

**Appendix 11.2 AECOM
Coolnabacky Feasibility Report**

Transportation:

Project:	ESB Site Access Timahoe, Co Laois	Job No:	60241205
Subject:	Feasibility Report on Access Options		
Prepared by:	C Dwyer	Date:	26.06.2012
Checked by:	M Dunne	Date:	10.07.2012
Approved by:	S Reid	Date:	14.11.2012

1. Background

AECOM have been commissioned by ESBI to provide traffic engineering consulting advice relating to vehicle access options for a proposed substation located at Coolnabacky near Timahoe, Co Laois, to the south of the town of Portlaoise. The facility is proposed to be constructed 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 approximately 8km to the southeast of Portlaoise, and 2.3km to the north of the village of Timahoe and is accessed from the R426 Regional Road.

The R426 from Portlaoise passes through the Money cross roads where it bisects the R427. Approximately 1.4km to the southeast of the Money crossroads a bend in the alignment is encountered and the proposed site lands are situated some 100m past this bend to the east side of the R426. The site access is proposed to be sited within a 75m long area of agricultural land that is bounded to the north by a farm track which also formerly provided access to a now disused quarry and to the south by a tree/hedge lined stream. The stream is culverted under the R426 at a point midway along the proposed site access land envelope via an old stone arch culvert of approximately 1.5m in diameter.

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Beyond the proposed site access lands the road meanders past farms and other individual private dwellings, and continues generally south-easterly thereafter through the village of Timahoe to connect to the R430 some 8.5m to the southeast of Timahoe.

A farm yard containing storage sheds is situated on the opposite side of the R426 slightly to the south west of the existing and proposed access track locations. Adjacent to the northern boundary of the farm yard there is a cul-de-sac road which joins the R426 serving field accesses and two residential properties.

There are existing overhead telecommunication lines traversing the area of the site. A telegraph pole located within the verge at the northern corner of the cul-de-sac road/R426 junction carries a line across the R426 into a farm and dwelling and a separate line also crosses to a pole located further down the farm/disused quarry track.

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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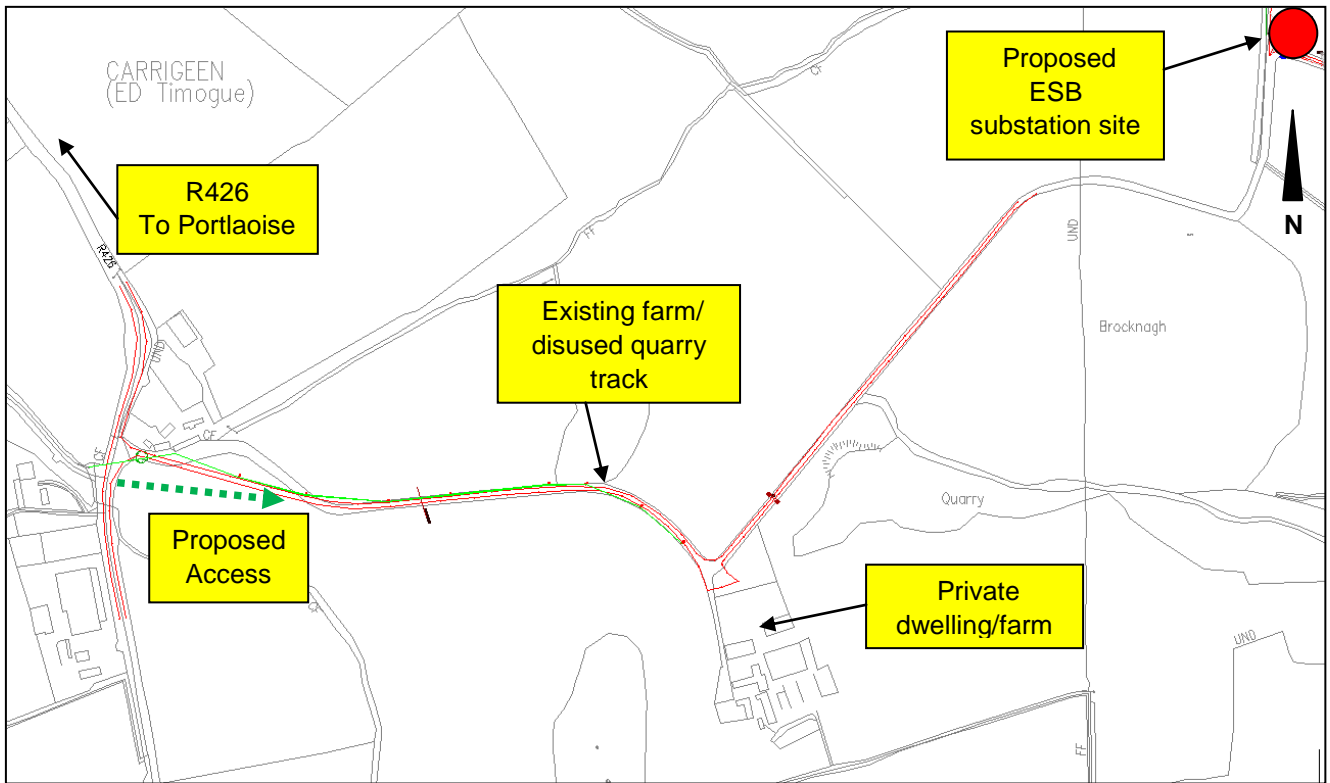


