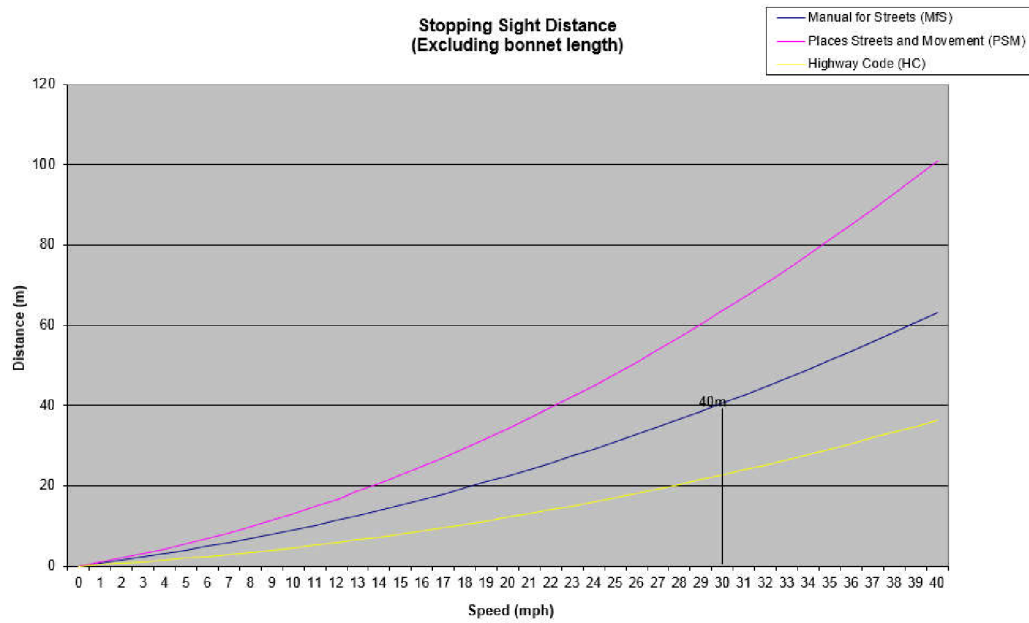


VISIBILITY SIGHT LINES
GUIDANCE FOR ARCHITECTS AND ENGINEERS



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1. INTRODUCTION

- 1.1 This document provides guidance to engineers and architects in respect of sight lines and associated highway safety issues.

Extract from Manual for Streets published in 2007 – Sight Lines Recommendations

Table 7.1 Derived SSDs for streets (figures rounded).

Speed	Kilometres per hour	16	20	24	25	30	32	40	45	48	50	60
	Miles per hour	10	12	15	16	19	20	25	28	30	31	37
SSD (metres)		9	12	15	16	20	22	31	36	40	43	56
SSD adjusted for bonnet length. See 7.6.4		11	14	17	18	23	25	33	39	43	45	59

Additional features will be needed to achieve low speeds

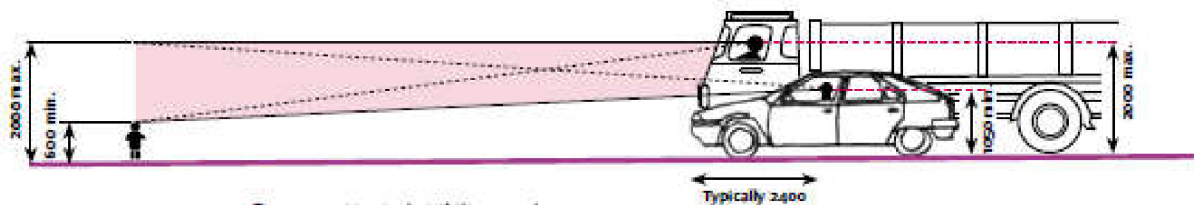


Figure 7.17 Vertical visibility envelope.

Scope of MfS

The following key areas of advice, derived from principles contained in MfS, can be applied based on speed limits, subject to a more detailed assessment of local context, as shown below in Table 1.1

Speed Limit	20mph	30mph	40mph	50+mph
User Hierarchy	●	●	●	●
Team Working	●	●	●	●
Community Function	●	●	●	●
Inclusive Design	●	●	●	●
Ped/Cycle Support	●	●	●	●
Master Plans/Design Codes	●	●	●	●
Stopping Sight Distance	●	●	●	●
Frontage Access	●	●	●	●

Minimise Signs & Street Furniture	●	●	●	●
Quality Audits	●	●	●	●
Connectivity/Permeability	●	●	●	●

Table 1.1 Application of key areas of MfS advice

Note: ● yes ● subject to local context

Recommended values for X and Y distances

An X distance of 2.4m should normally be used in most built-up situations, as this represents a reasonable maximum distance between the front of a car and the driver's eye.

