# 7. GEOMETRIC DESIGN FEATURES

**General**

7.1 This chapter outlines the geometric design features to be considered in the design of major/minor priority junctions. Many of the features are dealt with separately, and a designer should work systematically through the design procedure prior to assembling the component parts. This is an iterative process, and it may be necessary to alter part of the junction design covered previously in order to achieve a satisfactory design.

**Design Speed**

7.2 Geometric standards for junctions are related to the traffic speed of the major road, and for new roads this is the design speed as defined in **TD 9 (DMRB 6.1.1)**. Reference should be made to **TD 9** in order to determine the appropriate design speed.

**Visibility**

7.3 Minor road traffic has to join or cross the major road when there are gaps in the major road traffic streams. It is therefore essential that minor road drivers have adequate visibility in each direction to see the oncoming major road traffic in sufficient time to permit them to make their manoeuvres safely. This concept also applies to major road traffic turning right into the minor road. As well as having adverse safety implications, poor visibility reduces the capacity of turning movements. Visibility shall however, not be excessive as this can provide a distraction away from nearer opposing traffic.

7.4 Drivers approaching a major/minor priority junction from both the major road and the minor road shall have unobstructed visibility as indicated in the following sections. The envelope of visibility for driver's eye height is as set out in **TD 9 (DMRB 6.1.1.2.2)**.

Major Road

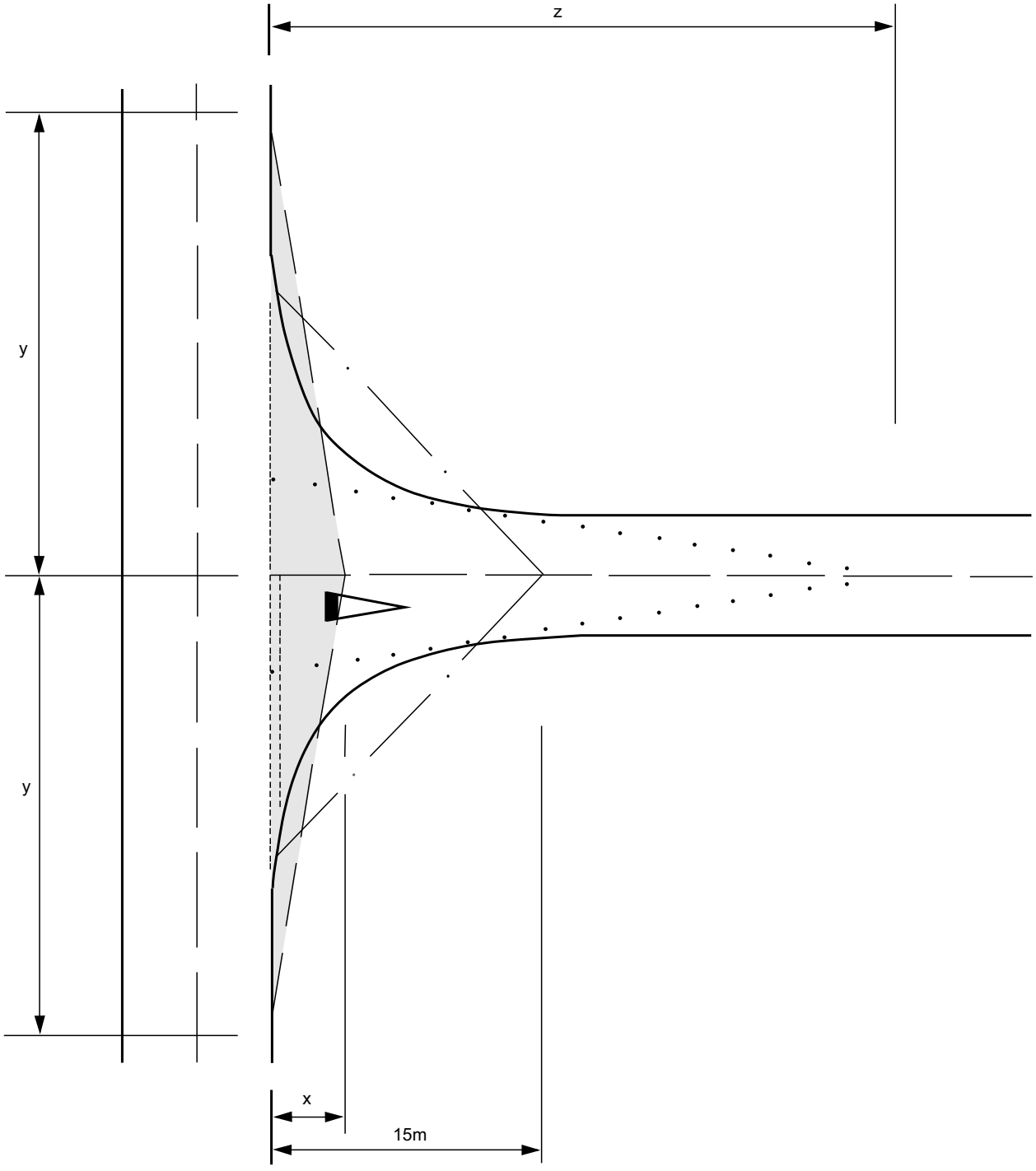
7.5 Drivers approaching a major/minor priority junction along the major road approaches shall be able to see the minor road entry from a distance corresponding to the Desirable Minimum Stopping Sight Distance (SSD) for the design speed of the major road, as described in **TD 9 (DMRB 6.1.1)**. This visibility allows drivers on the major road to be aware of traffic entering from the minor road in time for them to be able to slow down and stop safely if necessary.