Figure 2: Site Location – Local Context

(Source: ESBI)



Figure 3: Site Access Location (Existing Access Track)

Source: Google Maps)

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Photo 1: R426 Looking North opposite site



Photo 2: R426 looking South opposite site

Sightlines for Proposed Access on R426

The requirements 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 NRA DMRB Figure 7/2 rather than a straight line triangle as per NRA DMRB 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 R426 approximately 290m to the south of the existing access road - this position was selected as the closest location that would allow for installation and securing of the counter data recorder to a telegraph pole. The counter was used to obtain traffic flow and speed survey data for the R426. Full 24 hour data was collected from Tuesday 26.06.2012 to Sunday 07.07.2012 inclusive.

The results confirmed that 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 1,280 vehicles (2-way, 24 hour total), for the period of Tuesday-Sunday. The average for weekday was 1,358 vehicles. The full results are presented at Appendix 2.

In terms of speeds recorded, the ATC recorded a total of 9,383 vehicles over the period while installed. The full results are presented in Appendix 2.

The two-way 85th percentile speed would normally be taken as the design speed, and the result of the speed survey indicates that this is 86 kph. Based on Table 7/1 from the DMRB, this would result in a 'y' distance of 160 metres along the line of the road being appropriate.

However, from review of the directional surveys and with regard to pre-planning consultation between AECOM and Laois County Council, it is noted that northbound speeds are generally higher than southbound speeds on this section of the R426, as northbound traffic is coming to the end of an overtaking opportunity travelling from Timahoe towards Portlaoise.

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Therefore AECOM agreed to review the sightline requirements from the NRA DMRB on the basis if the directional 85th percentile speeds.

The key results are set out in Table 1 below:

Direction of Travel	85th Percentile Speed (kph)	Interpolated Sightline (m)
Northbound	89.6	177
Southbound	81.7	151

Table 1: ATC Speed Survey Data on R426 at Site Access

On site AECOM considered a number of possible locations where and measured the sightlines achievable for each using a measuring wheel.

Position 1 – Opposite the minor road on the west side of the R426

- To the left 66m for a 3.0m setback (see Photo 3)
- To the right 142m for a 3.0m setback (see Photo 4)



Photo 3: View to left from 1 (65 visibility)



Photo 4: View to right from 1 (142m visibility)

This will require cutting back and/or removal of a section of the hedge at the common party boundary between the lands to the south of the proposed access, to achieve a reasonable sightline to the south. It is the alignment of the road through the bend to the north which precludes increasing the sightline further than the 142m from this position.

Alternatives Considered:

Position 2 – at culvert (to south side of vehicle restraint barrier)

- To the left 70m for a 3.0m setback (see Photo 5)
- To the right 82m for a 3.0m setback (see Photo 6)

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If Position 2 (at the culvert) is used, the condition of the culvert should be checked by a structural engineer before using this as a construction access. It would be necessary to amend or lengthen the culverted section slightly to the north of the existing access and this should have a timber safety fence across the top to prevent personnel falling into the unprotected edge.

