

## **Appendix 11.3 AECOM Transportation: Ballyragget Feasibility Report**

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Project:	<b>ESB Site Access Ballyragget, Co Kilkenny</b>	Job No:	<b>60273241</b>
Subject:	<b>Feasibility Report on Access Options</b>		
Prepared by:	<b>C Dwyer</b>	Date:	<b>14.11.2012</b>
Checked by:	<b>M Dunne</b>	Date:	<b>14.11.2012</b>
Approved by:	<b>S Reid</b>	Date:	<b>14.11.2012</b>

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## 1. Background

AECOM have been commissioned by ESBI to provide traffic engineering consulting advice relating to vehicle access options for the proposed upgrading of the existing 38kV substation to a 110kV substation located at Moate, to the north of Ballyragget village, Co. Kilkenny. The upgrades to this facility are proposed as part of the Laois-Kilkenny Reinforcement Project, and it is a priority for ESBI and EirGrid that safe access to and egress from the site can be achieved.

Consideration of road safety during the construction period is also of paramount importance, and therefore the requirements for construction access have to be factored into the selection of the appropriate access location. This site will require temporary access not only by typical construction traffic (i.e. vans, concrete trucks, low-loaders) but also the specialised requirements particular to a substation which require occasional access by oversized vehicles with abnormal loads such as transformers.

This report considers the potential access options and sets out the technical issues relating road design, markings and signage and surface conditions.

The access options are considered for both conditions below:

- the period of construction (heavy vehicle access such as low loaders delivering modular units or other construction materials); and
- when operational (occasional access by van or very infrequent heavy vehicle access for replacement of components or generator vehicles).

As part of this report AECOM visited the site location and assessed the local road conditions.

## 2. Existing Situation

### 2.1 General

The site is located on the R432, approximately 1.3km to the north of Ballyragget village, and 15km to the south of Abbeyleix town, and is accessed directly from the west side of the road. Access to the site environs can also be achieved from the strategic road network by exiting the M7 at Portlaoise and passing through Abbeyleix, and either turning left onto the R432 in the town centre, or continuing south through Durrrow on the N77, towards Ballyragget village. This route requires traffic to pass through junctions within the built up areas of the aforementioned towns and villages.

By following the N77 route to Ballyragget, the site is then accessed turning left off the N77 at The Square in Ballyragget village and onto the R432 Moate Road. From here the R432 continues northwards in a relatively straight alignment. A slight right to left bend sequence is encountered in the vicinity of 'M and A Coaches Ltd' approximately 750m north of The Square and the site is located a further 550m to the north on the west side of the road.

To reach to site from the north via the R432 Ballinakill Road, traffic turns left off the N77 at Market Square in Abbeyleix. A fork in the road with the R430 is encountered at Thornberry (approximately 800m

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from the Market Square junction), where the R432 continues through the right hand side of the fork in a south-easterly direction. Beyond the fork, the R432 continues generally south-easterly thereafter through the townland of Raggettstown and the village of Ballinakill. As the road crosses the Laois/Kilkenny County border it swings towards the south west and continues in this direction for 8km until it reaches the existing substation site location.

The speed limit on the R432 in the vicinity of the substation site is 80kph. The change in speed limit from 50kph to 80kph is sign posted on the R432, some 300m to the north of the N77 Bridge Street/R432 Moate Road junction in Ballyragget village.

The existing substation site is bounded to the east by the R432, to the south and west by agricultural fields and to the north by Ballyragget cemetery. The substation site is currently served by two accesses located at the northern and southern extremities of the site frontage. Between the two accesses, the site is enclosed by a palisade fence that is enveloped by thick conifer trees.

The northern access serves the existing substation which the southern access is to serve ESB Telecoms compound, identifiable by the communications mast situated within the site just inside the southern access gate.

Two sets of high voltage (38kV) overhead power lines are supported by a pair of pylons located within the existing substation site and traverse the R432 in an easterly heading.

The regional context of the site location is shown in Figure 1, and a more local context illustrating the local access roads is shown in Figure 2.

