



Visibility and Road Safety at Priority Junctions

Invitation for Expressions of Interest

July 2020

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

CIHT has been awarded a grant of £100,000 by the Department for Transport to commission research into visibility splays at priority (major/minor) junctions, which will support the review and updating of guidance in Manual for Streets (MfS).

Junction visibility splays are a basic but fundamental aspect of highway engineering and most highway professionals consider that providing adequate visibility at priority junctions is vitally important to minimise collisions and casualties. However, since the publication of MfS in 2007 there has been uncertainty in the profession about the appropriate standards for visibility splays in some circumstances and the implications for road safety if they are not met.

This project will conduct research into this important issue with the objective of giving highway design professionals clear and evidence-based guidance.

Visibility splay requirements have a major bearing on the siting and design of new priority junctions and can be critical in determining whether a proposed junction, including to new developments, is acceptable. They can be the subject of intense debate around planning applications and at public inquiries involving the detailed assessment of traffic speeds and highway geometries.

Providing clear guidance will have the following benefits

- through a better understanding of visibility requirements and safe speeds around junctions, safer solutions can be designed for all road users that are appropriate to their context
- a clear definition of appropriate design standards will remove an area of uncertainty affecting the delivery of new housing and other developments based on sustainable transport solutions which enable active travel modes and create more inclusive, healthier communities.

CIHT is inviting expressions of interest from suitably qualified organisations which will be used to draw up a select list of tenderers. Consortia of organisations are welcome to make submissions.

2 RESEARCH STUDY

2.1 TECHNICAL BACKGROUND AND ISSUES

In the UK the minimum clear sight distance from the minor road (the Y distance) is normally based on recommended values for Stopping Sight Distance (SSD). Guidance on calculating SSDs is currently given by the Department for Transport in Manual for Streets 2 (MfS2). The Design Manual for Roads and Bridges (DMRB), published by Highways England and other national highway authorities, contains minimum standards for SSDs for use on the Strategic Road Network. These SSD values are set out in DMRB Document CD109, Highway Link Design, and are based on design speed.

For existing roads and streets MfS2 advises that the measured 85th percentile wet weather speed is used, on the basis that both speeds and (more critically) tyre friction are lower in wet conditions.

In 2007 Manual for Streets (MfS) recommended significantly reduced SSD values for design/measured speeds up to 60kph (37mph) compared to those given in DMRB and the now withdrawn Design Bulletin 32. In 2010 Manual for Streets 2 (MfS2) recommended driver reaction time and deceleration parameters for buses and HGVs which gave slightly longer SSDs, but otherwise retained the guidance given in MfS. For speeds above 60kph MfS2 advises that the parameters used to calculate SSDs underpinning the standards given in DMRB should be used.¹

This results in a large increase in SSDs when major road design speeds are even slightly over 60kph. The minimum standard Y-distance typically increases from around 60m to 90m at that point, which can be difficult to achieve in design terms, particularly where land is constrained. It is questionable whether the road safety impacts of such a small change in speed would be significant but concerns over its potential implications, based on current guidance, can cause difficulties.

There is also some uncertainty on how visibility splays should be set out. Common practice, which is required by DMRB, is to draw splays to the nearside kerb on both sides of the junction but MfS2 notes that vehicles will normally be travelling at a distance from the kerb line and so a more accurate assessment of visibility splay is made by measuring to the nearside edge of the vehicle track. The difference between measured visibilities to these two places can be significant.

There can also be uncertainty around the appropriate distance back from the give way line (the X distance) from where visibility splays should be measured. MfS advises that an X distance of 2.4m should normally be used in most built-up situations² and that while longer distances will increase capacity they may increase the possibility that drivers will not take account of pedestrians and cyclists, and can increase shunt collisions. DMRB, in document CD123, requires a minimum 2.4m X distance for simple priority junctions but increases the minimum to 4.5m where there is a turning facility on

¹ DMRB itself does not give those parameters, however.

² Based on an analysis of typical vehicle dimensions and driver positioning

the major road. It also advises that a 9m distance should be provided for all junctions, however.

A further complexity has arisen from the update of DMRB advice note TA22/81, now replaced by document CA185, which deals with Vehicle Speed Measurement. Like MfS2, TA22/81 stated that the normal design methods of major/minor junctions on existing roads should be based on wet weather speeds and included advice on how to calculate these values when speeds were measured in the dry. In drafting the replacement document Highways England removed the concept of wet weather journey speed as it was no longer considered to serve any meaningful purpose.

Considering the vertical plane, MfS states that visibility splays should be measured over an envelope based on a driver eye height of between 1.05m and 2.0m and an object height of between 0.6m and 2.0m. DMRB uses the same values for driver eye height but recommends a lower object height of 0.6m. The theoretical basis for these parameters and consequences of varying them on outcomes needs to be clarified.

Research by TMS Consultancy into the relationship between junction visibility and collision frequency was reported in MfS2.³ That study was unable to demonstrate that reduced Y distance visibility is directly associated with an increased collision risk. MfS2 therefore includes the statement that "unless there is local evidence to the contrary, a reduction in visibility below recommended levels will not necessarily lead to a significant problem.". This wording is somewhat vague and has proved difficult to apply in practice. The TMS research also has some limitations as it was not able to consider several factors other than visibility that may influence collisions at junctions, including traffic flows and speeds.