Use of position 2 would require cutting back of the hedge at the common party boundary between the lands to the south of the proposed access, to achieve a reasonable sightline to the south.

However, it is noted that the boundary wall to the north and the alignment of the road through the bend precludes increasing the sightline further than the 82m; therefore for this reason the site access at this position can be discounted from the proposals.



Photo 5: View to left from 2 (70m visibility)



Photo 6: View to right from 2 (82m visibility)

Position 3 – on north side of boundary hedge

- To the left 39m for a 3.0m setback (see Photo 7)
- To the right 85m for a 3.0m setback (see Photo 8)

If Position 3 (at the north side of the boundary hedge) is used, it is noted that careful design will be required to ensure that the entire road construction extents are within the land ownership (otherwise additional third party lands to the south will also be required).

It is noted that the boundary wall to the north and the alignment of the road through the bend precludes increasing the sightline further than the 85m; therefore for this reason the site access at this position can be discounted from the proposals.

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Photo 7: View to left from 2 (39m visibility)



Photo 8: View to right from 2 (85m visibility)

Optimum site access position

On the basis of the achievable sight lines, Position 1 has been identified in this preliminary exercise as the optimum position for the site access location.

Locating the site access within the frontage at Position 1 would minimise the amount of land take required between it and the existing farm/disused quarry track. Whilst the 142m sight line to the right of the proposed access junction is lower than the 151m requirement, it is considered appropriate for the level of traffic using the R426. However, a 177m sight line to the left cannot be achieved without significant cut back and/or removal of hedgerow to the south of the stream.

Further to discussions with Laois County Council it was agreed that the location at Position 1 was appropriate, and having regard to the proposal to remove the tree to the north of the access, sightlines of 65m to the south and 142m to the north for a 3m setback would be appropriate for the limited operational use of the proposed access, having regard to the improvements which will be made.

The following preliminary recommendations should also be considered at the proposed Position 1 junction location:

Road Cross-Section at Access on R426

Approaching the access from the northwest (from Portlaoise) the road is a single carriageway with a typical cross-section width of 6m (edge to edge of paved surface) there are no white centreline markings or yellow edge of carriageway markings in the vicinity of the site. There are several bends in the alignment of the road to the north of the proposed site access, with the road becoming fairly straight to the south of this area.

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 bends to the north as well as ensuring a greater level of safety for personnel accessing/exiting the substation access.

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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.

Proposed Minor Measures

Clearing out the verge areas through the area of the bend of the existing vegetation and replacing these with a flat grass verge would ensure visibility is maintained through the year with only occasional grass cutting required.

A 'SLOW' warning to the north of the bends (for traffic from Portlaoise) and similar marking to the south of the bend for traffic from Timahoe, would be a suitable measure, along with a solid white centreline to prohibit overtaking through this section, and yellow edge of carriageway markings using reflective thermoplastic and marker studs to ensure they are more visible during hours of darkness/low light conditions.

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.

Any permanent gated access should be a minimum 3.5m wide opening with a 45 degree 2m edge 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.

Drainage

No positive systems of road drainage were identified during a preliminary walk over survey of the R426 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.

Should it be necessary to introduce road drainage, such as drainage slots through the verges etc., then agreement will be required with LCC.

These arrangements are illustrated on the AECOM drawing 60241205_001.

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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 41-4211 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)