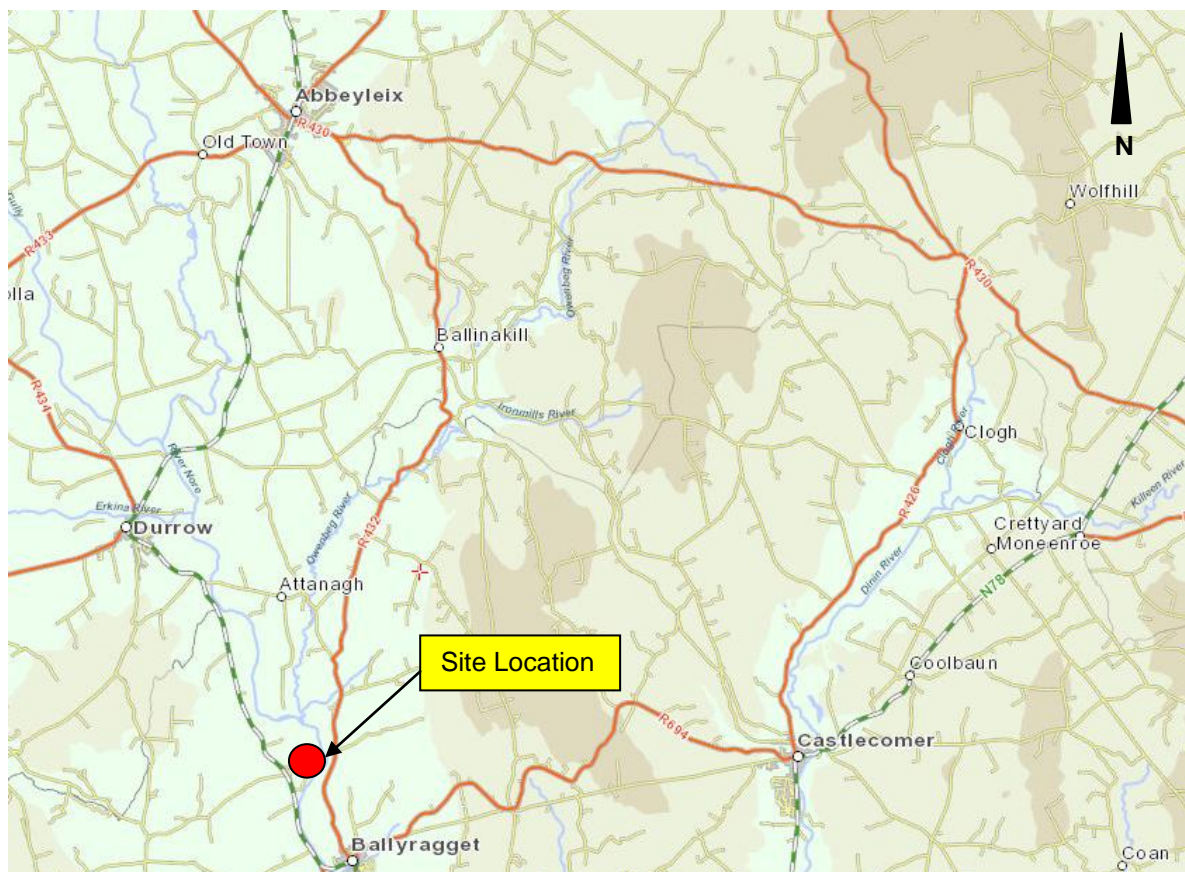


Figure 1: Site location – Regional Context

(source OSI maps)

