

APPENDIX E1

Flow Charts for Simplified Assessment Procedures for Providing Noise Mitigation Measures on Existing Flyovers

Simplified Assessment Procedures for Providing Noise Mitigation Measures on Existing Flyovers

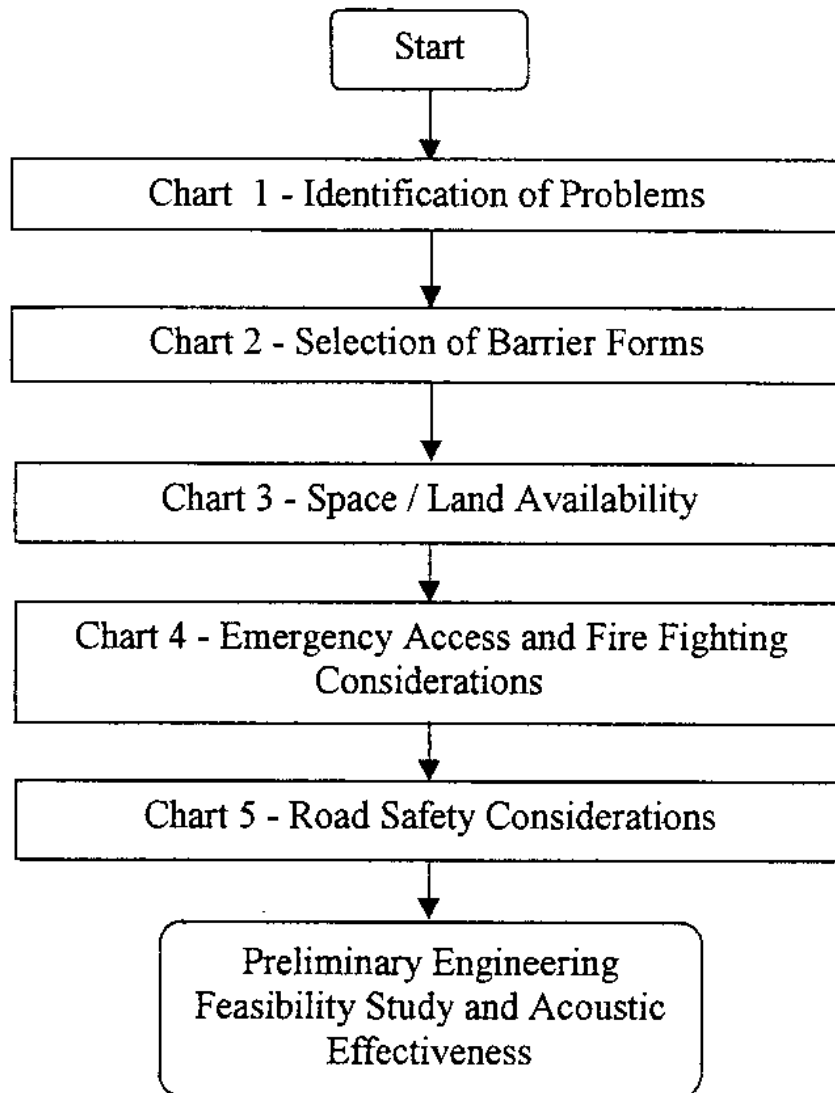
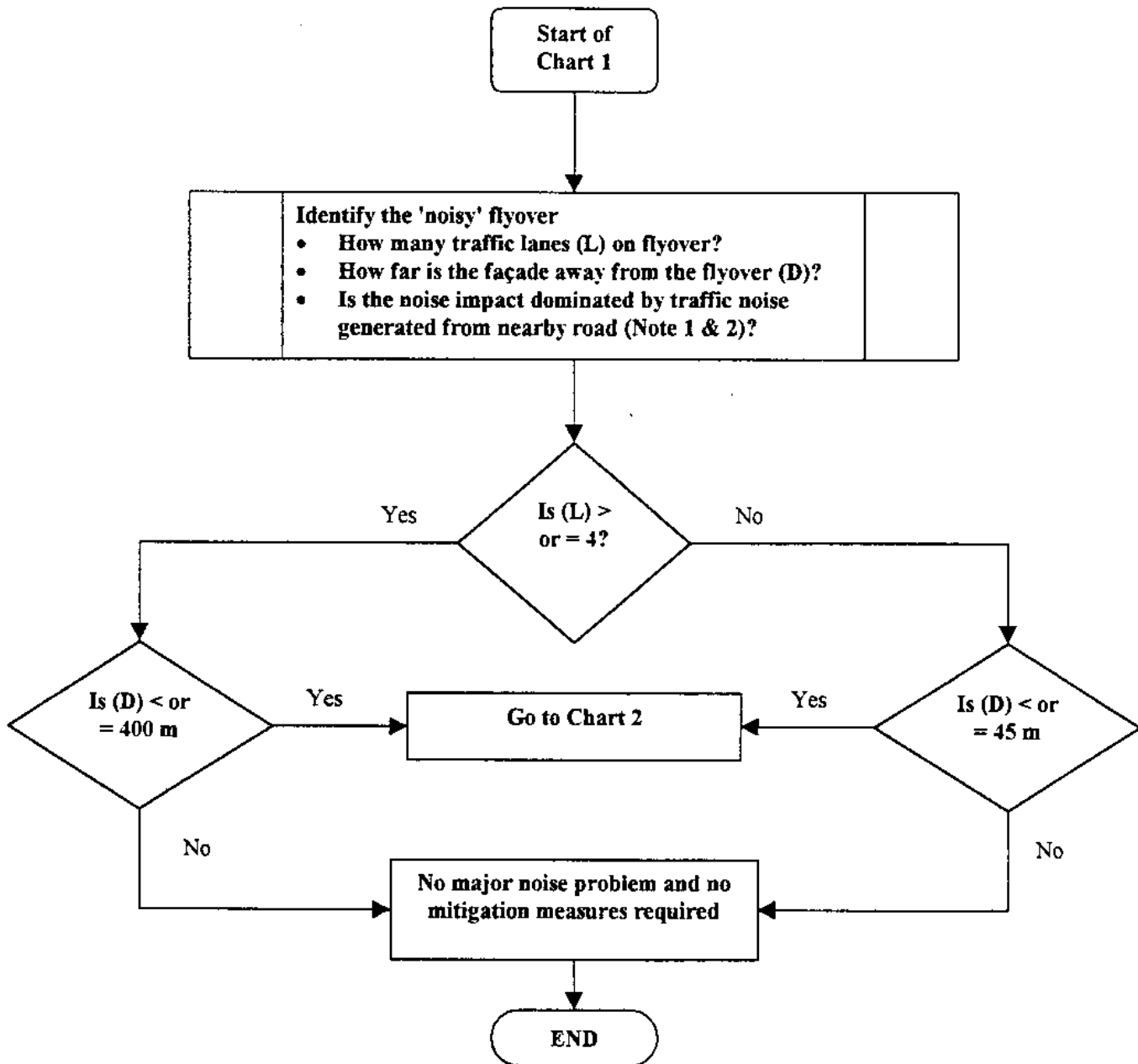