As a result of the above, current guidance in MfS2 can be difficult to apply. In particular, it does not adequately cover situations on the fringes of urban areas, including where a new 30mph speed limit may be recommended yet approach speeds are likely to be above 30mph. These types of location are often proposed for new developments.

The discussion around visibility splays usually focuses on road safety but sight distances can also have other implications, including on junction capacity and road user comfort. These impacts have not been well-researched in the UK. It is noted that some other countries use different approaches to setting visibility requirements at major/minor junctions (e.g. Intersection Sight Distance, which is based on gap-acceptance).

2.2 RESEARCH QUESTIONS

The Research study should address the following questions:

- What is the relationship between the extents of visibility splays (X and Y distances) at major/minor junctions and collisions and casualties?

³ https://www.tmsconsultancy.co.uk/files/4013/8053/8352/mfs_2_research.pdf

- How does this relationship vary with site-specific factors including:
 - Location and Context (urban/suburban/rural, local land uses etc)
 - Whether the minor road is a through route or solely provides access
 - Speed limit
 - Major road traffic speed
 - Major and minor road traffic flow and composition
 - Pedestrian and cyclist flows
 - Characteristics of the drivers and vehicles involved in collisions
 - Presence of obstructions in the visibility splay, including parked vehicles
 - Junction geometry and layout including provision for pedestrians and cyclists
 - Whether splays are measured to the nearside kerb or some other point
- What theoretical basis (or bases) should be used to determine visibility splay standards?
- Should Stopping Sight Distance continue to underpin visibility splay standards, or should other approaches be used, and if so in what circumstances?

2.3 INDICATIVE METHODOLOGY

The design of the study methodology will be the responsibility of the research organisation.

The following stages are envisaged but this outline methodology should not be regarded as fixed. Alternative approaches will be welcomed and interested parties are encouraged to be creative in developing their proposals.

- A literature review of published research on:
 - the relationship between visibility splay provision at priority junctions and reductions in collisions and casualties and other desirable outcomes; and
 - a comparison of UK practice with international guidance and standards on visibility splays, as well as the models, assumptions and research evidence that underpins them.
- A study of a statistically-robust set of priority junctions which builds on the methodology used in the previous MfS2 research, but adding additional measured parameters such as traffic flow, speed limit and actual speeds to provide a multiple regression model to assess the effects of varying junction visibility splay provision on outcomes.
- A comprehensive draft report for consultation with stakeholders followed by a final report stage and engagement across the sector to disseminate its findings and provide input into the refresh of Manual for Streets.

2.4 PROJECT TIMELINE

The following project timeline is intended but may be subject to change.

Expressions of interest open	31 July 2020
Closing Date for Expressions of Interest	1st September 2020
Invitation to Tender Issued	21 September 2020
Closing Date for Tenders	2 November 2020
Project Award	30 November 2020
Project Completion	31 December 2021

The detailed programme will be determined in collaboration with the appointed research organisation.

2.5 GOVERNANCE

The research study will be directed by a steering group consisting of CIHT staff and members and Department for Transport officials. Additional representatives on the project steering group may be drawn from other bodies and will be selected by CIHT and DfT.

3 EXPRESSIONS OF INTEREST INVITATION

3.1 CONSULTANT ORGANISATION

CIHT is inviting expressions of interest from suitably qualified organisations which will be used to draw up a select list of tenderers. Consortia of organisations are welcome to make submissions.

Applicants will need to demonstrate capabilities in highway engineering, road safety investigation, statistical analysis and academic rigour.

3.1 APPLICATION PROCESS

Organisations are invited to submit expressions of interest which should contain the following information. Where the expression of interest is from a consortium the lead organisation should be identified.

- Details of the organisation(s)
- CVs of the key team members
- Statement of experience relevant to the project
- Demonstration of understanding of the research questions
- Proposed methodology, including key milestones
- Proposed contractual arrangement for the commission

No financial information will be required at this stage.

Submission documents should be no longer than 25 pages, including CVs.

3.2 EVALUATION CRITERIA

Expressions of interest will be assessed by the project steering group against the following criteria:

1. Appreciation of the issues (20%)
2. Relevant experience (25%)
3. Quality, rigour and depth of the proposed research methodology (40%)
4. Resource availability – evidence of providing the resource required to support the project (15%)

3.3 INTELLECTUAL PROPERTY

CIHT and the consultant will retain ownership of the research but will grant the researchers the right to publish and re-use the material submitted to CIHT and will be fully credited for their work.

The researchers should acknowledge the support of CIHT and the Department for Transport in any subsequent publications and activity based on the research.

3.4 SUBMITTING EXPRESSION OF INTEREST

All submissions must be made to CIHT via e-mail to technical@ciht.org.uk

Deadline for submissions is 11.59pm 1 September 2020.

Submission documents should be no longer than 25 pages, including CVs

Submission should be in a single file in PDF format.

Specific enquiries relating to this document and the Expressions of interest invitation must be submitted by 19th August 2020

3.5 FURTHER INFORMATION AND ENQUIRIES

Website with information about the project: <https://www.ciht.org.uk/knowledge-resource-centre/resources/visibility-and-road-safety-at-priority-junctions-research/>

We welcome enquiries about this project, but please note that all responses to enquiries will be published as (anonymised) Q&As via the project website.

For enquiries, please contact technical@ciht.org.uk