Longer X distances enable drivers to look for gaps as they approach the junction. This increased junction circumstances, but it also increased the possibility that drivers on the minor approach will fail to take account of other road users, particularly pedestrians and cyclists. Longer X distances may also result in more shunt collisions on the minor arm. TRL Report No. 184 found that collision risk increased with greater minor-road sight distance.

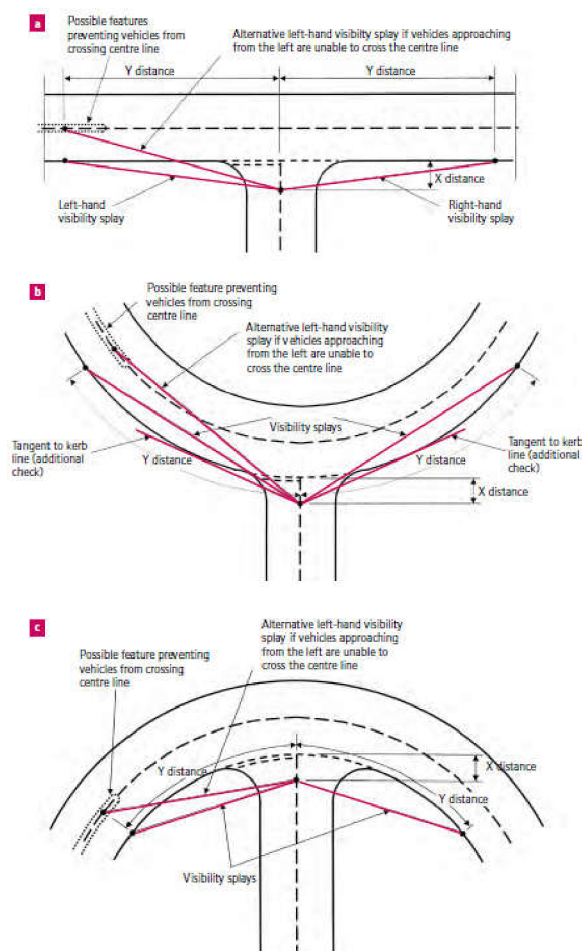


Figure 7.18 Measurement of junction visibility splays (a) on a straight road, (b) and (c) on bends.

Sight lines -Y Distances Manual For Streets Para 10.4 and 10.5

The measurement of Y distances changed based on the above guidance in MfS2. In paragraph 10.4.2 under "Site Visits"

Site Visits

Two investigators visited each location, and measured visibility to the left and right, from a point on the side road, 2.4m back from the main road channel line. Visibility was measured from a height of 1.05m, to a point at the kerb edge and a second point 1m out from the kerb edge, where observations showed that visibility increased.

10.5.3 The Y distance represents the distance that a driver who is about to exit from the minor arm can see to the left and right along the main alignment. For simplicity it has previously been measured along the nearside kerb line of the main arm, although vehicles will normally be travelling at a distance from the kerb line. Therefore a more accurate assessment of visibility splay is made by measuring to the nearside edge of the vehicle track. The

Most Highway authorities use 1m. Winchester City Council recommend a planning condition to this effect.

H120 – Visibility splays. (To a point measured 1.0m from edge of carriageway)

Before the development hereby approved is first brought into use, visibility splays of 2.4 metres by 160 metres (to a point measured 1 metre within the road from the edge of carriageway) shall be provided at the junction of the new access infrastructure road and public highway and visibility splays of 2.4 metres by 70 metres (to a point measured 1 metre within the road from the edge of carriageway) shall be provided at the new field gate entrance. The splays shall be kept free of obstacles at all times.

Highways England do not use a 1m offset for sight lines they use the centreline of the approaching carriageway lane. On a 3.65m wide lane the offset would therefore be 1.825m.