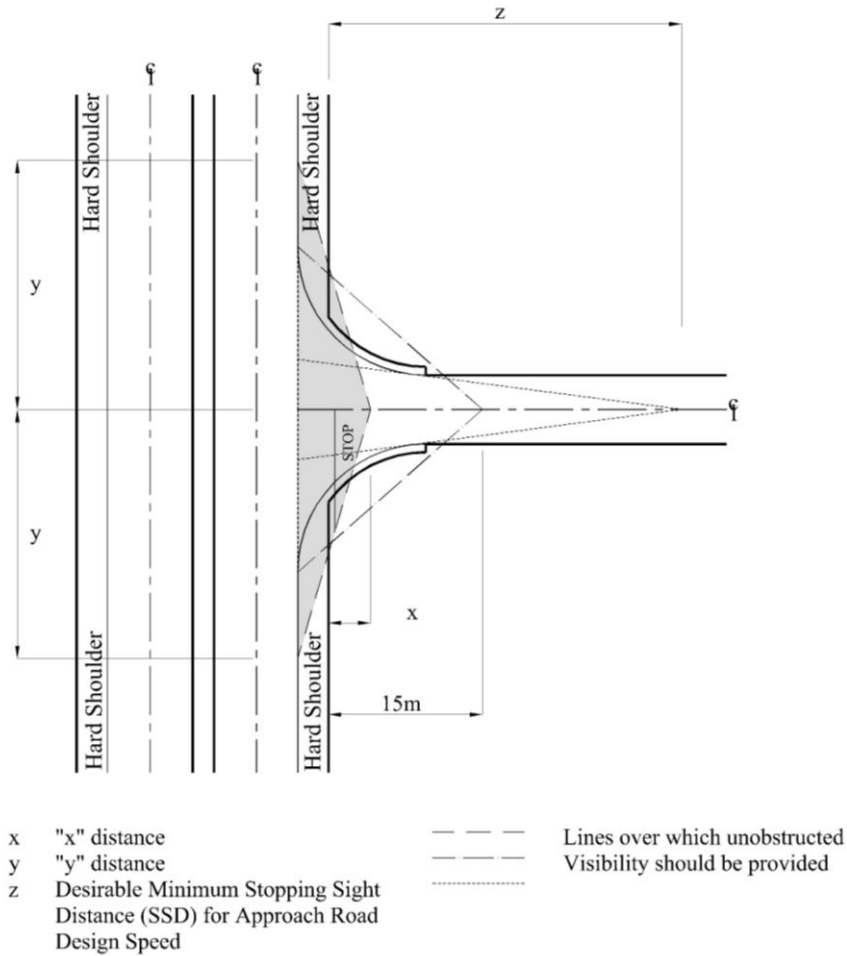


Figure 7/1: Visibility Standards (Para 7.7)

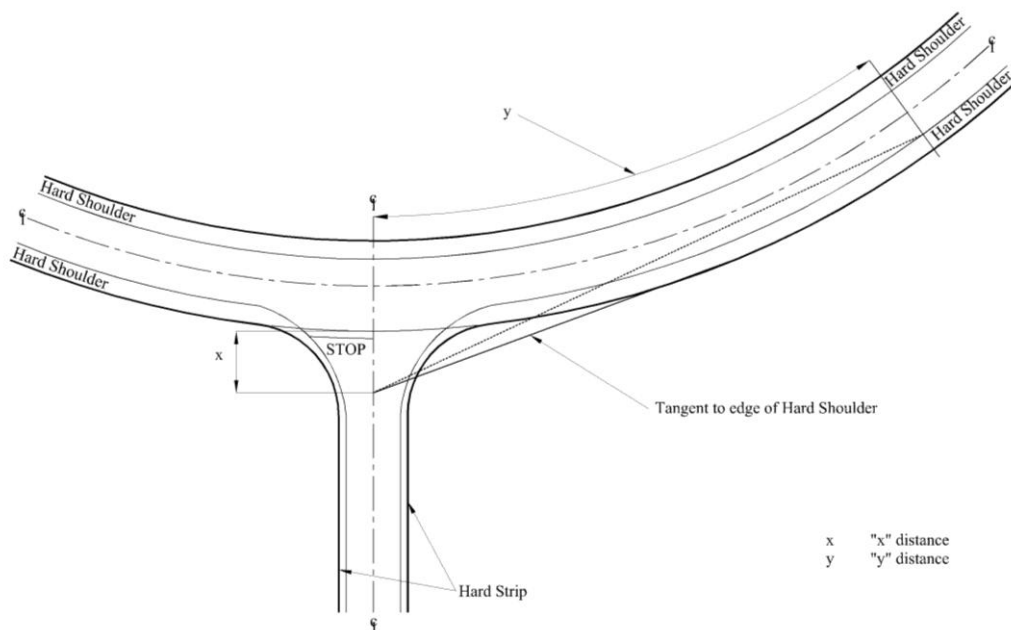


Figure 7/2: Visibility Standards with a Curved Major Road (Para 7.8)