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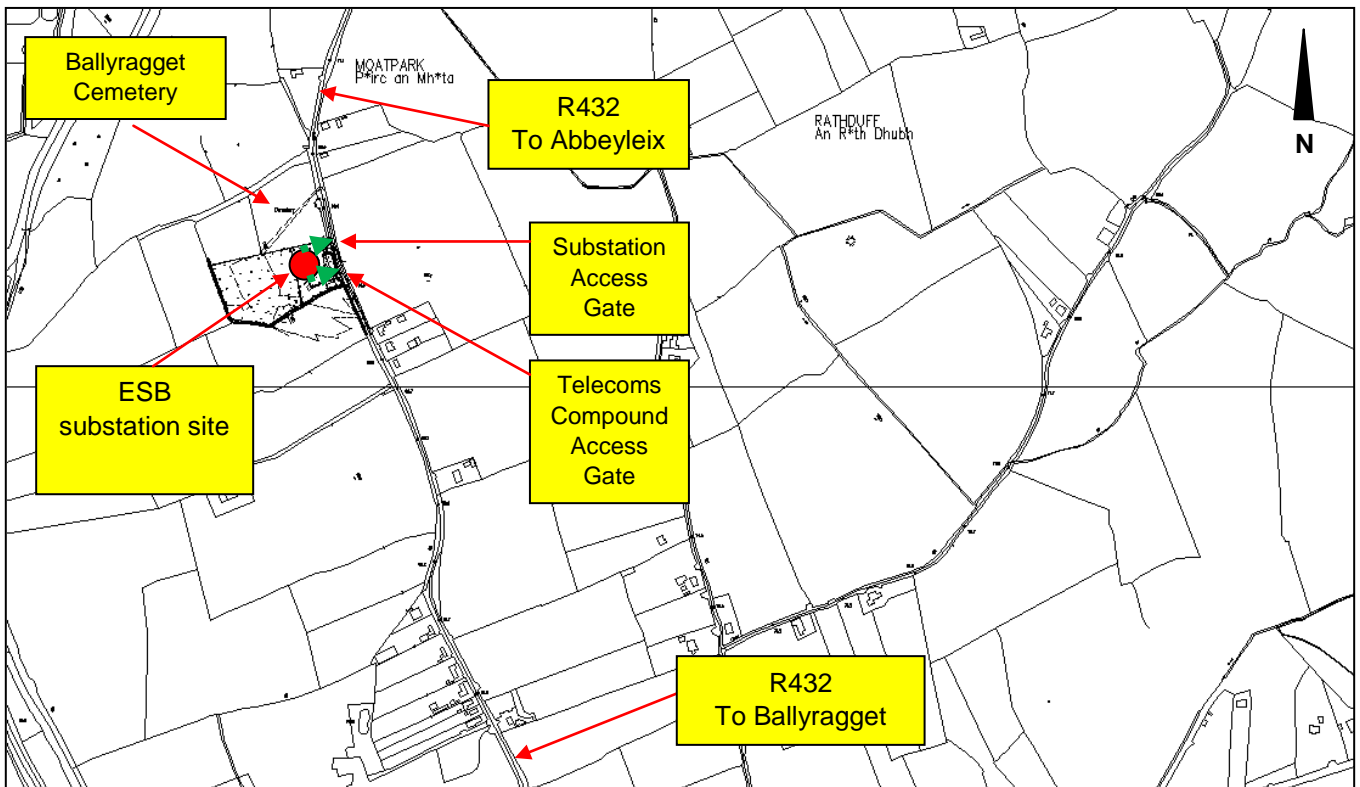


Figure 2: Site Location – Local Context

(Source: ESBI)

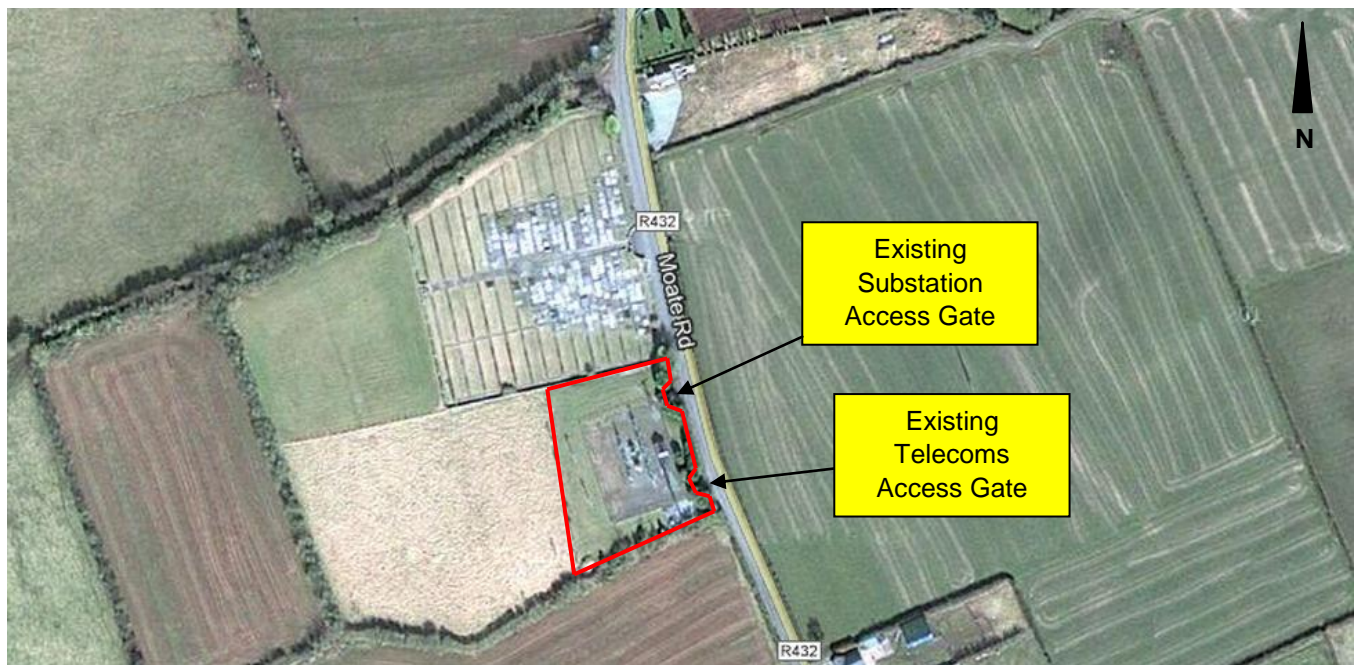


Figure 3: Site Access Location (Existing Accesses)

