotiation of bends, and
- emergency service vehicles can utilise the area to overtake slow moving or stationary vehicles.



Description (continued)

If there is sufficient width available, the central hatched area can also accommodate a dedicated right turning facility for vehicles turning into or out of a side road (although reference should be made to DMRB Standard TD 42). This reduces the risk of turning conflicts and nose to tail collisions, commonly associated with this manoeuvre.

To place greater emphasis on the central hatched area and further emphasise the segregation, coloured surfacing can be used within the central hatched area.

It should be noted that central hatching can have a negative effect on cyclist and motorcyclist safety. Firstly, motor vehicles can position themselves closer to the edge of the carriageway, limiting the room for cyclists. Secondly, motorcyclists may use the hatched area for overtaking which could destabilise the motorcycle.



Target Collision Type

Speed related collisions, head-on collisions

Case Studies

[CS 16 A36 Wilton to St Pauls Roundabout](#)

Associated Technical Guides

[Traffic Signs Regulations and General Directions](#)

[DMRB Vol.6, Section 2, TA 81 – “Coloured Surfacing in Road Layout \(Excluding Traffic Calming\)”](#)

[Traffic Signs Manual, Chapter 5, Section 4](#)

[DMRB Vol.6, Section 1, TD 27 Cross Sections and Headrooms](#)

Potential Impact on Star Rating



B6 - Transverse Yellow Bar Markings

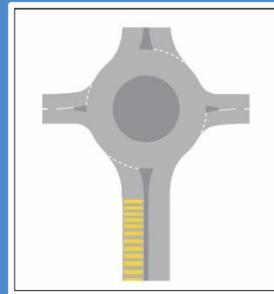
Road Markings



Description

Transverse yellow bar markings (also referred to as Lateral bars) can be provided on the approach to a roundabout (see TSRGD Schedule 11, Part 4, Item 35). The TSRGD and Chapter 5 of the Traffic Signs Manual provides guidance and a layout for the use of the road markings where the spacing between each bar decreases on the approach to a roundabout give way line. This provides road users with the visual illusion that they are travelling at a higher speed and encourages road users to slow down.

Due consideration should be given to using durable materials, such as MMA (Methyl Methacrylate) paint which lasts approximately twice as long as other paints. Whilst the initial costs are higher, the maintenance expenditure is usually lower and as such can make the use of high quality materials economically beneficial.



Description (continued)

Transverse yellow bar markings shall only be used on approaches to roundabouts on motorways and dual carriageway roads subject to the national speed limit. This can be either on the main carriageway or on an exit slip road from the mainline.

Where there is a significant number of cyclists a gap of 750mm can be provided between the edge of the running carriageway and the bar markings.



Target Collision Type

Overshoot / failure to give way collisions. Vehicles entering the roundabout at speed or driver lack of awareness of the roundabout; nose-to-tail collisions.

Case Studies

[CS 19 A650 Crossflatts Roundabout](#)

[CS 6 A43 Barley Mow Roundabout](#)

Associated Technical Guides

[Traffic Signs Manual, Chapter 5, Section 11](#)

[Traffic Signs Regulations and General Directions](#)

Potential Impact on Star Rating



B7 - Rumble Devices

Road Markings



Description

Rumble devices encompass a variety of features such as:

- rumble strips
- rumble bars
- rumble areas

The aim is to encourage road users to slow on the approach to the hazard by increasing its conspicuity. A consistent route approach will result in drivers learning to identify the hazard in advance. Rumble strips and bars are generally cheaper than rumble areas but to maximise their effectiveness they should be applied in a series of groups, positioned closely together on the immediate approach to a hazard.

Rumble devices are likely to result in only modest reductions in speed (typically 3mph, see DMRB Advice Note TA 87/04 and Local Transport Note 1/07), but do help to increase the attention and awareness to road users of an approaching hazard.



Description (continued)

Rumble areas are only recommended on roads with an 85th percentile speed of between 30mph and 45mph. There should usually be a minimum distance of 30 metres to the nearest building as they can create noise and vibrations, although this may need to be extended depending on specific ground conditions at each site (see Traffic Advisory Leaflet 1/05 "Rumblewave Surfacing").

Consideration should be given to cycle traffic and motorcyclists. In the case of rumble bars this could include leaving gaps (between 750mm and 1000mm) between the end of the bars and the nearside road edge. For rumble area a smooth strip can be provided near to the carriageway edge to allow cycle traffic to pass over the feature with minimum discomfort.

The use of rumble devices on bends should be considered due to the possible danger to motorcyclists.



Target Collision Type

Shunt type collisions and conflict with vulnerable road users due to inappropriate speeds.

Case Studies

[CS 31 A63 Hambleton to Monk Fryston Safety Improvements](#)

Associated Technical Guides

[Local Transport Note 1/07 Traffic Calming](#)

[Traffic Advisory Leaflet 11/93 "Rumble Devices"](#)

[Traffic Advisory Leaflet 1/05 "Rumblewave Surfacing"](#)

[DMRB Vol.6. Section 3 - TA 87 "Traffic Calming on Trunk Roads a Practical Guide"](#)

Potential Impact on Star Rating

Low

High



B8 - Double White Lines



Description

A double white line road marking within the centre of a road prohibits vehicles from overtaking when travelling in either direction. The road marking also helps to highlight the alignment of the road ahead and encourages road users not to cross the centre line when negotiating bends. It should be noted that road studs (measure B11) shall also be included in all double white lining systems.

These road markings should only be used on sections of road where forward visibility is insufficient to overtake safely. Chapter 5 of the Traffic Signs Manual provides guidance regarding the maximum forward visibility and road width allowed when considering using this road marking. However, where a significant collision history has been identified it is permissible to use this road marking even if forward visibility is better than the prescribed maximum.



Description (continued)

Care needs to be taken not to use this marking at inappropriate locations as this may lead to road users ignoring the road marking, resulting in an increase in inappropriate overtaking manoeuvres at other dangerous locations. Guidance states that where forward visibility is sufficient, but overtaking could still present a danger, a warning road marking should be used, or consideration given to central hatching (see measure B5).

Road Markings



Target Collision Type

Generally addressing overtaking collisions or head-on collisions at bends due to poor lane positioning

Case Studies

[CS 13 A46\(T\) at Screveton](#)

Associated Technical Guides

[Traffic Signs Manual Chapter 5, Section 5](#)

[Traffic Sign Regulations and General Directions Regulation 26\(2\), Diagram 1013.1](#)

Potential Impact on Star Rating



B9 - High Visibility Markings

Road Markings



Description

High visibility white road markings can provide an enhanced guidance system for road users both in wet and adverse weather conditions as well as during hours of darkness. They may also bring benefits to roads on an east-west alignment that may cause difficulties for road users travelling toward a low sun.

On concrete carriageways, it is recommended that high visibility road markings are used instead of underlying standard lines with black surface treatment.

An additional benefit of high visibility road markings is the reduced need for maintenance, however, this is dependent on its application, thickness and material type. However, the initial outlay for these road markings is approximately twice as expensive as the cost of normal road markings.



Description (continued)

High visibility markings can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing street lighting where currently no street lighting is provided.

Target Collision Type

Night-time, dark, wet and adverse weather related collisions.

Collisions on roads with an east-west alignment that may cause difficulties for road users travelling toward a low sun.

Case Studies

[CS 8 M42 Junction 1 to 3A Dark Collision Safety Scheme](#)



Associated Technical Guides

[Traffic Signs Manual \(2009\) Chapter 5 "Road Markings"](#)

BS EN 1423 "Road marking materials. Drop on materials. Glass beads, antiskid aggregates and mixtures of the two."

Potential Impact on Star Rating



B10 - Village Gateways

Road Markings



Description

Gateways can provide a clearly defined boundary for road users on the approach to a village or settlement located on a route, and emphasis of a changing environment and the need to adopt associated behaviour including a reduction in vehicle speed. Features of this nature are well suited to road safety route treatment schemes, as treating the entry to each village in a similar manner provides a consistent message to road users of an oncoming change in the characteristics of the route.

Gateways can comprise a package of measures including enhanced village entry signing, speed limit reduction, coloured carriageway surfacing, carriageway narrowing, and features such as dragon's teeth road markings.



Description (continued)

Gateways should be positioned as close to the settlement extents as possible although consultation with parish councils and other key stakeholders may result in some local variations. A clear sight line on approach to the gateway is a key requirement, ideally at least the stopping distance for the 85th percentile approach speed, and in view of the high speed approach measures should also be designed to be structurally forgiving if hit by an errant vehicle.

Generally, using a number of measures simultaneously can have greater impact, however, it is important that the use of these measures are justified to prevent excessive visual intrusion on the rural environment.



Target Collision Type

Speed-related collisions on entry to and through rural and semi-rural settlements and potential involvement of more vulnerable road users within these settlements.

Case Studies

[CS 28 A21 Whatlington Gateways](#)

Associated Technical Guides

[LTN 1/07 "Traffic Calming"](#)
[Road Safety Good Practice Guide, DTLR 2001](#)

[Traffic Advisory Leaflet 1/04 Village Speed Limits](#)
[DMRB Vol.6, Section 3 - TA 87 "Traffic Calming on Trunk Roads a Practical Guide"](#)

Potential Impact on Star Rating



B11 - Road Studs

Road Markings



Description

Road studs are a particularly effective way of enhancing forward visibility of the road layout on unlit roads during the hours of darkness or during inclement weather. The most suitable type of stud for the road in terms of the required performance and durability should be considered. Where traditional road studs may be ineffective, active road studs should be considered.

Active road studs include an internal light source, generally using a solar panel to provide a power supply. Instead of relying on a vehicle's headlights to illuminate the stud, the LEDs generate a continuous, brighter and more conspicuous feature. Active road studs are only usually introduced in areas where headlights may not be able to illuminate a traditional road stud sufficiently (e.g. due to poor vertical and horizontal alignment) and can extend visibility of the road layout ahead.



Road studs can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing street lighting where currently no street lighting is provided.

Target Collisions

Night-time and adverse weather related collisions including loss of control, run-off incidents and head-on collisions).

Case Studies

[CS 8 M42 Junction 1 to 3A Dark Accident Safety Scheme](#)



Associated Technical Guides

[Traffic Signs Manual, Chapter 5, Section 6 "Road Studs"](#)

[DMRB Vol.8, TD 26 "Inspection and Maintenance of Road Markings and Road Studs on Motorways and All-Purpose Trunk Roads"](#)

[Traffic Signs Regulations and General Directions Manual of Contract Drawings for Highway - Works, Volume 3](#)

BS EN 1463-1 1997 "Road marking materials. Retroreflecting road studs. Initial performance requirements"

BS EN 1463-2 2000 "Road marking materials. Retroreflecting road studs. Road test performance specifications"

Potential Impact on Star Rating



C1 - New / Improved Footways

Pedestrians, Cyclists and Equestrian Facilities



Description

Where pedestrian desire lines dictate, footways should be provided adjacent to the carriageway.

At grade crossing facilities on the pedestrian desire lines are generally preferred by pedestrians as they provide the most direct route, however, where this is not possible footbridges / subways can be provided. These shall be provided in accordance with DMRB Volume 2, BD 29 ("Design Criteria for Footbridges") in order to maximise accessibility, safety, and personal security.

Where new footways are introduced, these should be included within routine maintenance programmes to ensure that they are kept free of vegetation, and kept clean and attractive to encourage usage.

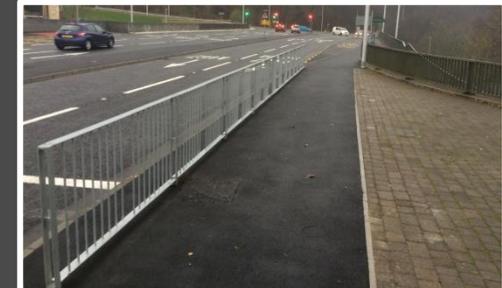


Description (continued)

In rural areas where pedestrian related collisions have been identified and no facilities are present, a new footway could result in a reduction of collisions involving pedestrians. Depending on the environment, it may also be necessary to separate the footway and the road, in areas where there is a greater density of traffic or high speeds; this can be done using physical measures such as pedestrian guardrail or by providing an appropriate margin strip between the footway and the carriageway.

Pedestrian guardrail can also be used to guide pedestrians towards formal crossing points or away from potential hazards. However, caution should be taken not to adversely impact inter-visibility and Stopping Sight Distance requirements.

Pedestrian guardrail should only be used where there are no other feasible options.



Target Collisions

Collisions involving pedestrians, caused by inadequate pedestrian facilities.

Case Studies

[CS 20 A456 Hagley Road](#)

Associated Technical Guides

[DMRB Vol. 5 HD 42 "Walking, Cycling and Horse-riding Assessment and Review"](#)

[DMRB Vol. 7 Section 2, HD 39 "Footway Design"](#)

[DfT Local Transport Note 2/09 - "Pedestrian Guard-railing"](#)

[DFT Local Transport Note 1/95 - "The Assessment of Pedestrian Crossings"](#)

[DFT Local Transport Note 2/95 - "The Design of Pedestrian Crossings"](#)

Potential Impact on Star Rating



C2 - Facilities for Cycle Traffic

Pedestrians, Cyclists and Equestrian Facilities



Description

Cycle facilities on and off carriageway are intended to provide cycle traffic with an alternative route from the main traffic lanes and reduce the risk of conflict with other road users. They can also raise awareness to road users of the likelihood of cyclists within the area.

There are a number of examples of cycle facilities including:

- Segregated footway / cycleway
- Mandatory or advisory on carriageway cycle lane
- Segregated on carriageway cycle lane (for example light segregation)
- Shared footway / cycleway

Cycle facilities can also be provided on the approach to and through junctions to give priority to cyclists and allow safer movements through the junction.



Description (continued)

Consideration is required when introducing cycle facilities to ensure that it is the most appropriate facility for the environment. For instance, providing on or off carriageway cycle facilities with insufficient width can introduce new hazards to either cyclists or other road users. The DMRB Advice Note TA 90/05 "The Geometric Design of Pedestrian, Cycle and Equestrian Routes" and Interim Advice Note "Cycle Traffic and the Strategic Road Network" provides in depth guidance on what the most appropriate provision should be.

Target Collisions

An unacceptable rate of collisions involving pedestrians, caused by inadequate junction layout or inadequate pedestrian facilities.



Case Studies

[CS 16 A36 Wilton to St Pauls Roundabout Safety Improvements](#)

Associated Technical Guides

[DMRB Vol. 5 HD 42 "Walking, Cycling and Horse-riding Assessment and Review"](#)

[DMRB Vol. 6 TA 90 "The Geometric Design of Pedestrian, Cycle And Equestrian Routes"](#)

[DMRB Vol. 5 TA 91 "Provision For Non-Motorised Users"](#)

[Interim Advice Note 195/16 "Cycle Traffic and the Strategic Road Network"](#)

Potential Impact on Star Rating



C3 - Equestrian Facilities



Description

A number of methods can be used in order to improve equestrian facilities. Guidance states that where practicable, horse-riders should be routed away from the immediate vicinity of roads. However, where road width permits, road space could be reallocated for horse-riders to provide them with a segregated off-carriageway route. Where equestrian routes meet high speed roads, a brideway bridge may be necessary so that horse-riders can cross safely.

Where there is sufficient equestrian demand and vehicle speeds and carriageway widths are appropriate, a 'Pegasus crossing' could be considered. Often Pegasus crossings include a fenced holding area and a wider crossing, so that horses crossing the road are further away from traffic than pedestrians and cyclists. It is also recommended that high friction surfacing on the carriageway is provided to prevent the horses from slipping.

Pedestrians, Cyclists and Equestrian Facilities



Description (continued)

Signs can also be used to offer advance warning to other road users that horse-riding occurs on this route.

On roads with a 85th percentile speed of above 50mph serious consideration should be given to the introduction to speed reduction measures before installing stand-alone crossings.



Target Collisions

An above average number of collisions involving horse-riders, caused by inadequate facilities.

