



Stopping Sight Distance (SSD)

Part 3.3

3.3.1 SSD is the distance a driver needs to be able to see ahead to have enough time to avoid an obstacle from a given speed. It is calculated from the speed of the vehicle, the time required for a driver to identify a hazard and then begin to brake (the perception-reaction time), and the vehicle's rate of deceleration. For new streets, the design speed for the location under consideration is set by the designer. For existing streets, the measured 85th percentile wet weather speed is used.

SSD is calculated using the following equation:

$$\text{SSD} = vt + (v^2/2(d+0.1a))$$

v = speed (or velocity) (m/s) (85thile wet weather measured speed)

Note: Dry-weather speeds can be converted by adding 4kph

t = driver perception-reaction time (s)

t = 1.5s if ≤ 37 mph (60 kph) 85thile wet weather measured speed

t = 2.0s if ≥ 37 mph (60 kph) 85thile wet weather measured speed

d = deceleration (m/s²)

d = 4.41 m/s² if $< 5\%$ HGVs

d = 3.68 m/s² if $> 5\%$ HGVs or bus lane

d = 2.45 m/s if ≥ 37 mph (60 kph) 85thile wet weather measured speed

a = longitudinal gradient (%) (+ for upgrades and – for downgrades)

Example $< 5\%$ HGVs

37mph measured wet weather speed $\times 2.237 = 16.54\text{m/s}$ velocity

16.54 $\times 1.5 = 24.81$

16.54² $= 273.58$

2 $\times 4.41 = 8.82$

8.82 $+ (0.1 \times 5) = 9.32$ (5% uphill gradient)

273.58 $\div 9.32 = 29.35$

24.81 $+ 29.35 = 54.16$

54.16 $+ 2.4 = 56.56\text{m}$ (visibility splay adjusted for bonnet length)

3.3.2 Speed is either a design parameter or a measured value. Deceleration depends on the carriageway surface and weather conditions as well as the braking capabilities of motor vehicles. Reaction times may increase on higher speed roads because there are usually fewer visual influences. It is inappropriate for designers to 'experiment' with these values without this being supported by credible rationale and risk assessment. It follows that for design purposes it is only speed (v) and gradient (a) that really need to be considered as variables in the SSD equation.

Figure F3.1.1 - SSD guidance table for speeds < 60km/h

Speed	kph	16	20	24	25	30	32	40	45	48	50	60
	mph	10	12	15	16	19	20	25	28	30	31	37
SSD adjusted for bonnet length nil gradient ('Y' & 'V' Distance (m))		11	14	17	18	23	25	33	39	43	45	59
SSD adjusted for bonnet length nil gradient > 5% HGVs ('Y' & 'V' Distance (m))		12	15	19	21	25	27	37	43	47	50	65

Figure F3.1.2 - SSD guidance table for speeds > 60km/h

Speed	kph	70	85	100	120
	mph	43	53	62	75
SSD ('Y' & 'V' Distance (m))		120	160	215	295

Visibility Splays

Visibility splays at junctions and direct accesses - Figure F3.1.3

3.3.3 Junction visibility splays cover the areas of land required to enable a driver to see approaching traffic when waiting to emerge from a junction or access. Splays are formed by linking the X-distance (the driver's position) with the Y-distance (the SSD). In most circumstances, the X-distance is measured along the side street or access centreline from the edge of the carriageway of the street with priority. In most built up situations the X-distance is 2.4m as this allows a driver to see without their vehicle protruding beyond the junction into the street with priority. The Y-distance is equal to the SSD and is usually measured from the centreline of the side street or access along the nearside channel of the street with priority in both directions. The Y-distance is measured to the nearside of the carriageway unless vehicles approaching from the left are physically unable to cross the centreline. In those instances, the Y-distance can be measured to the centreline.

3.3.4 Where there is a wide splitter island within the mouth of the junction or more than one junction approach lane, it will be more appropriate to measure the X-distance from the actual position of the driver. The measurement of the Y-distance is then adjusted accordingly. Where speed exceeds 60 km/h, the minimum X-distance is 2.4m for simple priority junctions. For all other priority junctions, the X-distance is 4.5m. The X-distance, from which the full Y-distance visibility is provided, shall not be more than 9.0m, as this encourages high minor road approach speeds into the junction, and leads to excessive land take.