(Source: Google Maps)

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**Photo 1: R432 Looking North**



**Photo 2: R432 looking South**

**3. Sightlines for Proposed Access on R432**

The requirements for sightlines are set out in the NRA DMRB. The appropriate sections are reproduced in Appendix 1 at the back of this document.

Therefore on the basis of a road speed limit of 80kph, the normal approach is to consider the sightline requirement of 160m in either direction, for a setback of 3.0m from the road edge. It should be noted that as the major road is curved in this case, the Y-distance is measured along a line following the curve, as per Figure 7/2 rather than a straight line triangle as per Figure 7/1.

Due to a general blanket approach to the application of speed limits (i.e. 80kph on county roads in rural areas), it is often more appropriate to review the road characteristics in the actual location and identify whether the road is effectively driveable at that speed, therefore allowing application of a sightline which is appropriate having regard to the actual speed driven.

An Automatic Traffic Counter (ATC) was installed on the R432 in the area between the existing substation accesses to obtain traffic flow and speed survey data for the R432. Full 24 hour data was collected for two consecutive days - Tuesday 26<sup>th</sup> July & Wednesday 27<sup>th</sup> July, 2012.

The traffic volumes on the road are generally low, and are therefore free flowing with only occasional platooning of traffic (when behind a slower vehicle such as an agricultural vehicle).

In summary, the Daily Average during the survey was 991 vehicles (2-way, 24 hour total). The full results are presented at Appendix 2.

In terms of speeds recorded, the ATC recorded a total of 2,866 vehicles while installed (this figure includes for the additional 9 hours of data collected on Monday 25<sup>th</sup> July, 2012 from the time the ATC was installed). The full results are presented in Appendix 2.

The key results are set out in Table 1 below:

<b>R432 at Substation Site Access</b>	<b>Two Way Speed Results</b>
<b>Mean Speed (kph)</b>	57
<b>85th Percentile Speed (kph)</b>	77

**Table 1: ATC Speed Survey Data on R432 at Site Access**

The two-way 85<sup>th</sup> percentile speed would normally be taken as the design speed, and the result of the speed survey indicates that this is 77 kph.

Therefore it is considered that a design speed of 77 kph would be appropriate.

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Based on Table 7/1 from the DMRB, it is considered in this case that the 'y' distance can be interpolated for a design speed of 77 kph and this would result in a 'y' distance of 139 metres along the line of the road being appropriate.

In addition to the method described above for calculating sightline requirements, AECOM note that we were advised by KCC Roads Department that they normally require a sightline of 145m on Regional Roads in the 80kph rural speed limit sections (which would be generally in the order of a value interpolated from the Table 7/1 DMRB values, which are 120m for 70kph, and 160m for 85kph design speed respectively).

On the basis that the 145m sightline requirement is slightly more onerous than the 139m value calculated from the observed 85<sup>th</sup> percentile speeds on the R432, AECOM have taken the 145m sightline requirement as the acceptable value for KCC and have therefore prepared a drawing and the remainder of this note based on the 145m value.

Having regard for the existing and proposed arrangements within the ESB substation site, it was noted that an access in the same location as the existing northern access position is the most suitable position. In terms of sightlines at this location, it is noted that the current conditions are restricted by planted conifers and other trees and vegetation/walls which are within the ownership site boundary.

The existing/unimproved sightlines are as follows:

- To the left      12m for a 3.0m setback (see Photo 5)
- To the right     8m for a 3.0m setback (see Photo 6)



**Photo 3: View to left (12m visibility)**



**Photo 4: View to right (8m visibility)**

The sightline to the left of the access may require the removal of a mature tree and the curtailment of a block wall in order to achieve a reasonable sightline. Both the tree and block wall are within the lands which form part of the ESB substation site.

The sightline to the right would require the removal of the conifer trees and the set back of the palisade/chain-link boundary fence along the frontage of the substation site between the two existing accesses.