Extract from Volume 6 Section 2 Part 6 TD 42/95 Geometric Design of Major/Minor Priority Junctions

Design Speed of Major Road		'y' Distance
(kph)	(Mph)	
50	30	70
60	37	90
70	40	120
85	50	160
100		215
120		295

The above technical guidance has been superseded by CA 185 Vehicle speed measurements, which requires all speed measurements are taken in dry weather, however the formula for converting between wet and dry has been retained but reversed. The sight line distances are now set out in CD 109 Highway Link Design.

Extract from CD109 Highway Link Design

Table 2.10 Design speed related parameters

Design speed kph	120	100	85	70	60	50	V2/R
Stopping sight distance (metres)							
Desirable minimum	295	215	160	120	90	70	-
One step below desirable minimum	215	160	120	90	70	50	-

CD 109 Revision 0

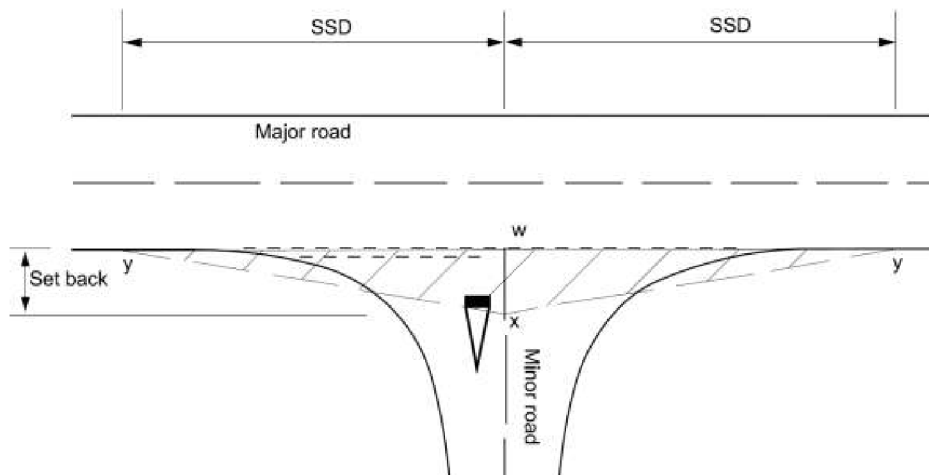
The "X" distance set back from the Give Way line is as follows:-

3.8 The minimum distances used to locate point X and therefore generating the visibility splay shall be:

- 1) 2 metres for direct accesses;
- 2) 2.4 metres for simple priority junctions; and
- 3) 4.5 metres for all other priority junctions.

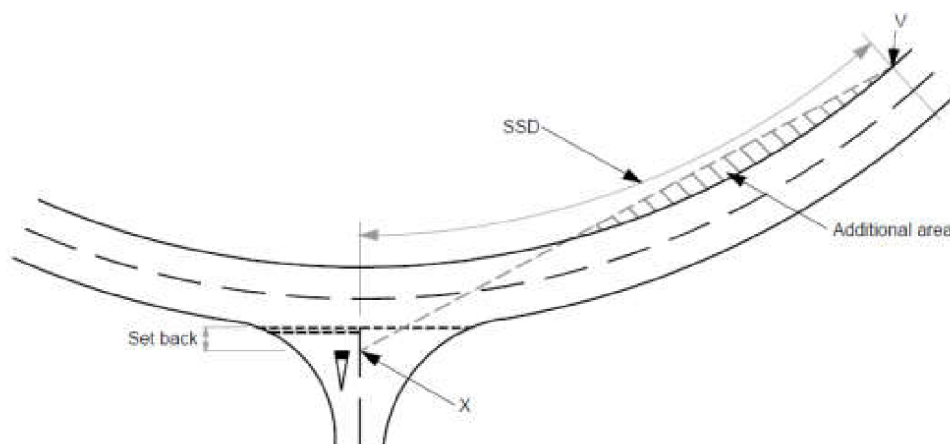
The current geometry and sight lines in the document is shown below.