Case Studies

[CS 29 A2 Kingston Bridleway Bridge](#)

Associated Technical Guides

[DMRB Vol. 5 HD 42 "Walking, Cycling and Horse-riding Assessment and Review"](#)

[DMRB Vol. 6 TA 90 "The Geometric Design of Pedestrian, Cycle and Equestrian Routes"](#)

[DMRB Vol. 5 TA 91 "Provision For Non-Motorised Users"](#)

[Traffic Advisory Leaflet 3/03 - Equestrian Crossings](#)

Potential Impact on Star Rating



C4 - Road Crossings and Road Crossing Islands / Refuges

Pedestrians, Cyclists and Equestrian Facilities



Description

There are a number of potential pedestrian crossings that can be considered depending on local circumstances:

- Uncontrolled / informal crossings
- Zebra crossings
- Puffin crossings
- Pegasus crossings (designed to be used by horse-riders, cyclists and pedestrians)
- Toucan crossings (designed to be used by cyclists and pedestrians)

Where it is proposed to introduce a controlled crossing, such as a zebra or puffin crossing, a sufficient volume of pedestrians is necessary in order to justify delays in traffic. Furthermore, a crossing used infrequently can result in regular road users becoming complacent about not needing to stop at the crossing which can result in road users failing to stop when a pedestrian has right of way.



Description (continued)

Care should be taken when implementing new crossings, as most pedestrians will only cross near their desire path.

Refuge islands can be provided in order to provide a safe place for pedestrians to wait whilst crossing the carriageway and to reduce the distance to be crossed in one movement. This can be particularly useful in areas where there is a higher than average number of less mobile pedestrians.

Consideration is required when introducing a refuge island as they can become obstacles for approaching road users and can cause vehicles to be pushed closer to the edges of the carriageway and limit the room for cyclists.

New or improved crossing facilities can be used in conjunction with other measures, such as warning signs and central hatching.



Target Collisions

Collisions involving pedestrians or cyclists.

Case Studies

CS 20 A456 Hagley Road

Associated Technical Guides

[DFT Local Transport Note 1/95 - "The Assessment of Pedestrian Crossings"](#)

[DFT Local Transport Note 2/95 - "The Design of Pedestrian Crossings"](#)

[DMRB Vol. 6 TD 50 "The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts"](#)

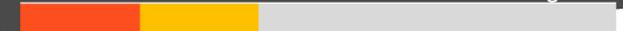
[DMRB Vol. 5 TA 91 "Provision for Non-Motorised Users"](#)

[Traffic Advisory Leaflet 5/05 - "Pedestrian Facilities at Signal - Controlled Junctions"](#)

Potential Impact on Star Rating

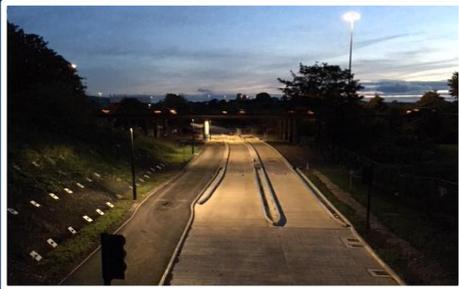
Low

High



D - New / Replacement Street Lighting

Lighting



Description

Where there is a high proportion of night time or dark collisions, street lighting can be introduced or upgraded as a road safety related measure along a route as a whole or at specific locations. Street lighting may not always be the most appropriate measure for an identified darkness collision problem, the use of reflectorized bollards, edge line road markings, high visibility road markings and road studs may be a more cost effective measure (both in terms of capital cost and maintenance) in many situations.

Before installing, upgrading or replacing street lighting, all proposals should be appraised using the DMRB Advice Note TA 49/07 "Appraisal Of New And Replacement Lighting On The Strategic Motorway And All Purpose Trunk Road Network" and IAN 167/12 "Guidance for the removal of road lighting" which gives requirements for the appraisal and design of lighting.



Description (continued)

If lighting columns are to be replaced, it is suggested that those vulnerable to being struck by an errant vehicle (in particularly those on bends or at junctions) are replaced with passively safe columns (where appropriate) to reduce collision severity.

Installing street lighting is an expensive option, and involves on-going maintenance/power-supply costs. Street lighting also creates light pollution making it less suitable for use in many (particularly rural) areas. It should therefore only be used on routes where it is likely to have a significant effect on road safety.



Target Collisions

Night-time or dark collisions

Case Studies

[CS 4 M20/M26 Street Lighting](#)

Associated Technical Guides

[DMRB Vol. 8, Section 3 - Lighting](#)

[DMRB Vol. 8, TA 89 "Use of Passively Safe Signposts, Lighting Columns and Traffic Signal Posts to BS EN 12767"](#)

Potential Impact on Star Rating



E – New/Improved Traffic Signals



Description

The main functions of traffic signals are to provide a right of way at junctions where there is conflict between traffic movements or non-motorised users and vehicles. Traffic signals are usually vehicle activated or connected to an urban traffic control system.

One of the main benefits of traffic signals over roundabouts and priority junctions is that they can interrupt extremely heavy traffic flows to permit the crossing of minor movements. They are also generally preferred as a safer option for cyclists as traversing a roundabout on-carriageway can be potentially more hazardous. They can also be more advantageous to pedestrians as they provide priority over the traffic rather than pedestrians relying on gaps or weaving through the traffic.



Description (continued)

In general, new or improved traffic signals can provide a number of benefits including reducing the number of side impact collisions and optimising vehicle flow. Therefore, where a route has a number of junctions with a historic collision problem and congestion issues, the provision of traffic signals along a route may provide a consistent approach that manages driver behaviour and speed and reduces the number of collisions.

However, consideration needs to be given to the installation and design of traffic signals as they can introduce rear shunt collisions and introduce congestion if improperly timed, both of which can be mitigated through good road and signals design. If traffic signals are used in conjunction with refuge islands then the carriageway lanes may be narrowed too much which can result in conflict between cyclists and other road users.



Target Collisions

Collisions at junctions, side impact collisions

Case Studies

CS 24 M6 Junction 29/ M65

Associated Technical Guides

DMRB Vol. 8, TA 84 “Code of Practice for Traffic Control and Information Systems for All-Purpose Roads

DMRB Vol. 8 TD 35 “All Purpose Trunk Roads MOVA System of Traffic Control at Signals”

DMRB Vol. 6 TD 50 “The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts”

Potential Impact on Star Rating



F1 - Spot Cameras

Safety Cameras



Description

Spot speed cameras can be used to enforce speed limits at an individual location by monitoring the speed of vehicles when in view of the camera. Spot speed cameras can either be fixed or mobile and should be used as part of a combination of route treatment measures.

When the camera has detected a vehicle travelling above the posted speed limit, a photograph is taken which is then reviewed by a law enforcement officer and an infringement notice issued to the registered owner of the vehicle.

Spot cameras can also be used to enforce compliance to traffic signals. Traffic light cameras can be triggered when a road user travels through a red signal by either loops in the ground or by radar technology. Dual cameras are also now available that can be used to enforce red light running and speed at the same location.



Description (continued)

Spot speed cameras are not a standalone measure and should only be used where there is a known history of speeding issues and / or speed related collisions in conjunction with other measures. Along a route spot speed cameras could be used in a series of villages that are subject to speed related collisions to provide a consistent route approach. Care shall be taken to ensure that the installation of a camera at one location will not migrate the safety issue elsewhere along the route.

Some of the benefits associated with spot speed cameras include; a reduction in the instances of vehicles travelling in excess of the speed limit in the vicinity of the cameras and potentially an increased awareness to drivers that they are travelling in an area with a road safety issue.



Target Collisions

Vehicles leaving the carriageway due to excessive speed, loss of control, head-ons, speeding, overtaking and incidents involving red light running.

Case Studies

CS 30 A45/A445 Ryton-on Dunsmore Junction Improvement

Associated Technical Guides

DMRB Vol. 8 TA 89, "Use of Passively Safe Signposts, Lighting Columns and Traffic Signal Posts to BS EN 12767: 2007"

DMRB Vol. 2 TD 19 "Requirement for Road Restraint Systems"

CHE Memo 411/17 "Use of Speed Cameras on the SRN"

Potential Impact on Star Rating



F2 - Average Speed Enforcement Cameras



Description

Average Speed Enforcement Cameras (ASECs) are a route-based road safety treatment that can be used to enforce speed limits along a route by monitoring a vehicles average speed. The technology can also be used to monitor journey times, bus lane enforcement and for congestion charging.

ASEC schemes consists of a set of cameras at the entry and exit points of a section of road with a time-stamped photo taken of each vehicle as it enters into the area. Automatic Number Plate Recognition (ANPR) software checks that the vehicle has not exceeded the sign posted speed limit, based on the time stamps and the known distance between the cameras. If an infringement has occurred then a law enforcement official will manually confirm the contravention before an infringement notice is issued to the registered owner.



Description (continued)

ASECs are only considered a mid-term solution until a permanent solution has been implemented, they should also not be applied as a standalone road safety measure and only introduced where there are speed-related collisions spread out along a route.

The benefits of an ASEC scheme can include a reduction in the number of collisions and casualties along a route and improvements to traffic flow and air quality.

For further information on justification for a ASEC scheme see CHE Memorandum 411/17.

Safety Cameras



Target Collisions

Vehicles leaving the carriageway, loss of control, head-ons, speeding, overtaking

Case Studies

[CS 10 A14 Huntingdon to Cambridge Safety Cameras](#)

[CS 27 A9 Average Speed Cameras](#)

Associated Technical Guides

[DMRB Vol. 2 BD 94 "Design of Minor Structures"](#)

[IAN 113/08 "Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Roadworks"](#)

[CHE Memo 411/17 "Use of Speed Cameras on the SRN"](#)

Potential Impact on Star Rating



G – Passively Safe Fixtures



Description

Passively safe fixtures include measures such as signposts and lighting columns. These are designed to reduce the severity of injuries in the event of being struck. Various designs are available, some absorbing the energy of impacts through deflection, and some shearing off at the base when struck.

Passively safe fixtures should be introduced on high speed roads where they may be more appropriate than a vehicle restraint system. Technical guidance is available which outlines where and when passively safe signposts / lighting columns should be used.



Description (continued)

Care needs to be taken to avoid placing passively safe posts / columns where the deflection / failure of the post could cause a secondary collision although any risk of this needs to be weighed against the primary risk of the initial collision. An example of this would be the central reserve of a dual carriageway where a struck passively safe column could fall into an opposing carriageway.

Before considering the installation of a passively safe feature, the first course of action should be to consider if the fixture is actually required or could it be relocated to a safer location?



Target Collisions

Vehicles leaving the carriageway

Case Studies

[CS 24 M20/M26 Street Lighting](#)

[CS 7 A46/A452 Junction Safety Improvements](#)

Associated Technical Guides

Design Manual for Roads and Bridges Vol. 8 TA 89/08, "Use of Passively Safe Signposts,

Lighting Columns and Traffic Signal Posts to BS EN 12767: 2007"

Design Manual for Roads and Bridges Vol. 2 TD19/06 "Requirement for Road Restraint Systems"

Potential Impact on Star Rating



H – Road Restraint Systems



Description

Road restraint systems include features such as:

- Safety Barriers/ Safety Barrier Terminals
- Bridge Parapets
- Crash Cushions

Road restraint systems can help to contain and redirect an errant vehicle from coming in to contact with a hazard such as a bridge abutment, tree, lighting column, traffic sign or embankment. Road restraint systems can also provide appropriate containment from a vehicle falling from height or reaching a water hazard. Rather than being seen as a preventative measure, they are generally considered a secondary safety feature intended to minimise the severity of a collision as removal of the hazard should be the first consideration.

The DMRB Road Restraint Risk Assessment Process (RRRAP) should be followed when considering and designing a Road Restraint System.



Description (continued)

Historically, road restraint systems could be unforgiving when struck by motorcyclists, however, recent upgrades and additions to existing restraint systems have shown a reduction in the severity of injuries when struck. One such example is a low level road restraint system that protects riders from hitting the barrier supports.

DMRB TD 19 shall be adhered to for all Trunk Roads with a mandatory speed limit of 50mph or more and wherever road restraint system is installed on the network. This document also provides guidance on the provision of rigid concrete barriers in the central reserves of motorways, or roads to motorway standards, with a two-way AADT of 25,000 vehicles or more per day.

Designers are permitted to use TD 19 retrospectively when tackling existing safety problems along a route.



Target Collisions

Vehicles leaving the carriageway

Case Studies

[CS 15 M1 Woodall Service Area Southbound Safety Area](#)

[CS 12 A34 East Ilsley Safety Improvements](#)

Associated Technical Guides

[DMRB Vol.2 TD 19 "Requirement for Road Restraint Systems"](#)

[DMRB Vol.6, Section 1, TD 27 Cross Sections and Headrooms](#)

Potential Impact on Star Rating



I – Fencing



Description

Fencing can be used in order to reduce the likelihood of two main collision types. Firstly, where there is a risk of animals straying into the carriageway from adjacent land. Boundary fencing is in place alongside much of the length of our network and therefore appropriate construction and subsequent maintenance are the key safety issues in this respect.

Secondly, fencing can be used in order to restrict and direct pedestrian, cyclist and equestrian access away from the carriageway and towards crossing points. This reduces the likelihood of pedestrians, cyclists and horse-riders coming into conflict with vehicles.



Description (continued)

It should be noted that where a fence is a post and rail construction, the horizontal rails should be located on the back of the post, i.e. away from the traffic, so that if struck the rails shear away from the vehicle. This also reduces the potential for the horizontal rails to penetrate an errant vehicle striking the fence.

Target Collisions

Collisions involving cyclists, pedestrian and horse riders and motorcyclists.

Animals straying into the carriageway and to direct non-motorised users to appropriate crossing points.



Case Studies

[CS 36 A1\(M\) Washington Services Pedestrian Barrier](#)

Associated Technical Guides

BS 1722: Fences (Various parts)

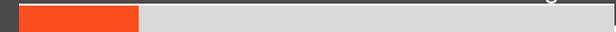
[Design Manual for Roads and Bridges Vol.2, TD 19/06 "Requirements for Road Restraint Systems"](#)

[Manual Of Contract Documents For Highway Works Volume 1 Specification For Highway Works - Series 300 Fencing, Series NG 311 Fencing and Series 2500](#)

[Design Manual for Roads and Bridges Vol.10, Section 5, Environmental Barriers](#)

Potential Impact on Star Rating

Low High



J1 - High Friction Surfacing (HFS and High-PSV)

Road Surfacing



Description

At locations where there is evidence of loss of control collisions or skidding incidents, high friction road surfacing or high PSV surfacing can be introduced and is commonly used on the approaches to:

- Pedestrian, cycle & equestrian crossings
- Signalised and non-signalised junctions
- Roundabouts
- Sharp bends

High Friction Surfacing (HFS)

There are a number of types of HFS and it is important to choose the most suitable one in order to achieve the greatest benefits and avoid costly maintenance. It is recommended that designers consult the DMRB Standard, HD 36/06 "Surfacing Materials for New and Maintenance Construction" for further guidance. Most of these surfaces can also be given a colour to further emphasise to the road user the presence of the potential hazard and the need to reduce approach speed.



Description (continued)

However, it is important that the application of coloured surfaces to provide warning is not overused as its common use could reduce the impact of this warning feature due to familiarity. Consideration needs to be given to the termination point of HFS to ensure it is extended beyond the acceleration zone downstream of the bend or exit from a roundabout.

High-PSV

New surface courses that have a high-PSV (Polished Stone Value) aggregate also provide improved skid resistance and be used as an alternative to high friction surfacing. This may prove to be a more effective method at some sites where a coloured treatment is not required and may prove to have a longer lifespan than high friction surfacing treatment. Further advice on this can be found in DMRB Standard Vol. 7, HD 36/06 "Surfacing Materials for New and Maintenance Construction".



Target Collisions

Loss of control, nose-to-tail collisions, turning conflicts, failure to stop at junctions and collisions involving skidding.

Case Studies

CS 11 A3(M) Junction 3 Safety Improvement Scheme

Associated Technical Guides

DMRB Vol. 7, HD 36 "Surfacing Materials for New and Maintenance Construction"

Potential Impact on Star Rating



J2 - Coloured Surfacing

Road Surfacing



Description

Coloured surfacing can be used to increase the conspicuity, understanding and compliance of a road layout. This in turn can provide positive road safety benefits. Coloured high friction surfacing can be used to encourage lower speeds on the approach to a hazard whilst also providing the safety benefits of high friction surfacing.

Coloured surfacing can be achieved through the use of paints or coloured asphalt, this section generally refers to the use of paints, however, similar results can be achieved using coloured asphalt.

There is a range of applications for coloured surface treatments including highlighting the desired path of vehicles through a junction or section of carriageway, discouraging encroachment on to a particular area of carriageway and providing warning of a potential hazard ahead.



Description (continued)

The most appropriate method of applying colour to the carriageway shall be selected to suit specific site conditions in order to maximise conspicuity and avoid excessive maintenance requirements in the future. For example, MMA (Methyl Methacrylate) paint is considered one of the most durable paints in heavy traffic and can therefore decrease the amount spent on maintenance. Consistency is also important when treating an entire route, ensuring the same colours are used for similar purposes throughout the route length.