This access location will require the lowest amount of disruption and no acquisition of third party lands to either the northern or southern boundary is required, as the clearance works needed for sightline purposes will be done within the lands of the existing substation site; i.e. the sightline envelope width is widest at the 3m set back within the access location and tapers down in width the further away it gets

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from the access. Refer to the attached drawing 60273241\_002 for sightline details and obstruction clearance extents for the proposed improvements at the northern access.

The permanent gated access is set back more than 6.5m from the road edge and is greater than the minimum 3.5m wide opening with a splay onto the verge, with adequate setback for a van to be parked outside the gate if it is closed prior to access or after departure.

The following preliminary recommendations should also be considered on the R432 in the vicinity of the proposed improved access location.

### **Road Cross-Section at Access on R432**

Approaching the access from the south (from Ballyragget) the road is a single carriageway with a typical cross-section width of 6m (edge to edge of paved surface). There is a solid white centreline marking which prohibits overtaking and yellow edge of carriageway markings along the extent of the site frontage. The approach to the site from the south is predominantly of straight alignment and as the road continues northwards it bends towards the northeast.

It is noted that the existing road widths are generally appropriate for the level and composition of traffic travelling along the road, notwithstanding the horizontal and vertical alignment. Significant widening would be likely to increase speeds and may reduce safety as a result.

What would be considered practical is the implementation of several on line measures to improve safety and remove existing issues, to benefit all road users passing through the area on the approaches through the bend to the north as well as ensuring a greater level of safety for personnel accessing/exiting the substation access.

NRA Interim Advice note 85/06 (October 2006) 'Minor Improvements to Existing National Roads' set out different categories of minor improvements and it is noted that Category 3 includes 'Edge Treatment (no change to x-section)' which most closely matches the type of measures considered appropriate.

Re-marking of the existing road markings with reflective thermoplastic would ensure they are more visible during hours of darkness/low light conditions is a recommended measure. This should be undertaken following completion of construction activity and any possible remedial works to the carriageway at the access as a result of the works access. KCC Roads Dept Engineers have advised that they do not install road marker studs on regional roads and therefore this measure is not proposed.

### **Drainage**

No positive systems of road drainage were identified during a preliminary walk over survey of the R432 in the vicinity of the proposed site access. It appears that surface water simply drains to the side of the road and into/along the verges at the road edges. There is no proposal as part of the access improvements to construct additional carriageway/impermeable surfaces outside the site. Therefore it is not anticipated that there will be any requirement to introduce positive road drainage, such as drainage slots through the verges.

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**Appendix 1 : Extract of NRA DMRB Relating to Sightlines**

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## Background

Sightlines for exiting an access onto a public road are normally considered as a function of the road speed limit in the first instance. NRA DMRB TD41-42/11 (Design Manual for Roads and Bridges, Volume 6 Section 2 Part 6, November 2011) sets out the requirements for visibility for new junctions.

This Standard was produced to incorporate the previously used standards: TD 41 'Vehicular Access to All-Purpose Trunk Roads' and TD 42 'Geometric Design of Major/Minor Priority Junctions' into a single document and associated NRA addendums

The following section on Visibility has been reproduced from the TD 41-42/11 Standard (pp23-25): It should be noted that sections in black boxes are mandatory - these are the sections with which the Design Organisation must comply or must have agreed a suitable Departure from Standards with the National Roads Authority.

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## 7. Geometric Design Features for Single Carriageway Roads

### General

7.1 This chapter outlines the geometric design features to be considered in the design of major/minor priority junctions and accesses associated with single carriageway roads. 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, as illustrated in Figure 2/1.

### 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 **NRA TD 9**. Reference should be made to **NRA TD 9** in order to determine the appropriate design speed.

### Visibility

7.3 Traffic from either a minor road or direct access has to join or cross the major road when there are gaps in the major road traffic streams. It is therefore essential that drivers emerging from a minor road or direct access shall 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 or direct access. 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 For safety, drivers both on the major road and on the minor road or direct access shall be able to see any potential hazard in time to slow down or stop comfortably before reaching it. It is necessary therefore to consider the driver's line of vision in both the vertical and horizontal planes and the stopping sight distance for the vehicle at the relevant design speed. It is also essential that other road users can equally see oncoming vehicles; particularly where vehicles cross the footway in front of pedestrians at the same level and the crossing may not be so obvious.

7.5 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 **NRA TD 9**.

#### *Major Road*

7.6 Drivers approaching a major/minor priority junction or direct access along the major road approaches shall be able to see the minor road or direct access entry from a distance corresponding to the desirable minimum SSD for the design speed of the major road, as described in **NRA TD 9**. It should be noted that **NRA TD 9** does not allow relaxations in SSD on the immediate approach to junctions with the exception of an individual field access. This visibility allows drivers on the major road to be aware of traffic entering from the minor road or direct access in time for them to be able to slow down and stop safely if necessary.