Notes: Visibility splays must be either within the public highway or over land in the control of the developer to ensure that they remain free from obstruction whilst ever the development remains in existence. Hedges should not be planted within 1.0m of the visibility splay if there is potential for the visibility splay to be encroached upon by vegetation during periods of rapid growth.

Where a visibility splay crosses multiple plots or frontages or where there is the possibility that the visibility splay could be obstructed in the future, the visibility splay must be incorporated into the footway.

Visibility splays at junctions in the vertical plane – Figure F3.1.4

3.3.5 To enable drivers to see oncoming vehicles from side streets and accesses, it is necessary to consider the driver's line of vision in the vertical plane from an eye height of between 1.05m and 2.0m. A clear view of an obstacle must be available from a height of 0.6m to 2.0m within the visibility splay. This will reduce to a height of 0.26m where the speed of traffic is >60kp/h.

Visibility splay for a junction or direct access on the outside of a bend – Figure F3.1.5

3.3.6 Where the line between the X-distance and Y-distance falls partially within the street with priority's carriageway, an additional area shall be added to the visibility splay formed by drawing a line from the X-distance to a point tangential to the nearer edge of the street with priority's carriageway.

Priority junction and direct access offside visibility splays when emerging on to a curved street – Figure F3.1.6

3.3.9 Where a junction is located on the outside of a bend, an additional area of visibility splay may be required from the inside of the bend, formed by drawing a line from the X-distance of the side street or access to the Y-distance measured along the offside channel of the street with priority from the junction or access centreline.

Forward visibility splays – Figure F3.1.7

3.3.7 Forward visibility is the distance a driver needs to see ahead to stop safely to avoid an obstruction in the road. The minimum forward visibility required is equal to the minimum SSD. It is checked by measuring between points on a curve along the centreline of the inner traffic lane.

Forward visibility splays in the vertical plane – Figure F3.1.8

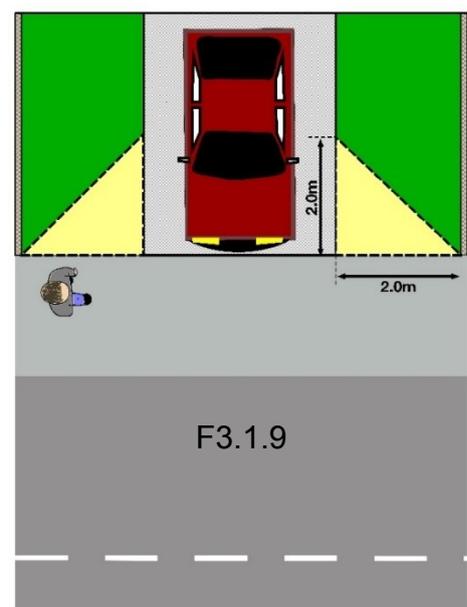
3.3.8 To enable drivers to see a potential hazard in time to slow down or stop comfortably before reaching it, it is necessary to consider the driver's line of vision in the vertical plane from an eye height of between 1.05m and 2.0m. A clear view of an obstacle must be available from a height of 0.6m to 2.0m within the visibility splay. This will reduce to 0.26m where the speed of traffic is >60kp/h.

Note: All the above visibility splays are to be kept clear from a height of 0.26m or 0.6m, depending on the speed of traffic, over the entire length of the splay to take into account changes in the driver's position as they travel along the street with priority. However, it may be acceptable to locate street lighting, road signs, small utility cabinets, etc. within a visibility splay if they are unlikely to obstruct the view of drivers materially and where this is unavoidable. However, care must be taken to ensure that a group of objects placed along a splay do not form a solid barrier to the line of sight.