It should also be noted that coloured surfaces are not a sign or road marking, and are therefore only intended to be used to supplement other signs or road markings.



Target Collisions

Various, dependent upon the location it is applied. Predominantly, loss of control, head-on incidents, junction turning or rear shunt collisions

Case Studies

[CS 1 A595 Scalegill and Linethwaite Junctions Safety Improvements](#)

[CS 16 A36 Wilton to St Pauls Roundabout Safety Improvements](#)

[CS 17 A303 Ilminster Hatching](#)

Associated Technical Guides

[DMRB Vol. 6, TA 81 "Coloured Surfacing in Road Layout \(Excluding Traffic Calming\)"](#)

Potential Impact on Star Rating



J3 - Re-surfacing

Road Surfacing



Description

Regular reviews of the carriageway surface are undertaken as part of the routine maintenance regime to ensure that the quality of the surface remains adequate. Where particular safety concerns have been raised, additional inspections should be undertaken.

Where the road surface has deteriorated it can result in hazards forming such as potholes which can lead to loss of control collisions. Poor quality road surface can also result in longer stopping distances, and therefore increase the number of nose to tail collisions.

At locations where the road surface has deteriorated it is recommended that resurfacing is undertaken. This is unlikely to be funded through the same process as a road safety route treatment as it is likely to be a maintenance activity.



Description (continued)

However there may be scope to make use of the Temporary Traffic Management provided for the maintenance works to undertake route treatment improvements.

The use of materials will be dependent on local factors such as environmental conditions and performance requirements.

This measure is likely to be popular with user groups, as worn surfaces can contribute to vehicle maintenance costs. When undertaking re-surfacing works, it should be ascertained if any other surfacing treatments can be used simultaneously.

Whilst re-surfaced roads generally improve stopping distances and can reduce the risk of loss of control collisions, it may also result in an increase in vehicle speeds.



Target Collisions

Loss of control collisions caused by poor surface, nose to tail collisions caused by poor surface.

Case Studies

[CS 11 A3\(M\) Junction 3 Safety Improvement Scheme](#)

[CS 23 A14 Newmarket Lay by Strategy Improvements](#)

Associated Technical Guides

[DMRB Vol. 7, HD 36 "Surfacing Materials for New and Maintenance Construction"](#)

Potential Impact on Star Rating



K1 - Slip Road Merge / Diverge Improvement



Description

Slip roads on the merges or diverges of dual carriageways or motorways are associated with a higher than average number of nose-to-tail collisions. This can be a particular issue on diverges as a result of motorists leaving a high speed route and failing to appropriately adjust their speed.

There are a number of enhancements that can be considered to improve the safety, including:

- Signalisation of the exit and entry points of the slip road, this aims to reduce the number of collisions occurring as road users misjudge gaps and can improve the flow of vehicles during peak periods;
- Widened and or lengthened diverge, this can increase the capacity of the slip road and reduce queuing back during peak periods;



Description (continued)

- Widening and or lengthening the merge, this gives motorists a greater amount of time to adjust their speed as they join the main carriageway;
- Landscaping improvements and vegetation clearance, this can improve visibility for road users already on the trunk road as well as on the slip;
- Resurfacing/ high friction surfacing on the diverge, this reduces the likelihood of skidding for road users who maybe decelerating quickly;
- Provision of additional lanes.
- Introduction of lane destination markings and improved road signing

Any proposed improvements to slip roads shall be in accordance with the requirements of the DMRB.



Target Collisions

Rear shunts, lane discipline and side impact.

Case Studies

[CS 2 M61 Junction 9/ M65 Junction 2 Signing and Road Marking Improvements](#)

[CS 22 A55/ A483 Junction Widening](#)

Associated Technical Guides

[DMRB Vol.6, TD 42 "Geometric Design of Major/Minor Priority Junctions"](#)

[DMRB Vol. 6 TD 22 "Layout of Grade Separated Junctions"](#)

[DMRB Vol. 6 TD 50 "The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts"](#)

Potential Impact on Star Rating



Road Geometry

K2 - Ghost Island Right Turn Lanes

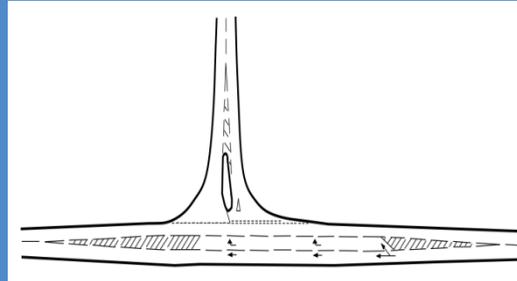
Road Geometry



Description

Ghost island junction layouts provide protection for right turning vehicles from the through flow of traffic by providing a dedicated lane in which turning vehicles can slow and wait to make their manoeuvre. The addition of ghost islands to protect turning vehicles may help to reduce the collision rate at even minor junctions if they have a history of incidents.

However, if opportunities for overtaking are restricted either side of the junction, the installation of a ghost island layout can pose road safety problems as the hatching, additional lane and widened carriageway could be used for overtaking and result in collisions with turning vehicles. In locations where this may be a problem, it may be more appropriate to install physical islands resulting in a single-lane dual carriageway layout.



Description (continued)

It is acknowledged that the installation of ghost island right turn lanes will be a higher cost measure and may also require additional land take. Consequently, it may not always be feasible to treat junctions on a route where there is no personal injury collision history in this way. However, where there are junctions on a route with personal injury collisions involving right turn related issues then consideration should be given to treating these sites in a consistent manner.



Target Collisions

Collisions involving right-turning movements

Case Studies

[CS 9 A120 Coggeshall Bypass / B1024 Colne Road Junction Improvement Safety Scheme](#)

[CS 16 A36 Wilton to St Pauls Roundabout Safety Improvements](#)

Associated Technical Guides

[DMRB Vol.6, TD 42 "Geometric Design of Major/Minor Priority Junctions"](#)

Potential Impact on Star Rating



K3 - New / Improved Roundabout

Road Geometry



Description New Roundabouts

Evidence suggests that roundabouts can result in fewer and less severe collisions in comparison to other types of junctions such as, priority junctions and cross roads. It is considered that this is due to road users having to slow down ready to give way as they join the roundabout circulatory.

Another benefit of a roundabout is that it can reduce congestion at locations where the approach arms have similar volumes of traffic. However, if there is an uneven density of vehicles then this can increase congestion and increase collisions due to road user frustration and road users diverting onto less safe roads.



Description (continued) Improvements to Roundabouts

Where there is already a roundabout, there are a number of options that could improve the safety of the junction. Types of measures include:

- Altering entry path radius to further reduce speeds on the approach to the roundabout;
- Vegetation clearance and street furniture de-cluttering to remove obstructions and improve visibility;
- Installation of high friction surfacing on the entry path,
- Introducing or improving lighting on the approach and within the roundabout
- Clearer signing and road markings
- Reduction in speed limit on the approaches
- Yellow bar markings
- Crossing facilities for pedestrians and cyclists



Target Collisions

Collisions at junctions,
Collisions occurring in darkness/night-time,
Collisions involving pedestrians, cyclists and horse riders.

Case Studies

CS 30 A45/A445 Ryton-on Dunsmore Junction Improvement

Associated Technical Guides

DMRB Vol. 6, TD 54 "Design of Mini Roundabouts"

DMRB Vol. 6, TD 16 "Geometric Design of Roundabouts"

Potential Impact on Star Rating



L – Vegetation Clearance



Description

At locations where there is limited or insufficient forward visibility, there is a greater risk of road users failing to react in time to a hazard. This can result in an increase in the number and severity of collisions.

Vegetation clearance can be one way of resolving this as well as removing non-passive vegetation. Vegetation clearance may be conducted under routine maintenance or through a bespoke scheme designed to permanently alter the landscape to ensure a potential hazard, road layout or sign is not obscured. When more significant problems occur, vegetation clearance may be required in conjunction with road realignment.

In some locations it may be appropriate to consider clearing and replacing the existing vegetation type, and its inherent maintenance issues, with a lower growing plant species.



Description (continued)

This may help with the safe operation of the road whilst maintaining a suitable vegetation cover to the adjacent verges.

Road landscapes should aim to fit with the local landscape character and this will include reflecting the predominant vegetation patterns and species. This is important not only for reducing the impact of the road corridor on the landscape but also in benefiting the road user experience. Furthermore, it is understood that drivers often respond positively to natural landscapes and this may help reduce road user stress and in some cases improve road safety. Vegetation clearance should therefore only be targeted at locations where there is an identified safety problem.

Additionally, consideration shall be given to the ecological impacts. Care should also be taken to not over provide visibility as this could encourage higher vehicle speeds.



Target Collisions

Nose to tail impacts, at junctions, Leaving c-way, involving objects in the c-way.

Case Studies

[CS 2 M61 Junction 9/ M65 Junction 2 Signing and Road Marking Improvements](#)

[CS 11 A3\(M\) Junction 3 Safety Improvement Scheme](#)

[CS 21 M180 Junction 3 Interchange](#)

Associated Technical Guides

[DMRB Vol 10, HA 56 "New Roads – Planting, Vegetation and Soils"](#)

[DMRB Vol 11 section 3 part 4, Ecology & Nature Conservation](#)

Potential Impact on Star Rating



M1 - Single Lane Widening – no additional lanes

Description

Reduced lane widths can have a negative impact on road safety by forcing vehicles closer to the edge of carriageway or closer to lane separation road markings and other vehicles. This can be a particular issue on narrow bends as it can result in road users straying into the opposing vehicular lane resulting in head-on collisions. In urban areas narrow lanes can result in cyclists or pedestrians being at risk of being struck by passing vehicles.

Widening the lane width, particularly on the approach to a bend, can increase the time available to road users to adjust their steering input. This not only reduces the potential for overrunning the lane markings but it will limit driver fatigue.

Description (continued)

However, consideration needs to be given to ensure that vehicle speeds do not increase. Therefore combining this measure with other measures such as improved signing, high friction surfacing and Where-You-Look-Is-Where-You-Go - system vegetation clearance and educational measures should be considered.

Road Widening / Lane Allocation

Target Collisions

Head on collisions on reduced lane widths
Loss of control collisions on reduced lane widths

Case Studies

No specific schemes identified

Associated Technical Guides

DMRB Vol. 6 TD 9 “Highway Link Design”

DMRB Vol 7. HD 27 “Pavement Construction Methods”

DMRB Vol.6, Section 1, TD 27 – “Cross-Sections and Headrooms”

Potential Impact on Star Rating



M2 - Wide Single 2+1 Carriageway



Description

A wide single 2+1 carriageway road consists of two lanes of travel in one direction and a single lane in the opposite direction. This provides overtaking opportunities in the two lane direction, while overtaking in the single lane direction is prohibited. This layout can help to improve safety on sections of roads where there are few opportunities to overtake slow moving vehicles.

When introducing schemes of this type, care shall be taken to ensure that road users are not encouraged to illegally overtake when travelling in the single-lane direction. This can be done by providing sufficient overtaking opportunities in both directions and avoiding situations where forward visibility is excessive. Opposing traffic flows shall be separated by double white system.



Description (continued)

Wide single 2+1 carriageway layouts can often be retrofitted to existing wide single carriageway roads with relatively minor alterations and little or no widening. Many restrictions apply regarding junctions, accesses and maintenance so it is important to consider the suitability of this measure on a scheme by scheme basis. The technique may not be valid on routes that have existing or proposed lengths of dual carriageway nearby.

Road Widening / Lane Allocation



Target Collisions

Poor overtaking manoeuvres due to a lack of appropriate overtaking opportunity

Case Studies

CS 17 A303 Ilminster By-pass

Associated Technical Guides

DMRB Vol. 6, TD 70 "Design of Single 2+1 Roads"

Potential Impact on Star Rating



M3 - Climbing Lane



Description

A climbing lane (sometimes referred to as a crawler lane) is used in order for heavy and slow moving traffic to travel up a steep gradient without slowing other vehicles. To introduce a climbing lane, a route should have a minimum distance of 500 metres at a gradient in excess of 2% (3% for dual carriageways).

Whilst climbing lanes are generally economically motivated they can in some cases be utilised as a safety measure as they create a safer overtaking environment and reduces road user frustration.

Climbing lanes shall include clear and legible signing and road markings.



Road Widening / Lane Allocation



Target Collisions

Collisions involving inappropriate overtaking manoeuvres to pass slow moving HGV's.

Case Studies

No specific schemes identified

Associated Technical Guides

DMRB Vol. 6 TD 9 "Highway Link Design"

Potential Impact on Star Rating



M4 - HGV Overtaking Bans



Description

Outside lane HGV overtaking bans on all-purpose dual carriageway roads can be introduced when the speed differentials between HGVs are significant enough that they lead to longer overtaking lengths and congestion. In most existing cases this is where there geometry is undulating.

The rationale for this is mostly economic, although HGV overtaking bans can also improve lane discipline and reduce road user frustration. These can be introduced at specific times of the day where traffic volumes are at their peak.

However, HGV overtaking bans do not necessarily gain support from all user groups and as the introduction of this measure requires a Traffic Regulation Order it is recommended that early discussions with the police and other stakeholders is undertaken to ensure there is support for the proposal.



Road Widening / Lane Allocation



Target Collisions

Collisions involving inappropriate overtaking manoeuvres to pass slow moving HGV's.

Case Studies

[CS 32 A1\(M\) Coxhoe Lane 2 HGV Ban](#)

Associated Technical Guides

[DMRB Vol. 6 TD 9 "Highway Link Design"](#)

Potential Impact on Star Rating



N – New / Improved Lay-by Provision



Description

Studies have found that whilst less than 2% of all collisions involved vehicles at lay-bys, approximately 35% of these resulted in fatal or serious injuries. Additionally, the number of large goods vehicles involved in lay-by related collisions is disproportionate. It is considered that this may be due to their reduced ability to accelerate and decelerate on the approach and exit of a lay-by and that goods vehicle drivers use lay-bys on a more regular basis.

New Lay-bys

Where new lay-bys are being introduced it is recommended that to reduce the potential for collisions that the lay-by:

- is not situated near a junction or access,
- is not located on the outside of a right-hand bend and
- is segregated from the carriageway to reduce the risk of errant vehicles entering it.



Description (continued)

Existing Lay-bys

Where there are road safety concerns over existing lay-bys, measures such as improvements to signage, vegetation clearance, re-surfacing and / or applying a coloured surface can all improve the conspicuity of the lay-by. However, if a lay-by is still considered too dangerous it is recommended that consideration is given to closing, relocating or potentially converting the lay-by into an Emergency lay-by or maintenance area.

When removing lay-bys, provision for safe stopping shall still meet the requirements of DMRB Standard TD 69. Any change to the number of lay-bys provided should consider the wider strategy for the route in terms of the provision of safe stopping facilities.



Target Collisions

Collisions involving driver fatigue and vehicles stopped in inappropriate locations.

Case Studies

CS 23 A14 Newmarket Lay-by Strategy Improvements

Associated Technical Guides

Design Manual for Roads and Bridges Vol. 6, TD 69 “The Location and Layout of Lay-bys and Rest Areas”

Potential Impact on Star Rating



O – Prohibition of Turns



Description

Where a route has had a number of collisions relating to a particular turning manoeuvre, physically preventing this manoeuvre should be considered; this could include treatments such as closing a gap in the central reserve. Where physical treatments cannot be employed, the issue could be treated by banning the manoeuvre by implementing a Traffic Regulation Order. Road users shall be informed through road signage and road markings that they are prohibited from making the turn. However, in the absence of regular enforcement, illegal manoeuvres may still be possible, and as such, this type of measure may result in a limited reduction in collisions.

When banning a manoeuvre or closing and central reserve gap care should be taken to ensure this does not create access problems, result in road users undertaking dangerous U-turn manoeuvres elsewhere, or simply transfer the problem to another junction further along the route.



Description (continued)

A solution to this can be locating a roundabout near a prohibited turn, allowing road users to access that turn from the correct direction. Alternatively, this measure could be introduced where there is an existing nearby roundabout which would minimise the inconvenience to road user.

When considering prohibiting a manoeuvre consultation with the appropriate stakeholders is essential.