#### *Minor Road/Direct Access*

7.7 The principle of providing the required visibility for drivers approaching the junction from the minor road or direct access has three distinct features.

a. Approaching drivers shall have unobstructed visibility of the junction from a distance corresponding to the desirable minimum SSD for the design speed of the minor road, as described in **NRA TD 9**. This allows drivers time to slow down safely at the junction, or stop, if this is necessary. Where a "Yield or Stop" sign is proposed the visibility envelope shall be widened to include the sign.

b. From a point measured 15m along the centreline of the minor road or direct access from the continuation of the line of the nearside edge of the surfaced carriageway (including hard strip or hard shoulder) of the major road, an approaching driver shall be able to see clearly the junction form, and those peripheral elements of the junction layout as shown in Figure 7/1. This

provides the driver with an idea of the junction form, possible movements and conflicts, and possible required action before reaching the major road.

c. The distance back along the minor road or direct access from which the full visibility is measured is known as the 'x' distance. It is measured back along the centreline of the minor road or direct access from the continuation of the line of the nearside edge of the surfaced road (including hard strip or hard shoulder) of the major road. The desirable minimum 'x' distance shall be 3.0m for all junctions and direct accesses except those with a "Yield" sign. Junctions and direct accesses with a "Yield" sign will require an 'x' distance of 9m. In difficult circumstances, the 'x' distance may be taken as a Relaxation from 3.0m to 2.4m for simple junctions in a stop controlled situation (see paragraph 2.23 for restrictions on the use of simple junctions). On regional and local roads a further relaxation of the 'x' distance to 2.0m may be considered in difficult circumstances. This further relaxation may only be permitted for lightly used accesses, excluding field accesses and other accesses where agricultural vehicles can be expected such as farm houses. On national roads any reduction of the 'x' distance below 2.4m shall be considered to be a Departure from Standard.

From the point "x" metres back from the major road a driver approaching the junction along the minor road 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 Figure 7/1.

d. On national roads the full 'y' distance must be achieved, however in difficult circumstances the low object height may be taken as 0.6m instead of 0.26m as a Relaxation.

e. For urban, regional and local roads with a demonstrably effective speed limit of 60kph or less, the 'y' distance may be relaxed by one design speed step in difficult circumstances, see also Para 7.11.

7.8 If the line of vision lies partially within the major road paved area, it shall be made tangential to the nearer edge of the major road paved carriageway (including hard shoulder or hard strip), as shown in Figure 7/2.

Design Speed of Major Road (kph)	'y' Distance (m)
42	50
50	70
60	90
70	120
85	160
100	215