Figure 3.4 Priority junction visibility splays



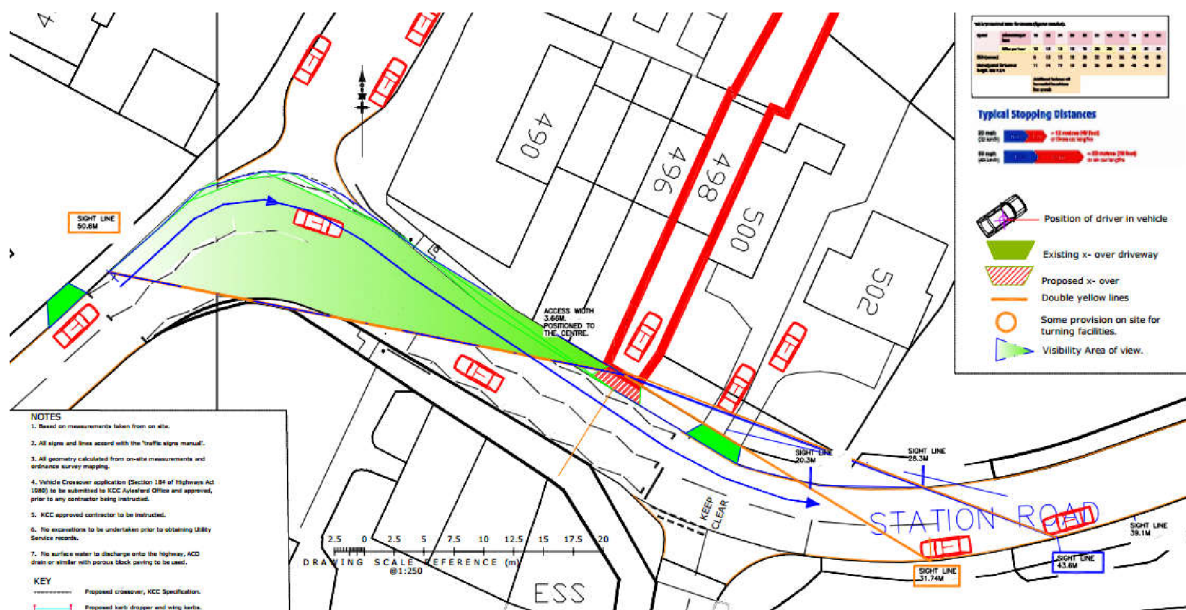
In the revised CD 123 (version 2.1.0) guidance is given below.

Figure 3.10 Additional area of visibility on the inside of a curved major road



NOTE 1 The additional area of visibility on the inside of the curve (as illustrated in Figure 3.10) applies to both the left and right of a priority junction/direct access.

An example is shown below from a project that obtained consent.



Vertical Requirements

The vertical alignment of any roads, new access points have to be checked to ensure they accord with general sight lines being 1.05m above carriageway level. This standard was first set out in Roads in Urban areas published in 1966, although in 1936 reference is made to a height of 5 feet. The pictures below show that 1.05m should be reviewed by Consultants/CIHT tasked with a revised MfS.



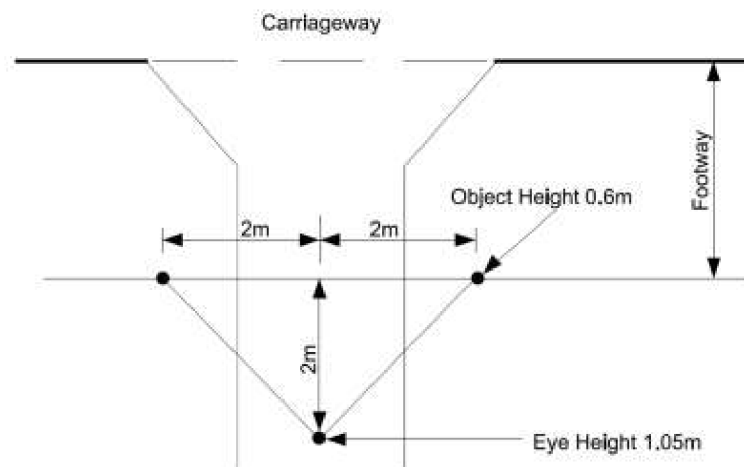
The photograph below highlights that sight lines from an access close to roads or over bridges with vertical curves can restrict sight lines.



Extract from CD 123 Geometric Design of at-grade Priority and Signal Controlled Junctions.

The standard sets out guidance in respect of access across a footway

Figure 3.3 Visibility at the back of footway crossing



This is the policy document that refers to the centreline of each lane is to be used.