Target Collisions

Turning conflicts at junctions and central reserve gaps

Case Studies

[CS 33 A1\(T\)/A6105 Duns Road Improvement](#)

Associated Technical Guides

[Traffic Signs Manual, Chapter 3, Section 4 "Compulsory and Prohibited Movements"](#)

[DMRB, Vol. 6 TD 50 "The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts."](#)

[DMRB, Vol. 6 TD 16 "Geometric Design of Roundabouts"](#)

Potential Impact on Star Rating



P – Narrowing / Lane Drop



Description

In some circumstances, narrowing the width of the carriageway lanes can also provide a number of road safety improvements. Firstly, it can act to slow the speed of vehicles which can reduce the number of loss-of-control collisions and reduce the severity of injuries sustained. For routes with a higher than expected rate of pedestrian collisions, lane narrowing can also result in additional space for footways, as well as shorter pedestrian crossing distances.

Lane narrowing can be achieved by either physically altering the layout of the carriageway or through the use of road markings. Physically reducing the width of the carriageway is more costly, however there is a greater chance that this will change road user behaviour. Reducing the carriageway lane widths through road markings may be cheaper but may be considered 'artificial' by some road users and may have limited speed reduction benefits.



Description (continued)

Consideration shall be given to all users groups when considering lane narrowing. Cyclists often feel pressured by any reduction of width and adequate planning needs to be undertaken so that emergency vehicles can safely use the road.

A lane drop is where narrowing occurs to such an extent that the number of lanes decreases. This can assist in providing safer merges onto dual carriageways by preventing vehicles from overtaking within the merge area. However, this can have a negative impact on the capacity of the carriageway. Where lane drops are introduced they shall be implemented with clear, legible signage to reduce the potential for late lane changes.



Target Collisions

Collisions caused by inappropriate speeds or poor lane discipline

Case Studies

[CS 9 A120 Coggeshall Bypass/ B1024 Colne Road Junction Improvement Safety Scheme](#)

Associated Technical Guides

[DMRB Vol. 6, TD 9 "Highway Link Design"](#)

[DMRB Vol. 6 TD 22 "Layout of Grade Separated Junctions"](#)

Potential Impact on Star Rating



Q – Speed Limit Reduction



Description

Lower speed limits can be applied as a road safety route treatment typically in conjunction with other traffic calming measures, either throughout the full length or on specific sections of a route.

Lower speed limits can have a positive impact on the safety record of the route by reducing the number of collisions involving non-motorised users and / or incidences of loss-of-control and T-bone collisions. However, it is essential that any associated speed reduction, particularly on the trunk road network, is considered within the context of a likely detrimental effect on journey times (to be considered in the SAR assessment) and the potential network efficiency as well as the scope for effective enforcement. Therefore, when considering a lower speed limit for a route, it is necessary to ensure the speed limit is appropriate for the route, balancing road safety and the needs of strategic through traffic.



Description (continued)

Physical measures combined with enforcement, may be considered where the road environment does not naturally self-regulate the speed limit.

The introduction of a speed limit can only be achieved through a Traffic Regulation Order, therefore, early consultation with the police and stakeholders is essential in ensuring that the scheme is supported. It is also necessary to ensure that the police will enforce the proposed speed limit.

Advisory speed limits can be utilised in some situations, such as on the approach to sharp bends when an assessment highlights an issue with loss of control collisions.

Advice on setting speed limits can be found in the DfT document Circular 01/2013 and evaluation of a proposed change to a speed limit can be undertaken using the Speed Limit Appraisal Tool identified in the circular.



Target Collisions

Speed related collisions

Case Studies

[CS 3 A56 Speed Limit Reduction Scheme.](#)

[CS 25 M5 Junction 11a Safety Improvements](#)

[CS 16 A36 Wilton to St Pauls Roundabout Safety Improvements](#)

Associated Technical Guides

[Traffic Advisory Leaflet 2/06 "Speed Assessment Framework"](#)

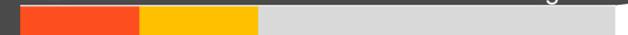
[DMRB Vol.6, TA 87 "Trunk Road Traffic Calming"](#)

[Department for Transport Circular 01/2013 "Setting Local Speed Limits"](#)

Potential Impact on Star Rating

Low

High



R - Where You Look is Where You Go (WYLIWYG)



Description

Motorcycle trainees are often taught that 'Where You Look Is Where You Go' (WYLIWYG). The principle is that if a rider can see around the bend to its vanishing point, generally this will be the adopted line, but if distracted by a road side object in the sight line ahead such as a tree or field gate, there is a possibility of loss of control as a result of a tendency to veer towards that direction.

Where there are safety concerns of road users losing control on a bend, the WYLIWYG principle can be introduced. This uses a series of hazard marker posts to draw the focus of motorcyclists and drivers to the vanishing point of the bend and prevent distraction by road side objects. Hazard marker posts are placed in the verge at regular intervals, extending both around the bend as normal, but also for some distance after the bend until the vanishing point starts to move away from the riders view, into the subsequent straight.

Description (continued)

WYLIWYG is most commonly introduced on unlit rural roads. Designers are required to give due consideration to the Passive Safety and BS EN 12767 when proposing the installation of hazard marker posts.

Providing hazard marker posts can have maintenance implications as maintaining vegetation is essential to ensure the hazard markers remain visible. Alternatively planting low-growth species or hardening the surface may prove a more cost-effective solution.

The reduction or removal of vegetation can also increase the natural light in the bend to assist road users in identifying both the bend and other road users earlier.

The position of any new signs and / or marker posts needs to be considered to reduce the likelihood of them being struck by errant motorcyclists.

Route Treatment Options for Bends

WYLIWYG can be used on their own or with a package of measures to treat collisions occurring during the hours of darkness and in some situations will be more appropriate than providing lighting where currently no lighting is provided.

Target Collisions

Motorcycle collisions on bends but beneficial in encouraging improved negotiation of bends and other similar hazards by all road users.

Case Studies

[CS 25 M5 Junction 11A Safety Improvements](#)

[CS 12 A34 East Ilsley Safety Improvements](#)

Associated Technical Guides

[Traffic Signs Manual Chapter 4: Warning Signs, section 16](#)

www.motorcycleguidelines.org.uk

Potential Impact on Star Rating

Low High



S – Treatment Options for Deer



Description

There will be a number of routes where deer collisions will be a continuous or seasonal safety issue. There are a number of treatment options that can specifically target the reduction of collisions between vehicles and deer (or other animals) these include:

1. High tensile road fencing - this aims not to stop deer crossings altogether but channels animals to safer crossing locations such as under passes.
2. Provide / improve warning signs to advise road users of the presence of the deer. This can take the form of static signs wild animals signs, VMS, or VAS.
3. Vegetation clearance to ensure forward visibility is improved in areas of dense woodland where vegetation meets the carriageway. This aims to improve the opportunity for a road user to identify a deer ahead and slow down.



Description (continued)

4. Optical wildlife warning reflectors - this works on the principle that lights from approaching cars will shine on a reflector which then reflects into the verge to alert deer as to traffic. This measure is only effective on routes with low volumes of traffic, as deer will become less frightened of the reflective light over time.
5. Public awareness information / educational campaigns.
6. Working with the local stakeholders to manage the deer population to sustainable levels.
7. A trial in Scotland has been undertaken in locations where deer are prominent using speed-activated deer warning signs, which flash red lights when approached by vehicles travelling above the sign posted speed limit.



Target Collisions

Collisions involving vehicles striking deer or other animals in the road

Case Studies

CS 34 Transport Scotland Spring and Autumn VMS Deer Alert

Associated Technical Guides

www.thedeerinitiative.co.uk/
www.deeraware.com

Potential Impact on Star Rating



T – Wrong Way Driving



Description

The term 'wrong way driving' is used to describe a vehicle being driven in the opposing direction (against the flow of traffic) along a one way street or carriageway. In order for this to occur, the vehicle must have first turned the wrong way onto the network.

We have recently undertaken research into the scale of this problem on the Strategic Road Network (SRN). We found that while instances of wrong way driving on the SRN are rare, the consequences can be severe. When a collision involves wrong way driving, it is twice as likely to result in someone being killed or seriously injured. To tackle the problem we need to reduce the risk of drivers turning the wrong way onto the network. To do this, we have developed a wrong way driving mitigation toolkit.



Description (continued)

This provides a process to help Highways England and our supply chain prioritise sites, assess risk and select an appropriate level of mitigation at each site. This can include making improvements to existing junctions. The toolkit can also be used to inform the design process of new schemes and major projects, and help ensure that the risk of wrong way driving is mitigated as far as is reasonably practicable.



Target Collisions

Head-on collisions

Case Studies

N/A

Associated Technical Guides

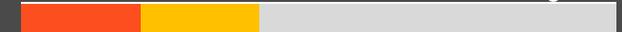
[Highways England Strategic Road Network Initial Report \(2017\)](#)

CHE Memorandum 405/17 'Wrong Way Driving: Mitigation Toolkit'

Potential Impact on Star Rating

Low

High



Case Studies

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CASE STUDIES

CS 1 - A595 SCALEGILL AND LINETHWAITE JUNCTIONS SAFETY IMPROVEMENTS

SCHEME DATE:

April 2013

SCHEME COST:

£33,000

SUMMARY OF PROBLEM:

History of rear shunt and overtaking type collisions occurring during daylight conditions. This was attributed to a combination of inappropriate vehicle speeds, road users being unaware of the junctions ahead and limited visibility to/from the junctions

ROAD TYPE:

Unlit Rural Single Carriageway

ROUTE LENGTH:

2km

TREATMENT MEASURES:

- Clearer junction warning ahead sign
- Reflectorised hazard marker posts
- Coloured road surfacing
- Carriageway text reading 'SLOW'
- Yellow backed signs
- Lane separation road markings

SCHEME DESCRIPTION:

The scheme is located in Cumbria between Bigrigg and Moor Row on the A595.

Two junctions are located in close proximity to one another which in essence forms a staggered crossroads.

The scheme aimed to reduce the number of collisions within the area through signing and lining measures in order to raise road user awareness of the junctions.

SCHEME OUTCOME:

- 30% collision saving
- Reduction in KSI collisions from 14% to 0%
- First Year Rate of Return: 313%

CASE STUDIES

CS 2 - M61 JUNCTION 9 / M65 JUNCTION 2 SIGNING AND ROAD MARKING IMPROVEMENT

SCHEME DATE:

June 2010

SCHEME COST:

£190,000

SUMMARY OF PROBLEM:

High frequency of collisions due to late lane changing and poor lane discipline.

ROAD TYPE:

Motorway

ROUTE LENGTH:

5km

TREATMENT MEASURES:

- Lane destination reallocation
- Lane destination carriageway text
- Improved visibility through vegetation clearance
- 150mm wide Lane Separation Road Markings

SCHEME DESCRIPTION:

The scheme aimed to address collisions resulting from poor lane discipline by adding carriageway spiral markings and lane destination signing, as well as improved existing give way signing and visibility

SCHEME OUTCOME:

- 65% collision saving
- First Year Rate of Return: 299%

CASE STUDIES

CS 3 - A56 SPEED LIMIT REDUCTION SCHEME

SCHEME DATE:

June 2010

SCHEME COST:

£220,000

SUMMARY OF PROBLEM:

A high frequency of collisions had been recorded on two sections of dual carriageway on the A56 near Rawtenstall. This included speed related collisions on the approach to the roundabout and after the exit of the roundabout.

ROAD TYPE:

Dual All-purpose

ROUTE LENGTH:

2.7km

TREATMENT MEASURES:

- Speed limit reduction

SCHEME DESCRIPTION:

It was considered that lowering the speed limit to 50mph may reduce this.

The scheme was introduced to reduce the collision rate only, and it was not thought that when taking into account the additional journey time that the scheme would provide a positive First Year Rate of Return.

SCHEME OUTCOME:

- 40% collision saving
- First Year Rate of Return: 227%

CASE STUDIES

CS 4 - M20 / M26 STREET LIGHTING

SCHEME DATE:

December 2008

SCHEME COST:

£2.7 million

SUMMARY OF PROBLEM:

Above average night time collisions

ROAD TYPE:

Motorway

ROUTE LENGTH:

2km

TREATMENT MEASURES:

- New Street Lighting
- Passively Safe Fixtures

SCHEME DESCRIPTION:

An above average incidence of night-time collisions near Wrotham in Kent resulted in this scheme being promoted. 144 passively safe lighting columns were installed over approximately 2km of previously unlit dual carriageway. 4 signs were also illuminated to improve their conspicuousness.

SCHEME OUTCOME:

- 'Dark-time' collision savings: 40%
- First Year Rate of Return: 22%

CASE STUDIES

CS 5 - A30 PENLAN MOBILE VARIABLE MESSAGE SIGNS AND HARDSTANDINGS – EASTBOUND SCHEME

SCHEME DATE:

December 2011

SCHEME COST:

£59,000

SUMMARY OF PROBLEM:

Merging two to one lane resulted in queuing traffic particularly during peak seasonal period. There was no advance warning and it was known to result in collisions.

ROAD TYPE:

Rural Dual Carriageway

ROUTE LENGTH:

8km

TREATMENT MEASURES:

- Mobile Variable Message Signs

SCHEME DESCRIPTION:

The A30 near Bodmin, experiences very high traffic levels during the summer months. At Penlan Service Station the dual carriageway merged from two lanes into one. The undulating topography of the area created limited visibility; meaning that an above average of shunt-type Personal Injury Collisions were occurring within the area.

The scheme proposed to introduce mobile Variable Message Signs and associated hardstanding to forewarn motorists of the likelihood of queuing traffic.

SCHEME OUTCOME:

- Collision savings: 40%
- No KSIs
- First Year Rate of Return: 309%

CASE STUDIES

CS 6 - A43 BARLEY MOW ROUNDABOUT

SCHEME DATE:

March 2009

SCHEME COST:

£39,000

SUMMARY OF PROBLEM:

Inappropriate vehicle speeds on approach to Barley Mow Roundabout

ROAD TYPE:

Rural Dual Carriageway and Roundabout

ROUTE LENGTH:

2km

TREATMENT MEASURES:

- Yellow Bar Markings
- Chevron signs
- Junction Warning Sign

SCHEME DESCRIPTION:

The scheme aimed to reduce the speed of vehicles as they approached the roundabout.

SCHEME OUTCOME:

- Collision savings: 66%
- No KSIs
- First Year Rate of Return: 580%

CASE STUDIES

CS 7 - A46 / A452 JUNCTION SAFETY IMPROVEMENTS

SCHEME DATE:

June 2012

SCHEME COST:

£195,000

SUMMARY OF PROBLEM:

Above average occurrence of rear end shunt collisions.

ROAD TYPE:

Rural Dual Carriageway

ROUTE LENGTH:

25km

TREATMENT MEASURES:

- Yellow backed signs
- Junction widening
- Passively safe reflectorized hazard marker posts
- Pedestrian footway improvements

SCHEME DESCRIPTION:

The A46/A452 safety scheme is located to the south-east of Kenilworth. The scheme was chosen to address rear-end shunt collisions via numerous measures on the exit slip roads of the A46. This holistic approach catered for vehicles, pedestrians and cyclists by widening the mouth of the junctions and installing hazard marker posts further back from the junction to warn motorists of non-motorised users earlier. Yellow backed signs warning motorists of the speed limit and of the presence of cyclists were also introduced.

SCHEME OUTCOME:

- Collision savings: 34%
- First Year Rate of Return: 111%

CASE STUDIES

CS 8 - M42 JUNCTION 1 TO 3A DARK COLLISION SAFETY SCHEME

SCHEME DATE:

April 2012

SCHEME COST:

£227,000

SUMMARY OF PROBLEM:

Above average rate of 'loss of control' collisions during the hours of darkness.

ROAD TYPE:

Motorway

ROUTE LENGTH:

10km

TREATMENT MEASURES:

- High visibility road markings
- Solar powered studs
- Reflective barrier markers

SCHEME DESCRIPTION:

The M42 scheme extends from Bromsgrove (Junction 1) to the M40/M42 interchange (junction 3A). Prior to the scheme, there was no road lighting and a high percentage of Killed or Seriously Injured collisions occurring during the hours of darkness.