**Table 7/1: 'y' Visibility Distances from the Minor Road (Para 7.7c)**

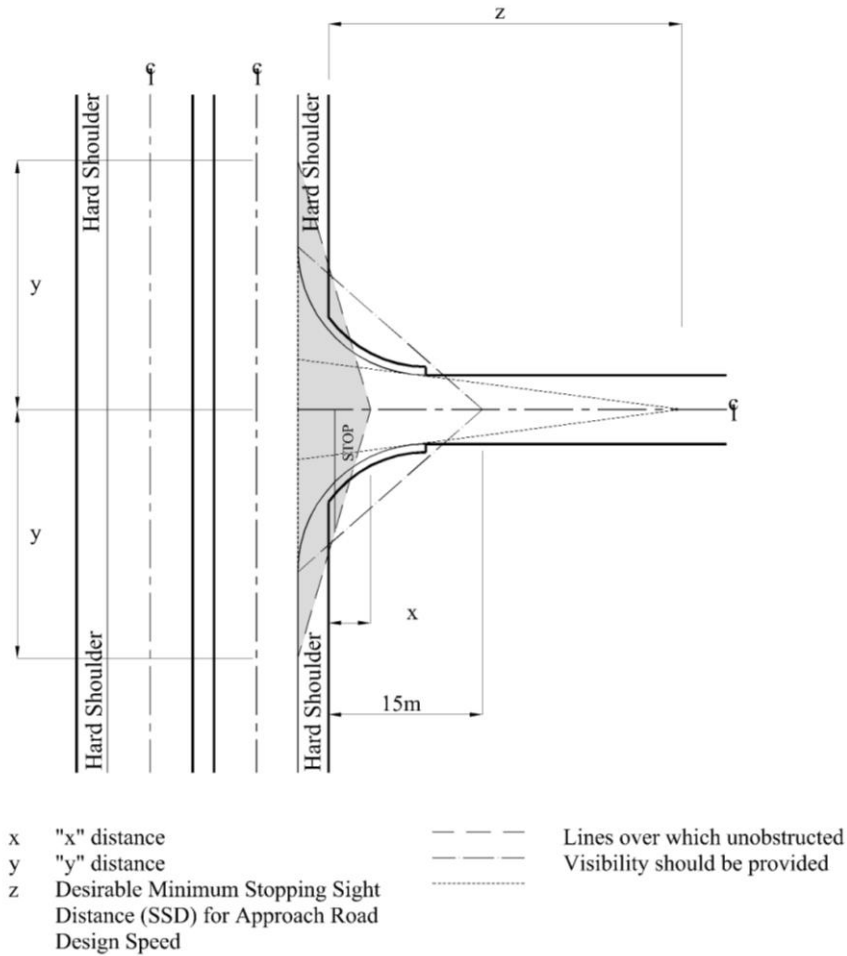


Figure 7/1: Visibility Standards (Para 7.7)

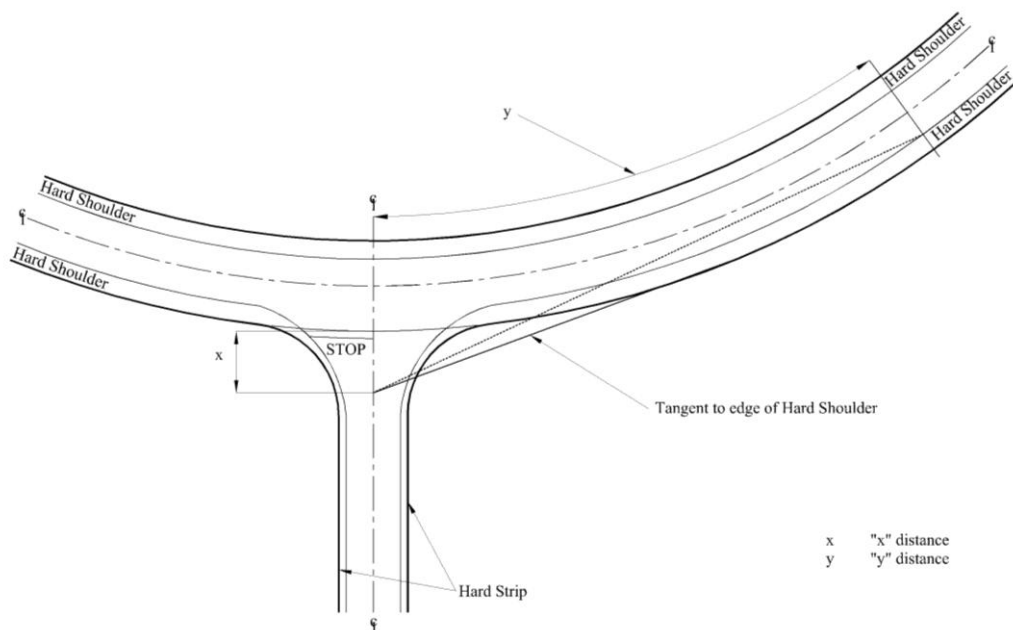


Figure 7/2: Visibility Standards with a Curved Major Road (Para 7.8)

**Appendix 2 : Automatic Traffic Counter (ATC) results**

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**Direction A**

		Mon 25th June																				Daily Total			
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM		8:00 PM	9:00 PM	10:00 PM
Time Drop	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	18	23	26	8	5	8	3
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	11	15	21	44	10	4	4	3
	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	18	17	8	29	3	4	2	2
	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	22	17	10	0	2	9	4	1
	1 Hr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	58	67	62	99	23	22	18	9

		Tue 26th June																				Daily Total			
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Time Drop	0	3	1	1	1	0	0	0	0	4	7	7	4	10	6	5	10	8	10	16	17	6	11	5	0
	15	1	0	1	1	0	0	0	1	3	5	2	10	3	2	15	10	4	14	16	4	12	5	8	1
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		Wed 27th June																				Daily Total			
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Time Drop	0	3	1	0	0	0	0	1	2	4	4	5	8	8	7	10	29	13	8	15	16	4	2	6	3
	15	0	1	0	0	0	0	0	2	5	2	7	4	12	5	11	20	8	13	8	14	4	2	7	6
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**Direction B**

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		Tue 26th June																				Daily Total			
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Time Drop	0	0	1	0	0	0	0	0	1	15	9	7	5	6	8	4	8	10	8	3	15	7	4	1	2
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	1 Hr	0	1	0	0	0	1	5	21	48	31	31	21	21	29	26	95	23	41	25	31	16	12	5	6