Appendix 2 : Automatic Traffic Counter (ATC) results

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Direction B

		Mon 25th June																						Daily Total		
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	1 Hr	7	1	1	5	2	1	4	2	12	18	22	31	57	53	52	52	39	44	50	29	63	93	16	11	
		Sun 1st July																						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	11:00 PM
Time Drop	0	1	0	1	4	0	0	0	0	2	6	5	2	6	9	7	16	8	12	11	9	5	5	3	3	442
	15	3	2	0	3	0	1	0	0	2	8	6	8	9	16	4	12	10	15	10	5	6	6	3	3	
	30	2	3	1	2	1	0	1	2	1	3	5	7	5	6	8	7	10	8	13	5	2	1	1		
	45	1	2	2	3	1	0	0	1	1	3	5	8	9	13	10	8	10	6	7	5	2	2	0		
	1 Hr	7	7	4	12	2	1	1	2	4	12	21	20	27	32	42	38	35	42	40	39	20	15	12	7	
		Mon 2nd July																						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	11:00 PM
Time Drop	0	1	0	0	0	0	0	0	1	3	5	5	6	9	12	11	7	11	16	-	-	-	-	-	-	362
	15	2	1	0	3	0	0	0	1	4	5	4	8	10	9	5	10	9	18	-	-	-	-	-	-	
	30	2	0	0	0	0	0	3	5	3	2	3	9	7	6	12	6	24	22	-	-	-	-	-	-	
	45	0	0	1	0	1	0	2	0	7	8	5	7	9	7	7	5	20	3	-	-	-	-	-	-	
	1 Hr	5	1	1	3	1	0	5	7	17	20	17	30	35	34	35	28	64	59	-	-	-	-	-	-	

Direction A Speed Stats			
<i>Speed Range (kph)</i>	<i>No. Within</i>	<i>No. Below</i>	<i>No. Above</i>
0 - 10	0	0	4796
10 - 20	56	56	4740
20 - 30	79	135	4661
30 - 40	43	178	4618
40 - 50	71	249	4547
50 - 60	204	453	4343
60 - 70	732	1185	3611
70 - 80	1549	2734	2062
80 - 90	1378	4112	684
90 - 100	539	4651	145
100 - 110	125	4776	20
110 - 120	17	4793	3
120 - 130	1	4794	2
130 - 140	0	4794	2
140 - 150	1	4795	1
150 - 160	1	4796	0
160 - 170	0	4796	0
170 - 180	0	4796	0
180 - 190	0	4796	0
190 - 200	0	4796	0

Direction B Speed Stats			
<i>Speed Range (kph)</i>	<i>No. Within</i>	<i>No. Below</i>	<i>No. Above</i>
0 - 10	0	0	4587
10 - 20	25	25	4562
20 - 30	117	142	4445
30 - 40	74	216	4371
40 - 50	135	351	4236
50 - 60	462	813	3774
60 - 70	1413	2226	2361
70 - 80	1496	3722	865
80 - 90	677	4399	188
90 - 100	156	4555	32
100 - 110	27	4582	5
110 - 120	5	4587	0
120 - 130	0	4587	0
130 - 140	0	4587	0
140 - 150	0	4587	0
150 - 160	0	4587	0
160 - 170	0	4587	0
170 - 180	0	4587	0
180 - 190	0	4587	0
190 - 200	0	4587	0

Total Speed Stats								
<i>Speed Range (kph)</i>	<i>No. Within</i>	<i>No. Below</i>	<i>No. Above</i>		<i>Maximum Speed (kph)</i>	<i>Minimum Speed (kph)</i>	<i>Mean Speed (kph)</i>	<i>Median Speed (kph)</i>
0 - 10	0	0	9383		153	11	73	74
10 - 20	81	81	9302		85th %ile Speed (kph)	95th %ile Speed (kph)		
20 - 30	196	277	9106		86	94		
30 - 40	117	394	8989					
40 - 50	206	600	8783					
50 - 60	666	1266	8117					
60 - 70	2145	3411	5972					
70 - 80	3045	6456	2927					
80 - 90	2055	8511	872					
90 - 100	695	9206	177					
100 - 110	152	9358	25					
110 - 120	22	9380	3					
120 - 130	1	9381	2					
130 - 140	0	9381	2					
140 - 150	1	9382	1					
150 - 160	1	9383	0					
160 - 170	0	9383	0					
170 - 180	0	9383	0					
180 - 190	0	9383	0					
190 - 200	0	9383	0					