SCHEME OUTCOME:

- Collision savings: None, night time collisions increased by 3%
- First Year Rate of Return: -9%

The POPE found that the majority of road markings were faded and the solar studs were only 'intermittent' along the route length. This shows the importance of ensuring that the most durable type of lining is used where necessary and that the road marking and studs are installed and maintained appropriately

CASE STUDIES

CS 9 - A120 COGGESHALL BYPASS / B1024 COLNE ROAD JUNCTION IMPROVEMENT SAFETY SCHEME

SCHEME DATE:

March 2012

SCHEME COST:

£91,000

SUMMARY OF PROBLEM:

Turning collisions at staggered junction

ROAD TYPE:

Rural Single Carriageway

ROUTE LENGTH:

3km

TREATMENT MEASURES:

- Ghost Island Right Turn Lanes
- Carriageway narrowing

SCHEME DESCRIPTION:

The scheme is located west of Colchester. The staggered junction was found to create a collision hotspot, with coloured surfacing adjacent to the kerb found to exacerbate this. To address this, the main carriageway width was reduced to allow the creation of 1.8m wide ghost islands between the main carriageway and the right turning lanes

SCHEME OUTCOME:

- Collision savings: 52%
- No KSI
- First Year Rate of Return: 302%

This scheme shows how creating a ghost island right turn lane can reduce collisions as it gives the road user more manoeuvrability and protection whilst waiting to turn.

CASE STUDIES

CS 10 - A14 HUNTINGDON TO CAMBRIDGE SAFETY CAMERAS

SCHEME DATE:

March 2007

SCHEME COST:

£2.4 million

SUMMARY OF PROBLEM:

High collision rate along A14, resulting in delays in traffic

ROAD TYPE:

Dual Carriageway

ROUTE LENGTH:

20km

TREATMENT MEASURES:

- Average Speed Safety Camera
- Improving Signing

SCHEME DESCRIPTION:

The scheme involved the retention of the national speed limit on the A14 between Huntingdon and Cambridge. 24 average speed cameras (Speed Enforcement Camera System) were introduced to replace the current fixed location speed cameras, in order to enforce the speed limit over a longer route length. Improved signing warned of queues and gave clearer directions to the airport.

SCHEME OUTCOME:

- Collision savings: 60%
- Severity index fell from 13% to 2%
- First Year Rate of Return: 388%

This scheme shows how average speed cameras can reduce the difference between high and low vehicle speeds, resulting in a less dangerous environment due to drivers adopting a more consistent speed along the route length.

CASE STUDIES

CS 11 - A3(M) JUNCTION 3 SAFETY IMPROVEMENT SCHEME

SCHEME DATE:

October 2009

SCHEME COST:

£10,000

SUMMARY OF PROBLEM:

Skidding collisions on the off-slip

ROAD TYPE:

Motorway

ROUTE LENGTH:

Less than 1 km

TREATMENT MEASURES:

- High Friction Surfacing
- Vegetation Clearance
- Improved Signing

SCHEME DESCRIPTION:

A 2006 Watchmen Safety Report identified a collision hotspot on the northbound exit slip of Junction 3 of the A3(M).

In order to improve the safety of the off-slip, a number of measures were introduced.

High friction surfacing on the slip was extended from 70 metres to approximately 95 metres, vegetation was cleared in order to increase forward visibility and 2 new “Roundabout ahead- Reduce speed now” signs were installed.

SCHEME OUTCOME:

- Collision savings: 15%
- First Year Rate of Return: 408%

This scheme illustrates the importance of delivering low-cost effective solutions.

CASE STUDIES

CS 12 - A34 EAST IISLEY SAFETY IMPROVEMENTS

SCHEME DATE:

February 2010

SCHEME COST:

£61,000

SUMMARY OF PROBLEM:

Road users failing to distinguish the nearside edge of a right hand bend leading to a loss of control incidents.

ROAD TYPE:

Dual carriageway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Hazard marker posts to delineate the edge of the carriageway (where you look is where you go)
- Road Restraint System
- Bend ahead warning signs
- Carriageway text road marking "SLOW"

SCHEME DESCRIPTION:

A 2008 fatal incident report suggested road users had difficulty distinguishing the nearside edge of a right hand bend on the A34. In one collision, this may have contributed to a vehicle leaving the carriageway. Numerous measures, as detailed above, were installed in order to improve the safety record at this bend.

SCHEME OUTCOME:

- Collision savings: 40%
- No KSI
- First Year Rate of Return: 33%

The scheme shows how 'light touch' measures (signage, road markings, and hazard marker posts) can be used with 'harder measures', such as safety barriers, to reduce the frequency and severity of collisions.

CASE STUDIES

CS 13 - A46(T) SCREVETON

SCHEME DATE:

October 2005

SCHEME COST:

£30,000

SUMMARY OF PROBLEM:

Above average number of collisions linked to inappropriate overtaking

ROAD TYPE:

Rural Single Carriageway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Double white lines
- Hidden dip signs

SCHEME DESCRIPTION:

The scheme involves the extension and improvement of a solid double white line system on the A46 (T) at Screveton, along with the provision of new 'hidden dip' signs. Both measures are designed to provide users with greater warning of potential hazards.

SCHEME OUTCOME:

- Collision savings: 100%
- First Year Rate of Return: 435%

This case study shows how providing road users with advanced warning of potential hazards can help reduce inappropriate overtaking manoeuvres. However, from further inspection of the scheme it appears that the double white line was not installed to modern standards. The road marking may reduce the route's legibility, which creates a potential hazard.

CASE STUDIES

CS 14 - M5 MOTORWAY CHEVRON MARKINGS

SCHEME DATE:

September 2003

SCHEME COST:

£34,000

SUMMARY OF PROBLEM:

High collision rate with a high proportion of rear shunt type collisions

ROAD TYPE:

Motorway

ROUTE LENGTH:

12 km

TREATMENT MEASURES:

- Vehicle Separation Markings

SCHEME DESCRIPTION:

The scheme consisted of installing vehicle separation markings on the M5 motorway between Sedgemoor Services and Junction 21. The aim was to increase the distance between vehicles and reduce nose to tail collisions.

SCHEME OUTCOME:

- Collision savings: 16%
- First Year Rate of Return: 162%

It is considered that a 7% increase in vehicles on this section of the M5 accounted for a lower reduction in collisions than anticipated. However, the scheme still gives a monetary return in its first year, and is a good example to show visual cues can remind road users to maintain safe distances.

CASE STUDIES

CS 15 - M1 WOODALL SERVICE AREA SOUTHBOUND SAFETY BARRIER

SCHEME DATE:

November 2007

SCHEME COST:

£23,000

SUMMARY OF PROBLEM:

A vehicle left the motorway and went through the timber perimeter fence into a service area, crashing into an employee's car. The lack of a safety barrier was therefore adjudged to compromise public safety.

ROAD TYPE:

Motorway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Road Restraint System

SCHEME DESCRIPTION:

Installation of a safety barrier along the M1 Southbound carriageway, adjacent to the Woodall Service Area.

SCHEME OUTCOME:

- Collision savings: 80%
- First Year Rate of Return: 295%

This scheme shows a single low cost measure can be utilised to address safety issues and prevent more severe collisions from occurring.

CASE STUDIES

CS 16 - A36 WILTON TO ST PAULS ROUNDABOUT SAFETY IMPROVEMENTS

SCHEME DATE:

September 2010

SCHEME COST:

£402,000

SUMMARY OF PROBLEM:

Higher than anticipated number of collisions and an unsafe and severed route for cyclists and pedestrians.

ROAD TYPE:

All-purpose single carriageway trunk road

ROUTE LENGTH:

4 km

TREATMENT MEASURES:

- New Advisory Cycle Lane
- Advanced Stop Line
- Pedestrian Crossing Facilities
- Coloured Surfacing
- Speed Limit Reduction
- Ghost Island Right Turn
- Relocation of the Centre Line
- Improved Signage
- Central Hatching

SCHEME DESCRIPTION:

The improvement scheme is located between Wilton and Salisbury. The scheme uses a combination of treatment measures in order to improve safety of all road users.

SCHEME OUTCOME:

- Collision savings: 37%
- First Year Rate of Return: 49%

CASE STUDIES

CS 17 - A303 ILMINSTER BYPASS

SCHEME DATE:

April 2006

SCHEME COST:

£59,000

SUMMARY OF PROBLEM:

Road users overrunning at changeover points in the 2+1 layout

ROAD TYPE:

Wide Single 2+1

ROUTE LENGTH:

4 km

TREATMENT MEASURES:

- Coloured Surfacing Treatment

SCHEME DESCRIPTION:

The improvement scheme is located on the A303 between Hayes End Roundabout and Southfields Roundabout.

During 2003 the wide single lane carriageway was converted into a 2+1 layout in an attempt to reduce the number and severity of overtaking collisions.

This scheme in 2006 aimed to improve the conspicuity of the hatching at the 2+1 changeover areas. It was considered that the hatched road markings did not stand out enough on the concrete road surface, resulting in road users over running the changeover area. The proposal aimed to resolve this by infilling the hatching with red surfacing.

SCHEME OUTCOME:

- Collision savings: 53%
- First Year Rate of Return: 861%

The scheme covered its expenditure within the first two months and shows how making the road markings more conspicuous can improve road users perception of hazards.

CASE STUDIES

CS 18 - M5 BETWEEN JUNCTIONS 1 & 2, ADVISORY SPEED LIMIT SIGNING AND VEHICLE ACTIVATED SIGNS (VAS)

SCHEME DATE:

May 2009

SCHEME COST:

£35,000

SUMMARY OF PROBLEM:

High number of loss of control, late lane changing and rear end shunt type collisions.

ROAD TYPE:

Motorway

ROUTE LENGTH:

5 km

TREATMENT MEASURES:

- VAS 'SLOW DOWN'
- Yellow backed bend ahead warning signs and advisory speed limit signs

SCHEME DESCRIPTION:

Junctions 1 and 2 of the M5 (near Sandwell) had been experiencing a high number of loss of control and shunt type collisions, some of which were attributed to inappropriate vehicle speeds.

The scheme replaced all existing advisory speed limit signs with yellow backed signs and a VAS displaying the message 'SLOW DOWN'

This was intended to provide clearer warning of the advisory speed limit and improve road user awareness of the approaching bends, improving the safety of the route.

SCHEME OUTCOME:

- Collision savings: 73%
- First Year Rate of Return: 2372%

CASE STUDIES

CS 19 - A650 CROSSFLATTS ROUNDABOUT

SCHEME DATE:

April 2006

SCHEME COST:

£55,000

SUMMARY OF PROBLEM:

History of overshooting collisions on both A650 approaches to Crossflatts Roundabout.

ROAD TYPE:

Dual Carriageway

ROUTE LENGTH:

3 km

TREATMENT MEASURES:

- Rumble Devices
- Yellow Bar Markings
- Road Signs

SCHEME DESCRIPTION:

Implementation of improved road markings, rumble strips and signs on roads incoming to the Roundabout

SCHEME OUTCOME:

- Collision savings: £29,478
- First Year Rate of Return: 54%

The scheme also increased the route's journey ambience score.

CASE STUDIES

CS 20 - A456 HAGLEY ROAD

SCHEME DATE:

July 2006

SCHEME COST:

£61,000

SUMMARY OF PROBLEM:

High proportion of pedestrian collisions occurring at an uncontrolled pedestrian crossing. The speed limit is 40mph with 85 percentile of speeds recorded at 53mph.

ROAD TYPE:

Dual Carriageway (40mph)

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Relocation of uncontrolled pedestrian crossing
- Installation of pedestrian guardrail and tactile paving
- Installation of a Vehicle Activated Sign
- Installation of pedestrian crossing warning signs

SCHEME DESCRIPTION:

The scheme relocated the uncontrolled crossing and made it staggered with pedestrian guardrail to direct pedestrians to look towards approaching traffic.

Permanent VASs were installed along with static pedestrian warning signs to inform road users of the speed limit and the proximity of pedestrians.

SCHEME OUTCOME:

- Collision savings: £74,000
- First Year Rate of Return: 121%

This scheme shows how vehicle activated signs can make road users more aware of their speed, and how providing pedestrian guard-rail can direct pedestrians to the safest crossing point.

CASE STUDIES

CS 21 - M180 JUNCTION 3 INTERCHANGE

SCHEME DATE:

February 2005

SCHEME COST:

£16,000

SUMMARY OF PROBLEM:

Failure to negotiate bend due to high entry speed, likely caused by a lack of visibility on a tight radius

ROAD TYPE:

Motorway

ROUTE LENGTH:

1 km

TREATMENT MEASURES:

- Vegetation Clearance
- Landscaping

SCHEME DESCRIPTION:

Improved stopping sight distance by the removal of trees and bushes within the visibility splay.

3 vehicles had failed to negotiate this bend successful in the past 5 years, with a lack of visibility being a common factor.

SCHEME OUTCOME:

- Collision savings: 60%
- First Year Rate of Return: 225%

This scheme shows how landscaping improvements can result in an increase in visibility, which allows road users to better select their speed when approaching a bend.

CASE STUDIES

CS 22 - A55/A483 JUNCTION WIDENING

SCHEME DATE:

March 2011

SCHEME COST:

£683,500

SUMMARY OF PROBLEM:

Above average number of loss of control and shunt type collisions caused by late lane change manoeuvres

ROAD TYPE:

Dual Carriageway

ROUTE LENGTH:

3 km

TREATMENT MEASURES:

- Lane Widening
- Additional Lane Provision
- Improved road markings including carriageway text

SCHEME DESCRIPTION:

A55/A483 is a grade separated junction south of Chester which during peak periods incurred severe congestion and higher than expected number of collisions.

Widening the circulatory carriageway and providing an additional lane on the A55 off slip is expected to increase capacity, and therefore decrease collisions as vehicles would be braking less sharply.

SCHEME OUTCOME:

- Collision savings: 25%
- First Year Rate of Return: 64%

These figures are worse than anticipated, partly due to a fatal collision that occurred post scheme implementation. No details of the cause of the collision were provided.

CASE STUDIES

CS 23 - A14 NEWMARKET LAY BY STRATEGY IMPROVEMENTS

SCHEME DATE:

May 2005

SCHEME COST:

£130,000

SUMMARY OF PROBLEM:

Substandard lay-bys, constrained visibility resulted in vehicular conflict.

ROAD TYPE:

Various

ROUTE LENGTH:

10 km

TREATMENT MEASURES:

- Lay-by improvements
- Closing of some lay-bys
- Improvements to road marking
- Improvements to road signing
- Re-surfacing

SCHEME DESCRIPTION:

In 2001 a study was commissioned in order to review each lay-by on the A14 near Newmarket. The review made recommendations for improving lay-bys to meet modern standards and close those where improvements were not feasible.

This resulted in 3 lay-bys being downgraded to “Emergency Use only” with the necessary signage and markings, and 1 was closed permanently. 2 were improved with re-surfacing, widening and signing measures.

SCHEME OUTCOME:

- Collision savings: 20%
- First Year Rate of Return: 74%

This scheme shows how a route treatment can involve reviewing and improving multiple lay-bys to provide a consistent safe provision and reduce collision severity.

CASE STUDIES

CS 24 - M6 J29 / M65

SCHEME DATE:

March 2011

SCHEME COST:

£585,000

SUMMARY OF PROBLEM:

The route was addressed primarily for economic reasons, although the PAR did note that the collision rate at the existing junction was unsatisfactory.

ROAD TYPE:

Motorway

ROUTE LENGTH:

3 km

TREATMENT MEASURES:

- Signals
- Junction Widening

SCHEME DESCRIPTION:

The M6 J29/M65 suffers from congestion in peak periods. The scheme aimed to improve journey times and collision rates by encouraging better lane usage and improving exits from the roundabout.

SCHEME OUTCOME:

- Collision savings: 33%
- 100% reduction in KSI collisions
- First Year Rate of Return: 17%

CASE STUDIES

CS 25 - M5 JUNCTION 11A SAFETY IMPROVEMENTS

SCHEME DATE:

March 2010

SCHEME COST:

£185,000

SUMMARY OF PROBLEM:

HGV's overturning on slip-road

ROAD TYPE:

Motorway

ROUTE LENGTH:

1 km

TREATMENT MEASURES:

- Advanced warning signs
- Chevron Signs
- Where You Look Is Where You Go (WYLIWYG)

SCHEME DESCRIPTION:

The slip road has a 270 degree bend, this has resulted in HGV's over turning and vehicles striking the Vehicle Restraint System. To address these collision problems, the previously stated treatment measures were introduced.

SCHEME OUTCOME:

- Collision savings: 100%
- First Year Rate of Return: 36%

CASE STUDIES

CS 26 - A38 WATCHORN JUNCTION PHASE 2 SAFETY

SCHEME DATE:

January 2007

SCHEME COST:

£175,000

SUMMARY OF PROBLEM:

High collision rate, particularly at a merging point on northbound slip road

ROAD TYPE:

Dual Carriageway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Lane Drop
- Edge of Carriageway Marking

SCHEME DESCRIPTION:

In order to reduce the high number of collisions, the northbound slip road was reduced from 2 lanes to 1 lane and the merge point was moved.