- 3.2 Desirable minimum stopping sight distance shall be available between any two points in the centre of each lane within the horizontal and vertical extents of the visibility envelope (measured for each carriageway in the case of dual carriageways and motorways).

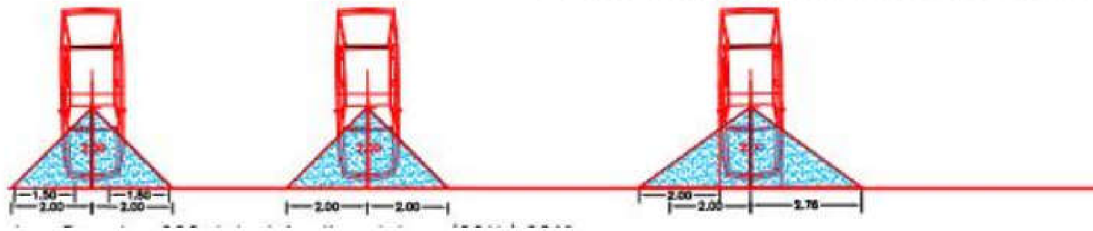
Relaxations are permitted and in Table 2.10 above 1 step below is permitted.

Sight Lines for pedestrians

Sight lines to enable pedestrians to observe vehicles reversing out of a driveway is also a requirement. Sight lines to figure 3.3 above are generally 2m x 2m in size. The photograph below shows how this can be achieved in practice. The house has chamfered walls. The standards above relate to an eye location from the vehicle hence the sight lines in the photograph are overly robust.



Various methods can be used to show pedestrian sight lines. They vary throughout the Country. Some examples are shown below.



Stopping Distances

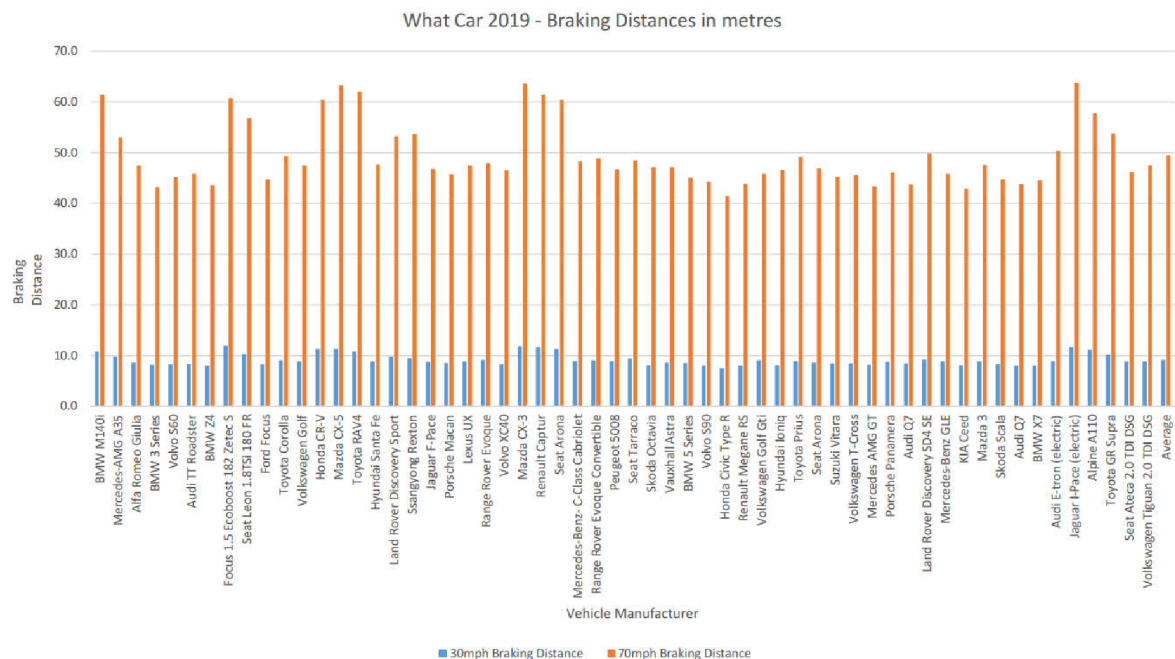
The details from Highway link Design has already been set out above. This is based on design standards that go back to the 30's and relies upon deceleration rates that are "comfortable" and not emergency stops or anything close to these rates. However, the Highway Code provides more practical distances.