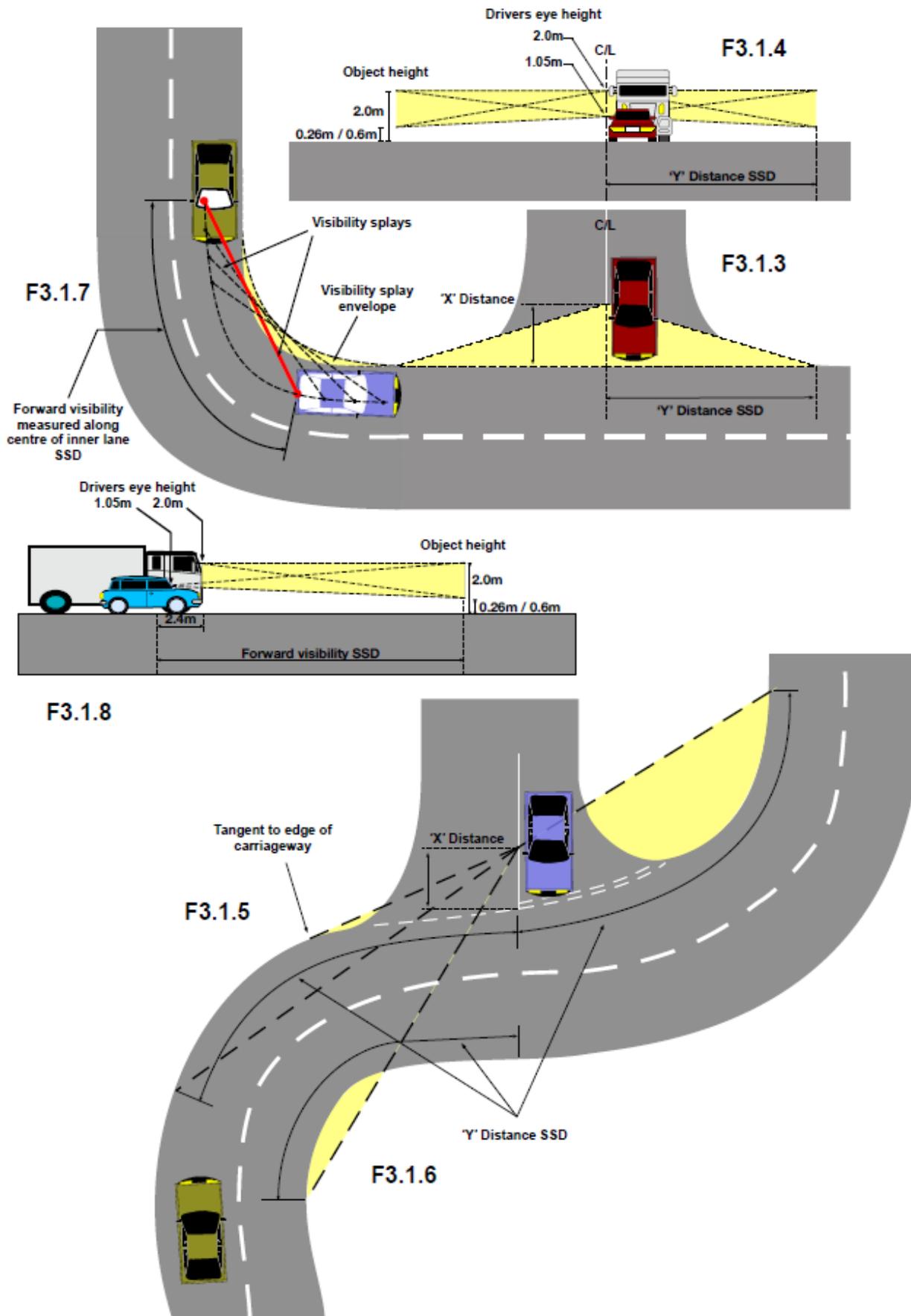
Pedestrian visibility splays - Figure F3.1.9

3.3.10 Pedestrian visibility splays will commonly be required adjacent private accesses in areas of moderate to high pedestrian activity. This is usually achieved by setback walls or fences with the area then kept clear above 0.6m.

3.3.11 A vehicle emerging from a driveway at the back edge of a footway will require the driver to consider the possible presence of pedestrians. The absence of pedestrian visibility splays may encourage drivers to emerge more cautiously. Consideration should be given as to whether the absence of splays is appropriate, considering the frequency of vehicle movements, the amount of pedestrian activity, and the width of the footway.



Visibility splay figures



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