Additionally, new continuous edge lines were provided between Watchorn junction and Alfreton tunnel in both directions.

The improvements were expected to produce a reduction in collisions rates and their severity, and improve journey ambience by reducing traveller stress.

SCHEME OUTCOME:

- Collision savings: £203,000
- First Year Rate of Return: 116%

CASE STUDIES

CS 27 - A9 AVERAGE SPEED CAMERA PROJECT

SCHEME DATE:

January 2007

SCHEME COST:

£2.5 million

SUMMARY OF PROBLEM:

High collision rate, particularly involving vehicles turning right and overtaking.

ROAD TYPE:

Single Carriageway

ROUTE LENGTH:

177 km

TREATMENT MEASURES:

- Implementation of average speed camera system
- Speed limit reduction

SCHEME DESCRIPTION:

The camera system is part of a package of measures that have been introduced on the A9 in a bid to improve safety. Cameras are located generally located 5 to 7 km's apart in both the north and southbound direction.

SCHEME OUTCOME:

Focusing on the Perth to Inverness section, it was found that the installation of average speed cameras was successful in providing a safer road environment.

Overall speeding was reduced from one in three road users to one in twenty, and excessive speeding (over 10mph above the limit) was reduced by 97%.

Whilst journey times have increased, journey time reliability has been improved and hauliers reported a significant reduction in journey times for HGVs.

The number of fatal and serious collisions was down by 29%.

CASE STUDIES

CS 28 - A21 WHATLINGTON GATEWAYS

SCHEME DATE:

February 2009

SCHEME COST:

£44,000

SUMMARY OF PROBLEM:

Inappropriate speeds within the 40mph speed limit resulting in collisions on the approach to Whatlington

ROAD TYPE:

Single Carriageway

ROUTE LENGTH:

1 km

TREATMENT MEASURES:

- Gateway markings
- Hazard warning marker posts
- Red surfacing
- Speed limit roundels

SCHEME DESCRIPTION:

The scheme involved upgrading the entry into the 40mph speed limit in an attempt to improve compliance and reduce the number of collisions occurring within the 40mph speed limit

SCHEME OUTCOME:

- Collision savings: £44,000
- KSI collisions reduced from 33% to 0%
- First Year Rate of Return: 302%

CASE STUDIES

CS 29 - A2 KINGSTON BRIDLEWAY BRIDGE

SCHEME DATE:

February 2010

SCHEME COST:

£1.5 million

SUMMARY OF PROBLEM:

None, this was an issue of access to the north downs and community severance created by the A2. Horse-riders were particularly prevented from safely crossing the A2

ROAD TYPE:

Dual Carriageway

ROUTE LENGTH:

n/a

TREATMENT MEASURES:

- Installation of bridleway bridge

SCHEME DESCRIPTION:

The installation of a bridleway bridge was identified as the best method to remove the severance caused by the A2. This also provided a safe route for pedestrians and cyclists

SCHEME OUTCOME:

- Collision savings: 0%
- First Year Rate of Return: 0%

The 0% outcome is due to this scheme not being led for safety reasons and that horses physically could not cross the A2. However, it does provide an example of introducing a safe crossing facility for horse-riders.

CASE STUDIES

CS 30 - A45 / A445 RYTON-ON DUNSMORE JUNCTION IMPROVEMENT, COVENTRY

SCHEME DATE:

August 2003

SCHEME COST:

£4,520,000

SUMMARY OF PROBLEM:

The road layout had a poor safety record with collisions occurring as vehicles exited the side roads. A smaller proportion of the collisions were caused by excessive speeds and movements across the central reservation gap.

ROAD TYPE:

Rural Dual Carriageway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- New Roundabout
- Safety camera
- Closure of Central Reservation Gaps

SCHEME DESCRIPTION:

Prior to the scheme opening the junction was arranged as a staggered crossroads, with the A45 having priority. This layout had a poor safety record, with there being an average of 5.8 collisions per year with a severity index of 54%.

The scheme aimed to reduce the number of collisions, firstly by installing a speed cameras and secondly by creating a four arm roundabout. This would involve the realignment of the B4029 Wolston Lane and the closure of the central reserve gap.

SCHEME OUTCOME:

- Collision savings (phase 1): 22%
- Collision savings (phase 2): 100%
- First Year Rate of Return: 11%

This schemes serves as an example as to how a roundabout can provide a safer road layout than central gaps by removing high speed conflicting movements.

CASE STUDIES

CS 31 - A63 HAMBLETON TO MONK FRYSTON SAFETY IMPROVEMENTS

SCHEME DATE:

September 2008

SCHEME COST:

£146,000

SUMMARY OF PROBLEM:

The site's pre-scheme collision history showed various contributory factors, including failure to look properly, disobeying a double white line and a failure to judge other vehicle speeds.

ROAD TYPE:

Rural Single Carriageway

ROUTE LENGTH:

4 km

TREATMENT MEASURES:

- Yellow Backed Signs
- Passively Safe posts
- Rumble Strips
- Improved Edge of Carriageway Lining
- Coloured Surfacing

SCHEME DESCRIPTION:

The site is located after a long straight section of road followed by two unsigned bends. A combination of high vehicle speeds and the bends resulted in loss of control collisions. Through the combined measures above the scheme aimed to reduce these.

SCHEME OUTCOME:

- Collision savings: 6% increase, although KSI collisions decreased from 47% to 25%.
- First Year Rate of Return: -19%

CASE STUDIES

CS 32 - A1(M) COXHOE LANE 2 HGV BAN

SCHEME DATE:

March 2007

SCHEME COST:

£124,000

SUMMARY OF PROBLEM:

The scheme was based on economic saving from journey time; and as such the POPE does not analyse the causes of the collisions.

ROAD TYPE:

Motorway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- HGV Overtaking Bans
- Associated signage

SCHEME DESCRIPTION:

The scheme was based on economics and journey time improvements. However, it was thought that limiting HGV overtaking opportunities would result in a reduction of road user frustration and vehicular conflict, and as a result safety benefits would form part of the appraisal.

SCHEME OUTCOME:

- Collision savings: 18%
- First Year Rate of Return: -89%

If this scheme was being adjudged purely on its merits to collision reduction, the scheme would have had a First Year Rate of Return of 25%. However, the expected journey times improvements did not occur, and as such the First Year Rate of Return was negative.

CASE STUDIES

CS 33 - A1(T) A6105 DUNS ROAD IMPROVEMENT

SCHEME DATE:

July 2004

SCHEME COST:

£95,000

SUMMARY OF PROBLEM:

High collision rate at a staggered junction.

ROAD TYPE:

Rural Single Carriageway

ROUTE LENGTH:

2 km

TREATMENT MEASURES:

- Banned right turn
- Associated signage
- Carriageway text road markings

SCHEME DESCRIPTION:

The A1 (T)/A6105 Duns Road had a high collision rate due to vehicular conflicts at a sub-standard staggered junction with a steep gradient and limited visibility.

The scheme physically removed the right turn manoeuvre from the minor roads and introduced signing and road markings

SCHEME OUTCOME:

- Collision savings: 100%
- First Year Rate of Return: 484%

This scheme shows how implementing a right turn ban can be a cost effective solution to dealing with a substandard junction. This work was carried out in parallel with another scheme to ensure that turning conflicts were not transferred elsewhere.

CASE STUDIES

CS 34 - TRANSPORT SCOTLAND SPRING AND AUTUMN VMS DEER ALERT

SCHEME DATE:

15th April to 31st May and 25th October to 16th November annually

SCHEME COST:

Unknown

SUMMARY OF PROBLEM:

High occurrence of deer strikes

ROAD TYPE:

Various

ROUTE LENGTH:

Various

TREATMENT MEASURES:

- Variable Message Signs

SCHEME DESCRIPTION:

Transport Scotland decided to address the problem by installing seasonal Variable Message Signs throughout May and October in areas where larger deer predominate.

Where signs are needed for multiple uses, deer warnings are focused to peak times of deer activity.

SCHEME OUTCOME:

- Collision savings: Unknown
- First Year Rate of Return: Unknown

CASE STUDIES

CS 35 - A43 WHITFIELD TURN SIGNING IMPROVEMENTS

SCHEME DATE:

February 2005

SCHEME COST:

£16,500

SUMMARY OF PROBLEM:

The existing collision record was low (1 collision in the 60 mths prior to the scheme). This collision had, as described in the Making Better Use (MBU) evaluation report, been linked to late lane switching.

ROAD TYPE:

All-purpose trunk road

ROUTE LENGTH:

1 km

TREATMENT MEASURES:

- Countdown markers on the approach to roundabouts

SCHEME DESCRIPTION:

Studies have shown that the pre-scheme signage was inadequate, with the minimal requisite signage easily obscured by HGVs. This meant that a number of motorists were performing late manoeuvres.

SCHEME OUTCOME:

- Collision savings: 100%
- First Year Rate of Return: 105%

CASE STUDIES

CS 36 - A1 (M) WASHINGTON SERVICES PEDESTRIAN BARRIER

SCHEME DATE:

July 2009

SCHEME COST:

£523,000

SUMMARY OF PROBLEM:

Pedestrian casualties from crossing the motorway from the services

ROAD TYPE:

Motorway

ROUTE LENGTH:

1 km

TREATMENT MEASURES:

- Anti-pedestrian fencing
- Pedestrian signing improvements

SCHEME DESCRIPTION:

In the five year assessment period prior to the scheme, two causalities were recorded. By significantly increasing the difficulty for pedestrians to reach the main carriageway, they would seek safer alternative routes.

SCHEME OUTCOME:

- Collision savings: 100%
- First Year Rate of Return: 6%

CASE STUDIES

CS 37 - A303 ILMINSTER 2+1

SCHEME DATE:

June 2003

SCHEME COST:

£195,950

SUMMARY OF PROBLEM:

Injudicious overtaking led to a higher than expected accident rate and low driver comfort

ROAD TYPE:

Wide single carriageway modified to Wide Single 2+1

ROUTE LENGTH:

4 km

TREATMENT MEASURES:

- 2+1 wide single carriageway

SCHEME DESCRIPTION:

The scheme aimed to provide overtaking lanes over 3 lengths of carriageway for a distance of 4km. By providing specific locations where overtaking was permitted it was expected to reduce the number of collisions and near misses. The severity of collisions was also anticipated to reduce due to the anticipated reduction in head on collisions.

SCHEME OUTCOME:

- Collision savings: 1.6
- First Year Rate of Return: 61%

The scheme covered its expenditure within the first two months and shows how making the road markings visually more conspicuous can improve road users perception of hazards.

7. Education and Information Campaigns

7.1. Education and Information Campaigns

7.1.1. Road safety education and information campaigns can be very cost effective tools in treating road safety problems and can be used as part of a range of treatment measures in order to improve a specific road safety behaviour. In certain circumstances the use of education and information campaigns in isolation can be considered.



7.1.2. Working with national and local stakeholders, such as the Department for Transport, local police forces, the Chief Fire Officers Road Safety Delivery Board and Road Safety Partnerships, we can provide targeted education and information to local areas where there are known road safety concerns or collision patterns.

7.1.3. Quantifying the collision saving benefits of an education / information campaign using SAR can be difficult. Therefore most education / information campaigns can be justified by developing a business case ([see Section 3.6](#) of this document).

7.1.4. Example case studies of education and information campaigns are provided in this section of the guide to give an indication of the benefits of implemented schemes.

7.1.5. A summary matrix is included which cross references the education / information case studies against the types of road safety problem they can be used to treat. It is important when developing any measures to work with the Regional Road Safety Coordinator.

Road Safety Education/ Information Matrix		Targeted Road Safety Education Measure by Road User Group								
		Driving for Work	Young	Senior	PTW <50	PTW >50<125	PTW >125	LGVs <3.5t	Cyclists	Pedestrians
Road Safety Issue	Loss of Control			Eyesight problems Understanding SMART motorways					Rider training Cycle Strategy training See Case Study: CS 46 National Standards Cycle Training - Freewheeling	Stop Look Listen Think
	Sudden Braking									
	Overtaking									
	Turning Movements / crossing traffic	Engagement with Businesses See Case Studies: CS 38 Mock Trial CS 39 Tyre Safety CS 40 Sellafield CS 49 Towing CS 51 Secure Loads CS 52 Driving in UK	School/ college talks Driver/rider training School/ college talks Driver/rider training See Case Studies: CS 41 Engage CS 42 Virtual Reality Trial And Evaluation CS 50 Baby Box	See Case Study: CS 43 Keystones Eyesight Testers CS 48 Older Drivers on Smart Motorways	Rider training School / college talks See Case Study: CS 45 Biker Down	Rider training See Case Studies: CS 44 Shiny Side Up CS 45 Biker Down	Rider training See Case Studies: CS 44 Shiny Side Up CS 45 Biker Down	Contact the Commercial Vehicle Incident Prevention Team CS 51 Secure Loads CS 52 Driving in UK	Rider training Cycle Strategy training See Case Study: CS 46 National Standards Cycle Training - Freewheeling	Stop Look Listen Think
	Drink Drive									
	Drug Drive									
	Mobile Phone									
	Speed									
	Seat Belts									
	Compliance and vehicle condition									

Note: Greyed out boxes indicate that no specific education initiatives or case studies have been identified.

CASE STUDIES

CS 38 – MOCK TRIAL

DESCRIPTION:

- A criminal or civil case is based on issues relevant to a local area (e.g. speeding, driving under the influence while working, poor maintenance of vehicles).
- Conducted as a mock trial with Police, Solicitors and Judge. Members from the organisation / business or course candidates are sworn in as the Jury.
- The defendant and the employing company face the Jury's decision.
- Key topics and strategies to help businesses are provided in workshop sessions following the trial.

OBJECTIVES:

- Making businesses and employees aware of the potential legal consequences of poor driving behaviours.
- Information about the new sentencing laws shared with the businesses.

TARGET AUDIENCE:

Aimed at business drivers (fleet, HGV, LGV and Grey Fleet)



CASE STUDIES

CS 39 – TYRE SAFETY

DESCRIPTION:

- It was identified that poor tyre safety was one of the most common vehicle contributory factor in KSI collisions occurring in the north west of England. Therefore Highways England in collaboration with the local police undertook vehicle tyre checks in a local car park.
- Illegal tyres can increase the severity of the following collision types:
 - loss of control (34% of KSI's)
 - travelling too fast for the conditions (14% of KSI's)
 - sudden braking (14% of KSI's)
 - slippery road (12% of KSI's)
- Command and Control data over a 12 months period has recorded over 40,000 tyre related incidents (not collisions) in England.
- **Tread checks.** 38% of people NEVER check the tread, a further 23% assume that it's done as part of the service (61% total).

- **Pressure checks.** 35% of people NEVER check the pressure, 13% assume that it's done as part of the service (48% total)

OBJECTIVES:

- Highways England and the police wanted to engage personally with individuals about tyre safety issues to increase awareness of the dangers and legal repercussions associated with illegal tyres.

TARGET AUDIENCE:

All road users



CASE STUDIES

CS 40 – SELLAFIELD

DESCRIPTION:

- Sellafield Ltd is the company responsible for safely delivering decommissioning, reprocessing and nuclear waste management activities on behalf of the Nuclear Decommissioning Authority.
- Route Safety Reports have identified that a high proportion of collisions in the area involved Sellafield employees, especially on the A595.
- The Highways England Regional Road Safety Co-ordinator for the North West region is currently working with Sellafield to raise awareness of road safety in general and the high proportion of collisions involving Sellafield employees.
- Company recognises the issues and importance of addressing them. Sellafield Ltd are receptive to support to address road safety issues. Liaison is ongoing between Highways England and Sellafield.

OBJECTIVES:

- Making Sellafield and their employees aware of collision statistics with the aim of changing driving behaviours.

TARGET AUDIENCE:

Employees of large businesses



CASE STUDIES

CS 41 – ENGAGE

DESCRIPTION:

- Cheshire and Merseyside councils contacted Highways England with a request to support the engage initiative (see <http://www.engagedriving.co.uk>). Engage is a simple set of learning resources developed by local authorities to help road users deal with common safety issues.
- The Cheshire and Merseyside areas generally had the highest learner driver casualty rates in the north west.
- This project covers a series of micro topics that are discussed as part of a learner's normal driving lesson. Topics include peer pressure, drugs, tiredness and fatigue.
- Discussions currently underway to develop this into a north west pilot project and potentially as a national scheme.

OBJECTIVES

- Informing learner drivers of common collision statistics with the aim of changing driving behaviours.