Extract from The Highway Code showing typical stopping distances

Typical Stopping Distances



Recent research undertaken by L Brown Associates shows that cars over the past few years have shorter "braking Distances" than the Highway Code; as shown in the graph below. KCC in their Kent Design Guide: Interim Guidance Note 2 have also agreed with the premise that "recent research has demonstrated what the Highway Code has long suggested: visibility distances in guidance spanning many years are unreasonably high."



Recent data suggests electric cars have longer braking distances than normal petrol/diesel vehicles. This may be due to their weight and/or low profile tyres.

Junction Turning Radii – HGV's and Pedestrian Sight lines

The photographs below shows that stopping distances and sight lines can interact close to a junction for pedestrians. HGV's are assumed by many to turn immediately close to the kerbline thereby creating a danger for pedestrians. The pictures confirm this is not the case.

HGV at Give Way Line



HGV turning out of Junction – Away from kerbline



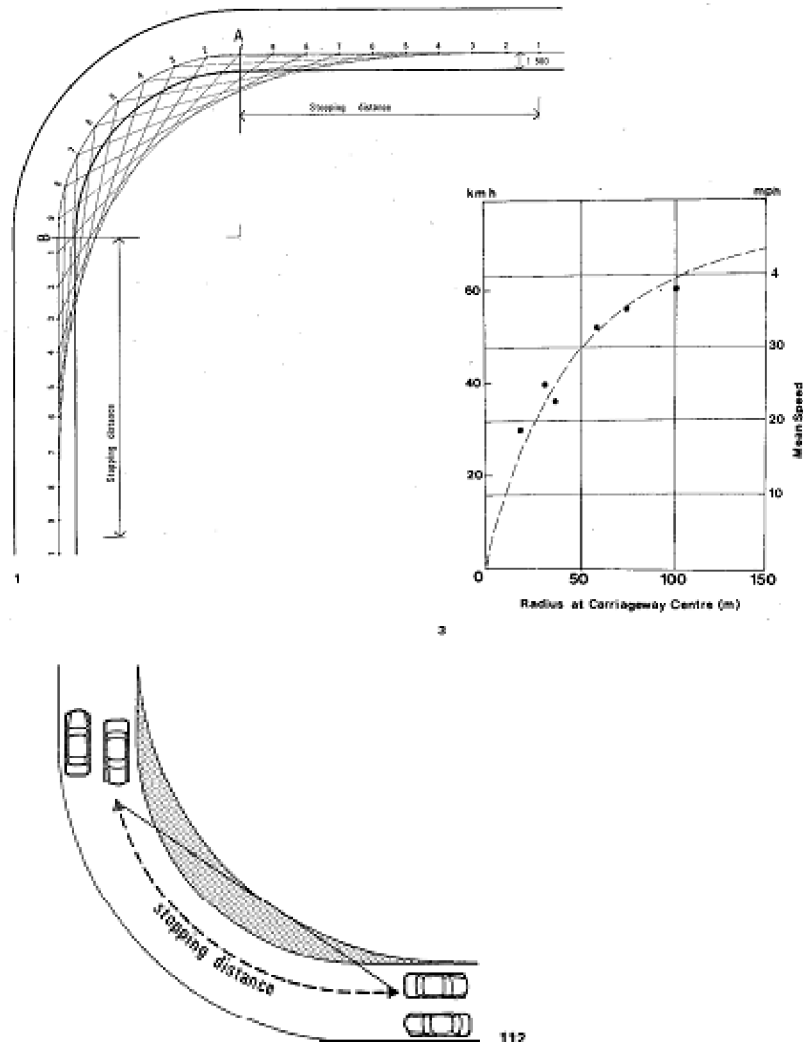
HGV Has now gained full access to the main carriageway



Only now are the tyres close to the kerbline

Forward Visibility & Junction Sight Lines

Extract from DB 32 1977 Plus also referred to in MfS2 Figure 10.1



The following pictures provide some examples of substandard sight lines.



Knoll Park Access - Sevenoaks



Research in Manual for Streets confirms statitically that substandard sight lines do not correlate.

Conclusions

- results were unable to demonstrate that the road safety concerns regarding reduced Y distance visibility are *directly* associated with increased collision risk at high risk sites
- collision risk is one aspect of road safety – perception of risk and driver “comfort” also matter