**Total**

		Mon 25th June																				Daily Total			
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM		8:00 PM	9:00 PM	10:00 PM
Time Drop	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	34	41	31	20	121	13	7
	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	17	26	31	51	14	13	11	3
	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	29	29	15	38	21	8	6	2
	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	28	32	16	5	34	20	9	1
	1 Hr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73	89	121	103	125	89	162	39	13

		Tue 26th June																				Daily Total			
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM		8:00 PM	9:00 PM	10:00 PM
Time Drop	0	4	2	1	1	0	0	0	1	9	24	11	14	15	8	13	16	13	16	27	36	11	15	9	2
	15	3	0	2	1	0	0	2	2	16	16	10	19	8	7	27	18	8	27	29	20	19	9	11	1
	30	0	1	1	0	0	0	2	9	15	16	17	13	14	7	15	14	10	19	19	17	8	11	7	4
	45	1	1	0	0	0	2	3	7	16	11	13	15	12	10	18	18	18	31	26	16	16	11	5	3
	1 Hr	8	4	4	2	0	2	7	19	56	67	51	61	49	32	73	66	49	93	101	89	54	46	32	10

		Wed 27th June																				Daily Total			
		12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM		8:00 PM	9:00 PM	10:00 PM
Time Drop	0	3	2	0	0	0	0	1	3	19	13	12	13	14	15	14	37	23	16	18	31	11	6	7	5
	15	0	1	0	0	0	0	2	5	16	13	16	10	16	15	20	25	13	19	13	16	5	6	9	8
	30	3	0	0	0	0	0	2	6	14	9	16	12	12	12	31	47	14	22	12	19	12	10	4	1
	45	0	1	0	0	0	1	3	14	17	11	12	7	12	14	25	51	8	30	21	8	12	6	3	2
	1 Hr	6	4	0	0	0	1	8	28	66	46	56	42	54	56	90	160	58	87	64	74	40	28	23	16

Direction A Speed Stats			
Speed Range (kph)	No. Within	No. Below	No. Above
0 - 10	0	0	1414
10 - 20	89	89	1325
20 - 30	92	181	1233
30 - 40	103	284	1130
40 - 50	119	403	1011
50 - 60	227	630	784
60 - 70	323	953	461
70 - 80	278	1231	183
80 - 90	132	1363	51
90 - 100	40	1403	11
100 - 110	10	1413	1
110 - 120	1	1414	0
120 - 130	0	1414	0
130 - 140	0	1414	0
140 - 150	0	1414	0
150 - 160	0	1414	0
160 - 170	0	1414	0
170 - 180	0	1414	0
180 - 190	0	1414	0
190 - 200	0	1414	0

Direction B Speed Stats			
Speed Range (kph)	No. Within	No. Below	No. Above
0 - 10	0	0	1452
10 - 20	68	68	1384
20 - 30	133	201	1251
30 - 40	173	374	1078
40 - 50	157	531	921
50 - 60	220	751	701
60 - 70	326	1077	375
70 - 80	241	1318	134
80 - 90	106	1424	28
90 - 100	26	1450	2
100 - 110	2	1452	0
110 - 120	0	1452	0
120 - 130	0	1452	0
130 - 140	0	1452	0
140 - 150	0	1452	0
150 - 160	0	1452	0
160 - 170	0	1452	0
170 - 180	0	1452	0
180 - 190	0	1452	0
190 - 200	0	1452	0

Total Speed Stats								
Speed Range (kph)	No. Within	No. Below	No. Above		Maximum Speed (kph)	Minimum Speed (kph)	Mean Speed (kph)	Median Speed (kph)
0 - 10	0	0	2866		114.40	10.10	57.10	60.50
10 - 20	157	157	2709		85th %ile Speed (kph)	95th %ile Speed (kph)		
20 - 30	225	382	2484		76.70	86.40		
30 - 40	276	658	2208					
40 - 50	276	934	1932					
50 - 60	447	1381	1485					
60 - 70	649	2030	836					
70 - 80	519	2549	317					
80 - 90	238	2787	79					
90 - 100	66	2853	13					
100 - 110	12	2865	1					
110 - 120	1	2866	0					
120 - 130	0	2866	0					
130 - 140	0	2866	0					
140 - 150	0	2866	0					
150 - 160	0	2866	0					
160 - 170	0	2866	0					
170 - 180	0	2866	0					
180 - 190	0	2866	0					
190 - 200	0	2866	0					