TARGET AUDIENCE:

Learner drivers



engage

WWW.ENGAGEDRIVING.CO.UK

CASE STUDIES

CS 42 – VIRTUAL REALITY TRIAL AND EVALUATION (Safer Roads Humber)

DESCRIPTION:

- A study commissioned by Safer Roads Humber and carried out by Road Safety Analysis (RSA), found that the use of a virtual reality (VR) film as a standalone activity will not lead to the required behaviour change, and as such the films should be used as part of a wider intervention such as a classroom presentation.
- Described as a ‘new and innovative method of delivering content at interventions’, VR technology is gaining in popularity among the road safety community.
- Much of this is due to an increase in its affordability and commercial application, as well as the quality of material that can now be displayed through it.
- The RSA research, which evaluated the psychological and physiological effects that take place when viewing differing types of content through 360 VR headsets, centred on the ‘Virtual Reality Fatal 4 - 360 (VF4 360)’ film.

- Developed by Leicestershire Fire and Rescue Service in 2016, VF4 360 is designed to give young drivers the ‘most realistic experience’ of a road traffic collision from the front seat passenger’s perspective.
- The research, conducted among more than 120 college students, explored the impact of the VF4 film in standard 2D, compared with the 3D VR film. The researchers found a ‘clear distinction’ between viewing the films in these different formats - with 3D having a greater impact on students.
- Safer Roads Humber hopes the research will enable road safety professionals to understand how ‘different emotional stances affect the level of presence when using VR’, thereby allowing practitioners to build upon current projects and take VR to the next stage.

OBJECTIVES

- Giving young driver a realistic experience of a road traffic collision. Informing those that use VR techniques that they should be used as part of wider interventions to be successful.

TARGET AUDIENCE:

Young Drivers

CASE STUDIES

CS 43 – KEYSTONE EYE TESTERS

DESCRIPTION:

- There is an emerging pattern of older drivers involved in KSI collisions on the SRN. So a Regional Road Safety Co-ordinator contacted Specsavers to explore the opportunities of a joint initiative to promote driver eye testing to business drivers and offer discounts for testing.
- The Keystone Tester which is a specialist driver eyesight scanner.
- The Keystone gives an indication of an issue (glare recovery, acuity, colour blindness, depth perception), a more complete eye test by a qualified optician is required if an issue is identified.
- Link with road safety partnerships to gain support for joint promotion of eye testing at events and promotional initiatives.
- A business case and MOU was produced to purchase the equipment.

OBJECTIVES

- To improve drivers eyesight particularly amongst the elderly.

TARGET AUDIENCE:

Elderly drivers



CASE STUDIES

CS 44 – SHINY SIDE UP

DESCRIPTION:

Taken from the biker saying “Keep your shiny side up” (so your tyres firmly on the road!)

- The campaign provides riders with information on the safety of routes and signs are placed at collision hot spots.
- The web site includes maps of popular routes and information where shiny side up notices have been placed at road safety problem locations.
- The initiative identifies powered two wheelers (PTW) issues, common trends in biker incidents and provides information to help bikers to be more aware of the dangers.

OBJECTIVES

- To reduce the number of collisions involving motorcyclists by trying to influence rider behaviours and inform motorcyclists about road safety risks and collision locations.

TARGET AUDIENCE:

Motorcyclists



THINK BOKE
www.shinysideup.co.uk

CASE STUDIES

CS 45 – BIKER DOWN

DESCRIPTION:

Biker Down is a free course that offers motorcyclist the chance to learn practical skills to help avoid being involved in a collision, as well as essential first-aid training and advice on what to do should they find themselves first on the scene of a collision where someone is injured.

OBJECTIVES

The three hour aim to teach bikers the following:

- Initial Scene Management and Protection - advice from emergency service staff about how to protect a scene and other road users who may have stopped to assist.
- Casualty Care - a look at basic lifesaving skills such as CPR, airway management and helmet removal including when and how to remove it.

- Rider Skills - how to get the best out of riding your bike. How to brake effectively. The science of being seen and the next steps to enhanced rider skills.

TARGET AUDIENCE:

Biker Down is aimed at motorcyclists of all ages and experience.



CASE STUDIES

CS 46 – NATIONAL STANDARDS CYCLE TRAINING - FREEWHEELING

DESCRIPTION:

- The UK government approved scheme for cyclists with outcome-based training and assessment sessions
- Three levels made available
 - Level 1 for beginners or those who want to cycle off the roads
 - Level 2 for improvers who want to cycle on B roads and back streets
 - Level 3 for those who want to cycle on A roads and in busy towns and cities
- Free courses are available in some areas; contact your local highway authority for full details
- 13,000 adult cyclists have been trained since 2011
- A similar scheme called Bikeability is running for school children, over 1.5 million trained since 2007

OBJECTIVES

- Up to 200% increase in uptake of regular cycling after training
- Improved safety and confidence for cyclists
- Removes a key barrier to cycling (road safety concerns)

TARGET AUDIENCE:

Cyclists of all ages and abilities



CASE STUDIES

CS 47 – WINTER DRIVING EVENT (MERSEYSIDE)

DESCRIPTION:

- A winter driving engagement event on a high casualty route during Road Safety Week. The event was organised and managed by a partnership of agencies and authorities including the Road Safety Partnership, Police, local authority Road Safety Officers, the Fire and Fire and Rescue Service, DVSA, Highways England Traffic Officers and the Regional Road Safety Coordinator.
- Targeted messages linked to the casualty profile and contributory factors of KSI collisions.
- Issues covered include;
 - Male driver KSI aged 21-59 years
 - Female driver KSI aged under 35 years
 - Older drivers in Merseyside
 - Failed to look and loss of control contributory factors (23% of KSI)
 - Contributory factors relating to wet weather score higher in the North West than the rest of the SRN nationally

- As part of the Brake Road Safety Week, over 250 drivers were engaged with in Merseyside alone. A summary of the issues dealt with at the Merseyside events that relate directly to the regional priorities are as follows:
 - 14 vans, 110 cars, 1 HGV
 - 96 drivers were male
 - 33 drivers were aged over 50 years
- Vehicles were given a winter driving check that included tyres, windscreen wipers, windscreen wash, lights, fuel, winter driving and travel planning advice.
- Where defects were found, the drivers were given time to get their defects rectified.
- 5 vehicles were found to have at least one tyre tread depth below the legal limit (including a Driving Instructor who had 2 illegal tyres).
- 10 vehicles were found to have other significant vehicle condition defects.

OBJECTIVES

- Target and educate those road users that commonly appear in collision statistics.

TARGET AUDIENCE:

Drivers within the casualty profile

CASE STUDIES

CS 48 – OLDER DRIVERS ON SMART MOTORWAYS

DESCRIPTION:

- South Yorkshire Partners identified an opportunity to target older drivers through inviting them to an event covering aspects of safer driving ranging from eyesight and medication checks through to hazard perception.
- As two new sections of Smart Motorways have opened on the M1 in South Yorkshire there was an opportunity to engage with older drivers and provide advice on how to use these sections safely and what to do in an emergency.
- Attendance from Traffic Officers helped provide more assurance and advice on the safest way to use our network.
- Around 40 people have attended each event so far and have been very engaged in the presentation and information provided.
- The groups have known about Smart Motorways through radio advertising and knew some of the basics, but had questions to help boost their confidence in using these new sections of motorway.

OBJECTIVES

- To engage with older drivers about new highway features and negotiate roads safety and to discuss health issues that older drivers may face.

TARGET AUDIENCE:

- Older drivers



CASE STUDIES

CS 49 – NATIONAL TOWING WORKING GROUP

DESCRIPTION:

- Towing incidents are common and expose recovery vehicle workers, emergency services, Highways England traffic officers and other road users to roadside risk. This could be prevented with good towing practices, regular maintenance of the vehicle and trailer, and safe and compliant driving.
- Highways England, in partnership with National Roads Police Intelligence Forum (NRPIF) agreed that towing safety is a key area that needed addressing. In 2016 the National Towing Working Group was established and is made up of representatives from across the towing community.
- There is a strong commitment from all members to work together to identify and deliver actions, that will reduce the number of towing related incidents. Activities are intelligence led and are delivered in a coordinated and consistent manner.
- In 2017 the working group developed and cascaded a towing survey aimed at understanding who was towing on our roads, how safe and confident they felt towing and what could be done to improve safety.

- The group to-date has organised the following events:

M5 engagement events - In the summer of 2017 there were two engagement events which aimed to raise awareness amongst drivers who tow of road worthiness. The second event was organised by Highways England and identified just 3 road worthy vehicles out of 23 towing vehicles stopped.

Freddie campaign (raising awareness of how to tow safely) - Driver and Vehicle Standards Agency (DVSA) launched a campaign following the tragic death of 3-year-old Freddie Hussey in Bristol. Freddie was walking with his mother when a 2-tonne trailer became unattached from a Land Rover. The trailer mounted the kerb before hitting Freddie. The investigation into Freddie's death found that the trailer's handbrake lever was in the wrong place. In March 2017, a meeting was held between the National Towing Group, Freddie's parents, Bristol MP Karin Smythe and a selection of Towing Working Group members. The group raised awareness of Highways England's aims and ambitions and the purpose of the National Towing Group setting out our commitment to work together to prevent such incidents in the future.

OBJECTIVES

- To engage with people who tow trailers to inform them of vehicle towing legislation and safe towing practices with an objective to reduce towing related incidents on the UK road network.

TARGET AUDIENCE:

- Road users who tow trailers and caravans, including businesses.

CASE STUDIES

CS 50 – BABY BOX

DESCRIPTION:

- Baby Box University is an all-encompassing programme that offers parental engagement, education and aims to unite the whole community to offer every child a safe and supported start in life. Baby Box is free and accessible to all expectant parents across all counties in England regardless of NHS trust.
- Highways England is working in partnership with Baby Box University to raise awareness of the importance of checking your vehicle before you travel. This partnership provides an excellent opportunity to provide key road safety messages to an audience who are highly receptive to information on how to keep their family safe.
- Achievements to date:
 - The launch of the partnership in the conjunction with the video going live was made at the Rotherham NHS Foundation Trust Baby Box launch on Wednesday 25th October 2017.
 - The launch was a huge success with positive reactions from parents for our video and the messages they were receiving. Whilst engaging with parents we also took the opportunity to

show them how simple tyre tread readers can be used as part of their regular vehicle check routine.

- We had 3,334 views since its inclusion in the first 22 days, and over 7000 views since its inclusion in the Syllabi. We are now receiving over 3000 complete video views by unique users.
- We have arranged for the inclusion of the double sided leaflet to be included in all Baby Boxes, so far we have provided 19,000 leaflets to date
- 32,000 families have received Baby Boxes in England through Baby Box University this year.
- It is expected that Baby Boxes will be sent to 60,000-100,000 expectant parents in 2018, and thereafter in 2019 we expect Baby Boxes to be received by 50% of the annual birth population.

OBJECTIVES

- It is essential that the vehicle/s that both parents and new-borns are travelling in are properly maintained, road worthy and safe at such an important time in their lives. This initiative is a reminder we all have a role to play in travelling safely.

TARGET AUDIENCE:

- Parents of new-borns.

CASE STUDIES

CS 51 – SECURING COMMERCIAL AND PRIVATE VEHICLE LOADS

DESCRIPTION:

Commercial Loads

- In 2016, Highways England worked with the Health & Safety Laboratory (HSL) to pilot the development and delivery of expert load security training to Humberside Police who utilised this training to identify poorly loaded commercial vehicles, educate drivers and, where necessary, undertake enforcement action to deal with poor load securing. Due to the pilot success, further training has been provided to West Yorkshire Police, Greater Manchester, Warwickshire and Kent.
- HSL are investigating high risk loads that cause maximum impact to the strategic road network when the load is shed and considering how these specific loads can be managed more effectively to reduce the impact of potential incidents.
- Over 100 tickets have been issued for load security offences, 50 vehicles have been prohibited for unsafe loads.

Private Loads

- It was concluded that the public purchase their items without

giving any consideration as to how they plan to transport their goods home safely, without putting themselves, their families and other road users – upon entering the SRN – at risk. A research project has concluded that private motorists are not aware of the risks associated with load security, posing a safety risk to their passengers, themselves, other motorists using our network and our staff who risk their lives to clean up the damage post incident.

- As a result, the Incident Prevention Team has worked closely with HSL and various internal communications representatives to develop a series of messages based around the title of; **‘Let’s all get home in one piece’**. The campaign, consisting of various animated GIFs, aims to raise awareness of the dangers of poor load securing and promote best practice and will be launched during the early May bank holiday weekend (5-7 May) via our Highways England Facebook, Instagram and Twitter pages.
- Following the initial publication of the campaign, an evaluation will be carried out to define a plan of events to continuously reinforce the messages at key shopping periods throughout the year.

OBJECTIVES

- To raise awareness amongst businesses and individuals of the importance of securing loads correctly in an attempt to reduce collisions caused by the shedding of loads.

TARGET AUDIENCE:

- Businesses and road users who haul goods on the SRN.

CASE STUDIES

CS 52 – DRIVING IN THE UK

DESCRIPTION:

- According to research conducted by ROSPA; when looking at road casualties, in 2016 there were 267 killed, 1,017 seriously injured and 6,212 slights, reported to the Police. Of these quantities, 9 killed, 37 seriously injured and 381 slights involved overseas commercial vehicle drivers. This equates to 3.3% of deaths in incidents involving registered foreign HGV drivers, 3.6% serious and 6.1% slight. ROSPA also state that left hand drivers are 3.4 times more likely to be involved in collisions involving changing lanes or overtaking.
- The current project consists of the production of a leaflet/booklet which will contain key information, surrounding highlighted issues such as; general driving etiquette (including blind spot awareness), illegal/inappropriate parking, breakdown information, speed limits / conversions, motorway driving (incl. SMART motorways / red X's), Traffic Officer Service information and key charges (such as Dartford). An animation will also be produced by HE's creative team which will be language neutral featuring a series of key short animated messages.

- Highways England have begun communications with key organisations such as the Road Haulage Association and Freight Transport Association who have shown a key interest in aiding the distribution of such information as well as organisations we currently work alongside such as DVSA/Police. Highways England will also be presenting at the 2018 Commercial Vehicle Show at the NEC from 24-26 April where we seek to launch/pilot the campaign materials.

OBJECTIVES

- The objective of this initiative is to aid overseas commercial drivers to use the Strategic Road Network (SRN) safely, thus contributing to the reduction of incidents and KSIs on the network, by developing information targeting overseas commercial vehicle drivers on the SRN; targeting the issues specific to England's roads which evidence shows led to significant incidents.

TARGET AUDIENCE:

- The materials are aimed at overseas commercial drivers who come to the UK and may not be familiar with our road network. The materials will also serve as a refresher / provide new and current information to overseas commercial drivers who are frequent visitors to the UK.

8. Enforcement Measures

8.1. Introduction

8.1.1. Road traffic law sets out the basis for how road users should use the highway safely and appropriately. When road users persistently do not conform to the road traffic law, enforcement becomes an essential part of preventing collisions. Although the police have a central role in this enforcement, there are other initiatives that can be promoted by Highways England and their supply chain in consultation with the police and road safety partnerships to encourage appropriate driver behaviours. This could be by working with key stakeholders in order to deploy intelligence led tactical enforcement across the network to ensure the most efficient and effective enforcement is undertaken.

8.1.2. Enforcement measures typically include the following:

- Spot speed cameras
- Average speed enforcement cameras
- Red light running cameras

8.1.3. Information on these primary enforcement measures can be found in the measures section of this document ([see Section 6](#)).

8.1.4. Enforcement measures can also take the form of a more proactive approach, this could include mobile enforcement ([see Section 8.2](#) below)

8.1.5. Enforcement options should only be used as the last resort after other remedial measures have been utilised and proven ineffective. Highways England and the supply chain should also confirm that the environment does not mislead road users ensuring that:

- Is the speed limit appropriate for the environment?
- Are the reasons for the speed limit clear?
- The signing of the speed limit is adequate?

8.1.6. Guidance on setting local speed limits can be found in the Department for [Transport publication Circular 01/2013 'Setting Local Speed Limits'](#).

8.1.7. A procedure for the introduction of speed cameras on the SRN can be found in [CHE memorandum 411/17](#).



8.2. Case Studies

Speed Enforcement Cameras

- 8.1.1. Please see case studies [CS 30](#), [CS 10](#) and [CS 27](#) within [Section 6](#) of this document which provides information on successfully implemented enforcement initiatives.