Minor Road

7.6 The principle of providing the required visibility for drivers approaching the junction from the minor road has three distinct features.

a. Approaching drivers shall have unobstructed visibility of the junction from a distance corresponding to the Desirable Minimum Stopping Sight Distance (SSD) for the design speed of the minor road, as described in **TD 9 (DMRB 6.1.1)**. This allows drivers time to slow down safely at the junction, or stop, if this is necessary. Where a "Give Way" sign is proposed the visibility envelope shall be widened to include the sign.

b. From a point 15m back along the centreline of the minor road measured from the continuation of the line of the nearside edge of the running carriageway of the major road (not from the continuation of the back of the major road hardstrip if this is present), an approaching driver shall be able to see clearly the junction form, and those peripheral elements of the junction layout. This provides the driver with an idea of the junction form, possible movements and conflicts, and possible required action before reaching the major road.




x "x" distance
y "y" distance
z Desirable Minimum Stopping Sight Desirable (SSD) for Approach Road Design Speed

Lines over which unobstructed visibility should be provided

**Figure 7/1 : Visibility Standards (para 7.6)**

c. The distance back along the minor road from which the full visibility is measured is known as the `x' distance. It is measured back along the centreline of the minor road from the continuation of the line of the nearside edge of the running carriageway of the major road. The `x' distance shall be desirably 9m (but see para 7.8). From this point an approaching driver shall be able to see clearly points to the left and right on the nearer edge of the major road running carriageway at a distance given in Table 7/1, measured from its intersection with the centreline of the minor road. This is called the `y' distance and is defined in Fig 7/1. Relaxations are not available for this distance.

7.7 If the line of vision lies partially within the major road carriageway, it shall be made tangential to the nearer edge of the major road running carriageway, as shown in Fig 7/2.

| Design Speed of Major Road (kph) | `y' Distance (m) |
|---|---|
| 50 | 70 |
| 60 | 90 |
| 70 | 120 |
| 85 | 160 |
| 100 | 215 |
| 120 | 295 |