Unmarked HGV cab national project – Operation Tramline

- 8.1.2. Since April 2015 Highways England have funded and coordinated the use of an unmarked HGV tractor unit that Police Forces use to patrol the SRN to capture distracted commercial drivers and private motorists using mobile phones, laptops or reading / cooking whilst driving.
- 8.1.3. The objective of the initiative is to change driver behaviour and improve road safety by reducing the number of incidents on the SRN.
- 8.1.4. During the initial two year contract, April 2015 – March 2017, 28 police forces stopped 4,176 vehicles, detected 5,039 offences and issued 5,207 interventions. The project has been extended until November 2020 with participating police forces having access to 3 HGV tractor units.
- 8.1.5. This is a good example of how Highways England can work collaboratively and successfully with police forces. For further information contact your regional Road Safety Co-ordinator.



9. Compliance Initiatives

9.1. Compliance Initiatives

9.1.1. The Strategic Road Network is an engineered environment designed to be utilised by road users in accordance with the Highway Code. However, when road users fail to use the network appropriately this can result in collisions.

9.1.2. Common behaviours reported as leading to collisions include: 'Inappropriate speed', 'ignoring signs and signals' and 'tailgating'. However, there is a much more extensive list of compliance issues that may impact on the road safety of a route, these include:

- Distraction (including mobile phone use).
- Vehicle roadworthiness.
- Lane discipline.
- Inappropriate driving for conditions (weather).
- Middle lane hogging.
- Driver fatigue.
- Seatbelt use.
- Drink driving.
- Drug driving.
- Mobile phone use.
- Inappropriate use of hardshoulders.
- 'Rubber necking'.

9.1.3. Treatments for addressing compliance issues can include engineering measures (such as speed cameras), education and information and enforcement.

9.1.4. This section of this document includes examples of compliance initiatives that incorporate engineering measures, education and information campaigns and enforcement measures which designers could use to help develop their own road safety treatment for a route.

COMPLIANCE INITIATIVES

CS 53 - DISTRACTION (INCLUDING MOBILE PHONE USE)

DESCRIPTION

A RAC report published in September 2016 showed that 31% of motorists used a handheld mobile phone whilst driving compared with 8% in 2014. The number of drivers who said they sent a message or posted on social media rose from 7% to 19% in the same period, while 14% said they had taken a photograph or video while driving.

ENGINEERING:

There are currently no highway engineering measures that have been proven to reduce road user distraction.

Managing smartphone use may be effective in reducing in-vehicle distraction by using a mobile phone. Smartphone apps can block and divert incoming phone calls and messages, and restrict user interaction with the device whilst the vehicle is in motion. This intervention would be particularly useful for fleets as they are in a better position to enforce app usage. Among private motorists, those who are willing to use the app may be more safety-oriented and therefore already less prone to using the phone whilst driving.

EDUCATION:

A National Driver Offender Retraining Scheme (NDORS) course called 'What's Driving Us?' is a short classroom based course (three hours plus a 15 minute break) targets offenders who have committed a wide range of offences including using mobile phones while driving. The course consists of an interactive presentation and discussion to explore a number of myths about using the phone whilst driving and reviews a number of driving scenarios. An alternative police diversion course for drivers caught using their mobile phone is offered by several police forces.

Many companies provide online education for drivers as part of their risk management programme. For example the module available via Driver Metrics takes about 20 mins to complete. The driver is shown the dangers of using a mobile phone while driving. The module includes two scenarios demonstrating the dangers of talking and texting whilst driving. The driver is presented with interactive video clips that demonstrate how difficult it is to listen to a phone message and concentrate on the road at the same time.

ENFORCEMENT:

Enforcement of mobile phone use while driving currently relies on police interaction. However, there are several ways in which better enforcement levels could be achieved, this includes:

- Community spotters (similar to [community speed watch](#)).
- Police HGV based camera system (see [Section 8.2](#) of this document).
- CCTV in traffic officer vehicles.

COMPLIANCE INITIATIVES

CS 54 - CLOSE-FOLLOWING (TAILGATING)

DESCRIPTION

Research reveals that many drivers attempt to follow with time headways significantly lower than two seconds and close following contributes to a high percentage of road traffic collisions. The behaviour of following the vehicle in front with short headways is commonly referred to as close-following or tailgating. This behaviour is considered to be risky and some countries including the UK have penalties for drivers who close follow.

ENGINEERING:

Close-following engineering treatments mainly fall into two categories, vehicle engineering and highway engineering. Highway engineering treatments include:

- [General road signs and road markings](#) (Vehicle Separation Road Markings)
- [Variable Message Signs](#)

EDUCATION:

Close-following educational interventions can include the following:

- Hazard perception training
- Training in schools and colleges using computers ([DriverIQ](#))
- Interactive deterrent systems ([TailGuardian](#))
- Targeted communication campaigns

ENFORCEMENT:

Enforcement currently relies on police intervention and penalties for dangerous and careless driving. However, a warning letter system could be considered in partnership with the police and DVLA.

Highways England undertook a warning letter trial for close following in the summer of 2017. The aim was to issue a nominal amount of letters for a limited number of trial detection sites. A leaflet was also included along with information about logging into a portal in which feedback can be gathered about the offence to build up Highways England understanding of the issue.

COMPLIANCE INITIATIVES

CS 55 - DRIVER FATIGUE

DESCRIPTION

Driver fatigue can be defined as a general psychophysiological state which diminishes the ability to perform the driving task. Driver fatigue makes drivers less aware of what is happening on the road and impairs the ability to respond quickly and safely if a dangerous situation arises. It is very difficult for drivers to accurately assess their own level of fatigue. The ability to self-assess becomes increasingly impaired as become more fatigued, however self-confidence to do so remains high.

ENGINEERING:

Engineering measures can be either in car technology or highway treatments.

Highway treatments include:

- Rumble Devices
- Raised profile edge of carriageway road markings
- Signing (e.g. "Tiredness can kill")
- Increased stopping provision (lay-bys and rest areas)

EDUCATION:

Highways England (Commercial Vehicle Incident Prevention (CVIP) team) is supporting a Motorway buddy app which provides commercial drivers with up to date information about truck stops (with support from the Freight Transport Association and the Road Haulage Association). The app can be translated into many languages but Polish is the initial translation. The app aligns with smart parking solutions to show real time availability of truck stops for drivers. The app also allows drivers to pay for their stay and simplifies all transactions as shown below. The app is currently being used by 40,000 drivers.

- Provides a comprehensive daily check-list with defect reporting for drivers which can be completed from the driver's handset, then sent to the haulage company web portal
- A load security function that enables pictures to be taken before departure that displays every available precaution was taken before setting off
- The app gives the ability to capture three pictures of an incident for insurance purposes.

ENFORCEMENT:

Currently enforcement relates to commercial vehicle driving time regulations which specify the number of hours which can be driven in a day, breaks that have to be taken and hours permitted to be driven in a week.

COMPLIANCE INITIATIVES

CS 56 - SEAT BELT USE

DESCRIPTION

Seat belts are designed to retain people in their seats during a crash, and so prevent or reduce injuries. They minimise contact between the occupant and vehicle interior and significantly reduce the risk of being ejected from the vehicle. In Great Britain, seat belt wearing rates are very high. Almost all (95%) car drivers and front seat passengers wear seat belts. In the rear of cars, 89% of passengers wear seat belts or use child car restraints.

ENGINEERING:

Seat belt reminders can be displayed on VMS signs.

Other engineering measures included in-vehicle technology that alerts drivers if the seat belts in occupied seats are not being used.

EDUCATION:

The Think! 'Three Strikes' media campaign in 2008 focused on the physics of a crash. The campaign was aimed at increasing people's perceptions of the risk of not wearing a seat belt in all driving situations.

ENFORCEMENT:

Enforcement is via fixed penalty notices issued by the police.

COMPLIANCE INITIATIVES

CS 57 - DRINK DRIVING

DESCRIPTION

The risk of road traffic injury and collision increases rapidly with alcohol consumption. Drivers with a blood alcohol concentration (BAC) between 20mg alcohol per 100ml blood (20mg/100ml) and 50mg/100ml have at least a three times greater risk of dying in a crash than drivers with no alcohol in their blood. This risk increases to at least six times with a BAC between 50mg/100ml and 80mg/100ml, and to 11 times with a BAC between 80mg/100ml and 100mg/100ml. Apart from being potentially life-threatening, drink driving on the roads can often result in tailgating, speeding and sudden braking.

ENGINEERING:

Reminders to not drink and driver can be displayed on VMS signs.

Engineering measures to prevent drink driving revolve around in vehicle technology such as Ignition systems that require a sample of breath before allowing the engine to start.

EDUCATION:

A Drink drive campaigns targeted at young men aged 25 to 34. A media campaign ran from 1st December 2015 to 3rd January 2016 in England and Wales. The campaign was aimed at targeting nearly 5.4 million British young men through the social networks (e.g. Facebook, Twitter, and Spotify) and while they plan their night out, whilst on a night out, or drinking at home. This included social media advertising and posters in pubs.

ENFORCEMENT:

The main enforcement measure taken to reduce the level of alcohol-impaired driving and alcohol-related collisions is to implement a range of penalties for drink driving so the drivers can be imprisoned, banned from driving and face a fine for driving impaired. The actual penalty which drivers may receive, depends on the offence and is this is unlimited. In most cases a conviction for drink driving leads to a significant increase in car insurance costs, problems entering/traveling to several countries (e.g. USA) and a conviction being recorded on the driving license.

COMPLIANCE INITIATIVES

CS 58 - DRUG DRIVING

DESCRIPTION

Drugs (both legal and illegal – see www.gov.uk/drug-driving-law) can severely affect drivers mentally and physically for hours or even days, influencing their ability to drive safely. The most common effects of drugs are:

- slower reaction times
- poor concentration
- sleepiness/fatigue
- confusion
- over-confidence leading to risk taking
- erratic behaviours
- hallucinations
- blurred vision/ enlarged pupils
- aggression

According to the latest report by European Transport Safety Council (2017), nearly 13% of drivers in the UK self-declared driving under the influence of drugs at least once for the last 12 months that makes it a second place in Europe, with France leading (16%).

ENGINEERING:

EDUCATION:

A new campaign video warned people who drive under the influence of drugs that a change in the law means it's now easier to get caught. The new advertising campaign simulated the paranoia felt by many drug drivers. The levels for the illegal drugs, which include heroin, cocaine and cannabis, mean there will be zero for drivers caught with these substances in their system. The drivers were warned that the police will be using "drugalysers" to screen for cannabis and cocaine at the roadside and also be able to test for these and other drugs including ecstasy, LSD, ketamine and heroin at a police station, even if a driver passes the roadside check. No evaluation of this campaign could be sourced.

ENFORCEMENT:

Under the new legislation in the UK, drug drivers face an unlimited fine, up to six months in prison and a minimum one-year driving ban.

COMPLIANCE INITIATIVES

CS 59- MIDDLE LANE HOGGING

DESCRIPTION

The lane on the far left (Lane one) is the lane a driver should use to travel in. The middle lane (Lane two) and the outside lane (Lane three) are there to give an opportunity to overtake slower moving traffic. Once drivers have overtaken slower traffic they are expected to pull back into Lane one as soon as it is safe to do so. Lane hogging is therefore defined as staying in lane two or three for a significant amount of time without overtaking. Drivers should return to the left-hand lane after overtaking slower-moving vehicles as soon as they are safely past.

ENGINEERING:

Reminders to not hog the middle lane can be displayed on VMS signs.

EDUCATION:

A campaign was launched in collaboration between Highways England and Cheshire Police in 2015 warning middle-lane hoggers that they were putting their lives in danger, as well as risking a fine and penalty points. The main goal of the campaign was to cost effectively use stakeholder engagement and communication activities to positively influence driver behaviour to influence driver attitudes and behaviours. The campaign consisted of several main components:

- Paid-for poster advertising: five Motorway Service Areas (MSA) over four weeks
- VMS campaign
- Public engagement activity – stakeholders and traffic officers
- Media engagement and coverage
- Social media content – via Twitter hashtag, Facebook etc.

Adverts at five motorway Services advised lane hoggers that they could face a £100 on-the-spot fine and three penalty points, and electronic message signs are being used to encourage drivers to stay safe by keeping left. One advert showed a car coasting in the middle lane with the warning 'More likely to encounter an undertaker'. Another showed a car sticker on a vehicle parked illegally in a disabled bay, with the slogan 'My other car hogs lanes'

ENFORCEMENT:

Currently there are several pieces of legislation to address lane hogging including on-the-spot fines introduced in 2013 as part of a wider initiative to tackle "careless driving".

COMPLIANCE INITIATIVES

CS 60 - INAPPROPRIATE DRIVING IN BAD WEATHER

DESCRIPTION:

Every type of severe weather conditions has its own effect on driving that should be taken into account by drivers. Precipitation can cause surfaces to be slippery, reducing the grip of the tyres and increasing braking distance. Visibility can also be vastly reduced in heavy snow or rain which could impair the ability to see dangers ahead. High temperatures can soften road surfaces, causing cracks and disrupting the clarity of road markings. Wind can cause debris to blow onto the roads, fell trees or cause other obstructions. Finally, the condition of road surfaces that can be eroded by bad weather means that road markings that are essential for directing and instructing motorists may become faded or damaged and can put road users at risk. This is especially harmful in low visibility conditions caused by weather, as the visibility of the road markings will be relied upon even more. Inappropriate driving in bad weather mostly refers to driving too fast for the conditions

ENGINEERING:

Engineering measures for reducing inappropriate driving in bad weather include:

- [Variable Message Signs](#)
- [General Road Signs](#)
- [Vehicle Activated Signs](#)
- [High visibility road markings](#)

EDUCATION:

Highways England launched a campaign in 2016 called “When it rains, it kills” aimed at encouraging drivers to slow down when it rains. This campaign was designed because Highways England data showed that road users were 30 times more likely to be killed or seriously injured in rain than in snow. The campaign, ‘when it rains, it kills’ states that even driving within the speed limit in wet weather can be dangerous if drivers don’t allow extra space between them and the vehicle in front. It generally takes at least twice as long to stop on a wet road as on a dry road because tyres have less grip.

ENFORCEMENT

Inappropriate driving for the conditions such as driving too fast in bad weather can lead to prosecution in accordance with recent changes to speeding fines and penalties from April 2017. A driver driving too fast in bad weather may also be prosecuted for other offences such as careless driving (driving without due care and attention) which attracts a fine of up to £5,000 and between 3–9 points.

COMPLIANCE INITIATIVES

CS 61 - VEHICLE ROADWORTHINESS

DESCRIPTION

Road worthiness can generally be considered as one of the main safety requirements for vehicles on the roads. Every vehicle in order to function properly on the roads and serve its purposes need to be in a suitable operating condition and meet safety standards. In 2016, more than 85,000 breakdowns on the roads took place due to poor vehicle roadworthiness. In 2014, there were 38 KSIs which were directly linked to driving without checking that the vehicle was roadworthy.

ENGINEERING:

Reminders for road users to ensure their vehicles are roadworthy can be displayed on VMS signs.

EDUCATION:

Highways England Keele Tyre Pilot - Project WASP (Weight and Safety Partnership) was a tyre pressure technology pilot from March to December 2015 with 115,209 tyres measured (86,539 from cars and 28,670 from HGVs). Pressure pads can also measure tyre tread.

One in eight vehicles were more than 20% away from their nominal pressure with one in twelve for HGVs.

Highways England launched their Vehicle Checks THINK! Campaigns on the 31st of March 2017. The campaign has been designed to prompt people to perform simple vehicle checks before setting off on long journeys. The target audience of this campaign was 30-50 year olds and drivers on long journeys with families. The main slogan of the campaign is "You wouldn't expect a pilot to take off without running through checks, so why shouldn't you take the same approach for an important journey?"

TyreSafe started campaigning in 2006 the number of casualties related to illegal, defective or under-inflated tyres has decreased from 1,624 to 1,210 in 2010. TyreSafe is particularly concerned about road users growing up in an age where vehicles in general need less maintenance, it therefore provides education and information about how to check tyre pressures and ensure that tyres are legal. Highways England have been working collaboratively with TyreSafe on a number of campaigns including Tyre Safety month, displaying the Tyre Safe strapline 'Safe Tyres Save Live' and through video campaigns showing CCTV footage from motorway cameras of tyre failure incidents.

ENFORCEMENT:

It is illegal in the UK to drive a vehicle that has poor roadworthiness. Drivers caught driving a vehicle in a poor condition can be fined up to £2,500 and receive three points on their driving license.