**Table 7/1: `y' Visibility Distances from the Minor Road (Relaxations not available - para 7.6c)**

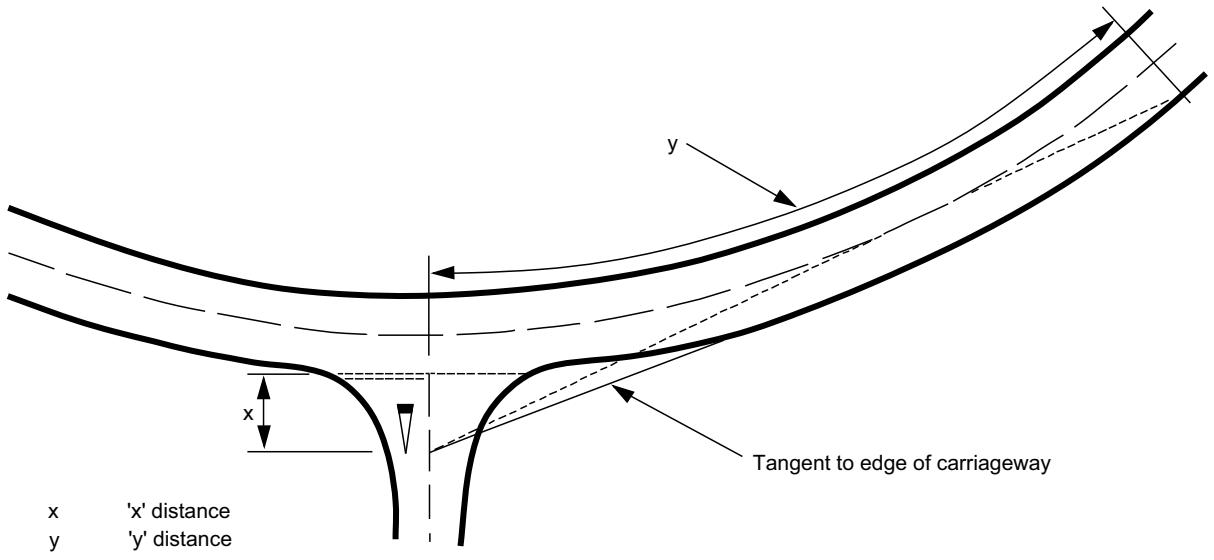



**Figure 7/2 : Visibility Standards with a Curved Major Road (para 7.7)**

7.8 In difficult circumstances, the `x' distance may be taken as a Relaxation from 9.0m to 4.5m for lightly trafficked simple junctions, and in exceptionally difficult circumstances, to 2.4m back from the nearer edge of the major road running carriageway. The `x' distance, from which full `y' distance visibility is provided, shall not be more than 9m, as this induces high minor road approach speeds into the junction, and leads to excessive land take.

7.9 Similarly, although the `y' distance shall always be provided, there is little advantage in increasing it, as this too can induce high approach speeds and take the attention of the minor road driver away from the immediate junction conditions. Increased visibility shall not be provided to increase the capacities of various turning movements.

7.10 These visibility standards apply to new junctions and to improvements to existing junctions.

7.11 Where the major road is a dual carriageway with a central reserve of adequate width to shelter turning traffic, the standard visibility splay to the left is not required, but the central reserve to the left of the minor road shall be kept clear of obstructions for the appropriate `y' distance, when viewed from an `x' distance of 2.4m.

7.12 If the major road is one way, a single visibility splay in the direction of approaching traffic will suffice. If the minor road serves as a one way exit from the major road, no visibility splays will be required, provided that forward visibility for turning vehicles is adequate.

7.13 Vehicles parked within splay lines may obstruct visibility. Where necessary, parking and access should be controlled to prevent this. Care should also be taken in the placing of signs, landscaping and street furniture within the visibility splay areas to ensure that their obstructive effect is minimal.

**Design Vehicle**

7.14 Allowance shall be made for the swept turning paths of long vehicles where they can reasonably be expected to use a junction. Consideration shall also be given to the manoeuvring characteristics of these vehicles in the design of staggered junctions.

7.15 All of the geometric parameters used in the design of a major/minor priority junction have been developed to cater for a 16.5m long articulated vehicle, whose turning width is greater than for most other vehicles within the normal dimensions permitted in the existing **Vehicle Construction and Use Regulations**, or likely to be permitted in the near future. The turning requirements of an 18.35m long drawbar trailer combination are less onerous regarding road width. In cases where hardstrips are present, the design vehicle is assumed to use these on some turns, and at some simple junctions, it may encroach into opposing traffic lanes.

7.16 However, a 15.5m long articulated vehicle with a single rear axle has been shown to be more onerous than the 16.5m long vehicle, but the small numbers of this type of vehicle currently operating in Great Britain mean that designing all junctions for such vehicles could be economically unjustifiable. Hence, if the major/minor priority junction being designed is in an area where there is likely to be regular use by such vehicles, the designer should take account of this either by amending the design to cater for such a vehicle, or by accepting that these vehicles may encroach into other traffic lanes, or overrun other areas. In such instances, consideration may be given to providing differential coloured or raised surfacing indicating the area of allowable overrun.

**Corner Radii**

7.17 Where no provision is made for large goods vehicles, it is recommended that the minimum circular corner radius at simple junctions should be 6m in urban areas and 10m in rural areas. Where provision is to be made for large goods vehicles, the recommended circular corner radius is:-