Chart 1 - Identification of Problems



Note 1: If the noise impact is dominated by traffic noise generated from other roads i.e. roads other than the flyover under investigation, no practical scheme should be provided for the flyover under investigation.

Note 2: Noise impacts from other roads are considered predominant if the following conditions apply:

- (a) **Case 1: Other road has more or equal number of traffic lanes**
 The road is 50% closer to the receiver than the road under investigation, while the angle of view of the road is no less than 50%.
- (b) **Case 2: Other road has 50% lesser number of traffic lanes***
 The road is more than 80% closer to the receiver while the angle of view of the road is similar.

* In general, a single two-lane carriageway carries 800 vehicles per hour in two directions while a four-lane single carriageway or a dual two-lane carriageway carries 2,400 to 2,800 vehicles per hour in one direction

Chart 2 - Selection of Barrier Forms

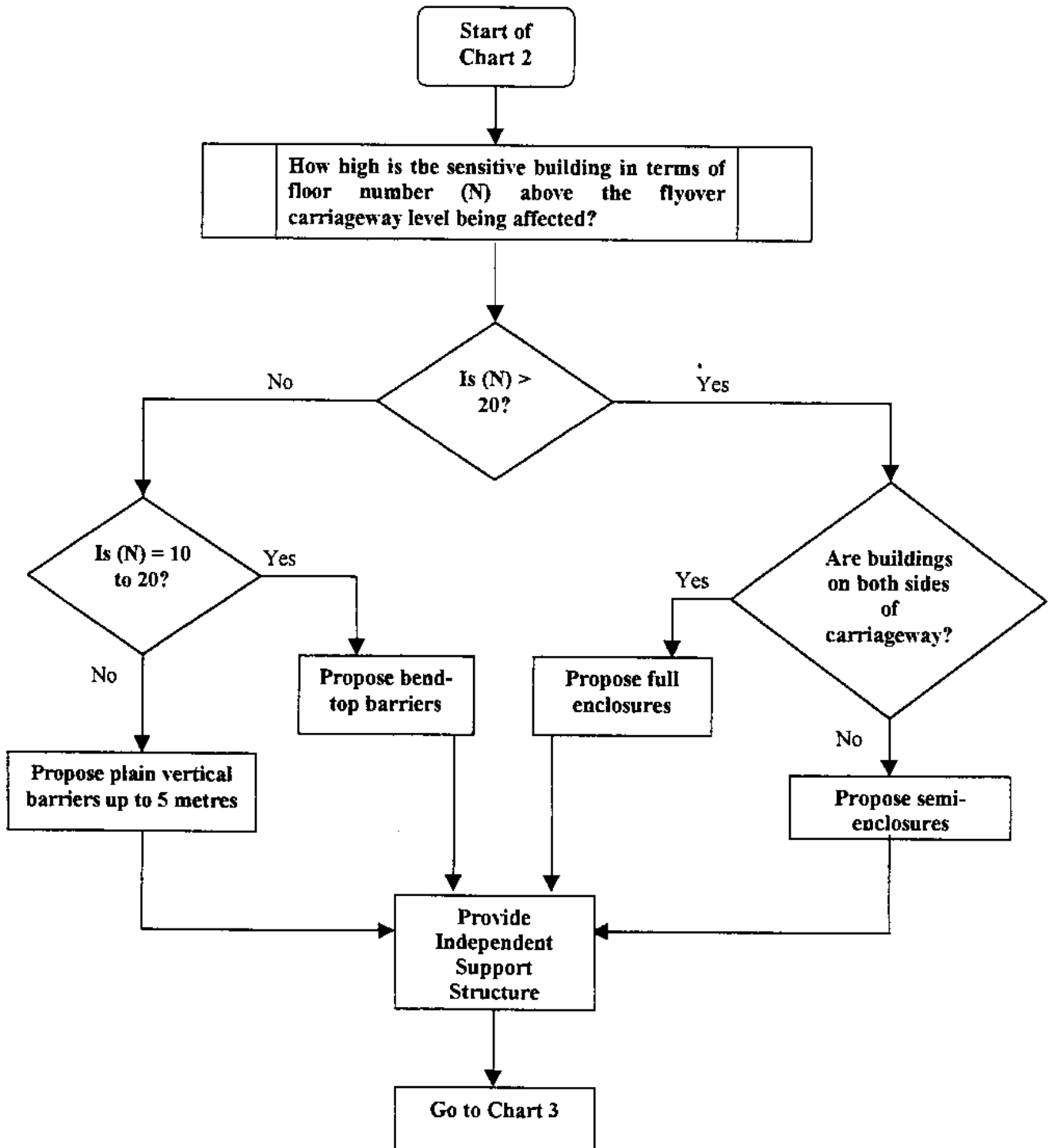
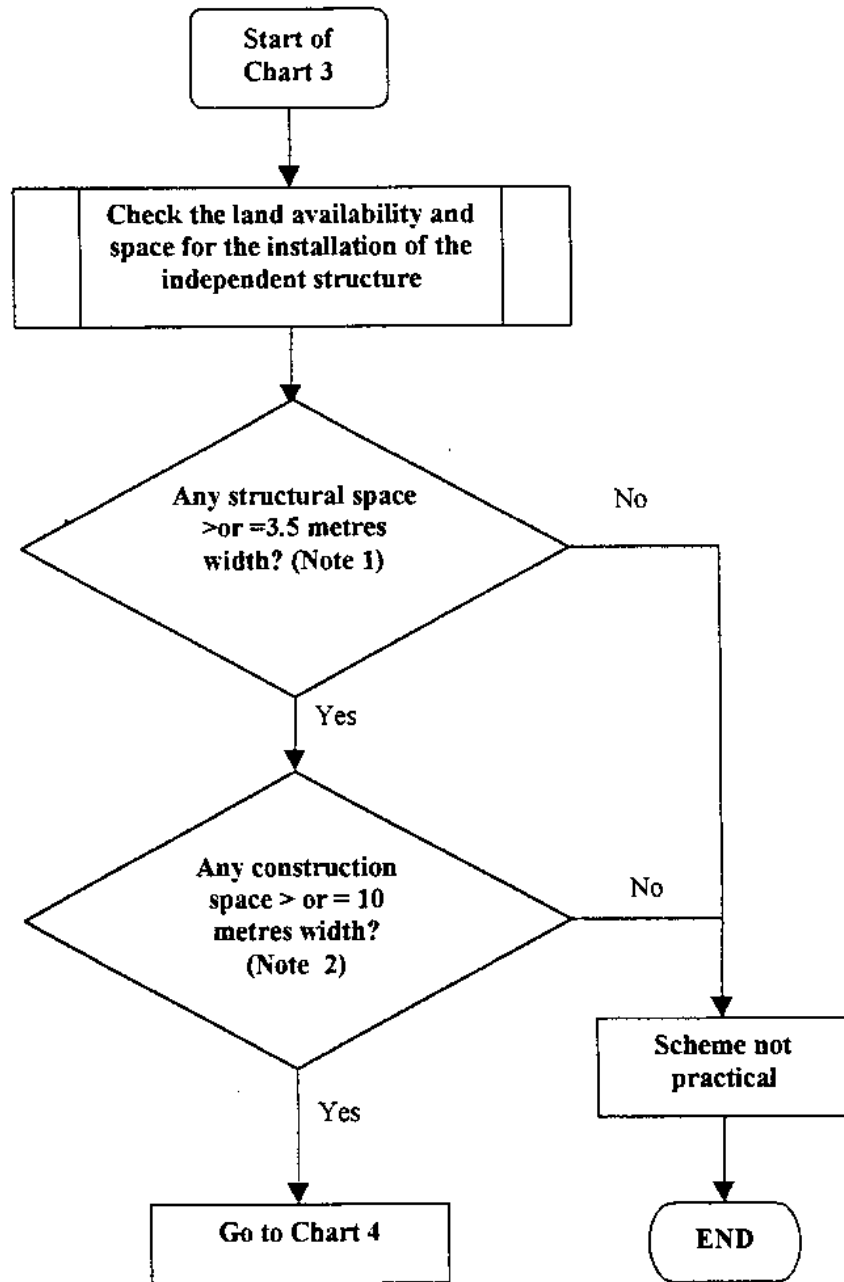


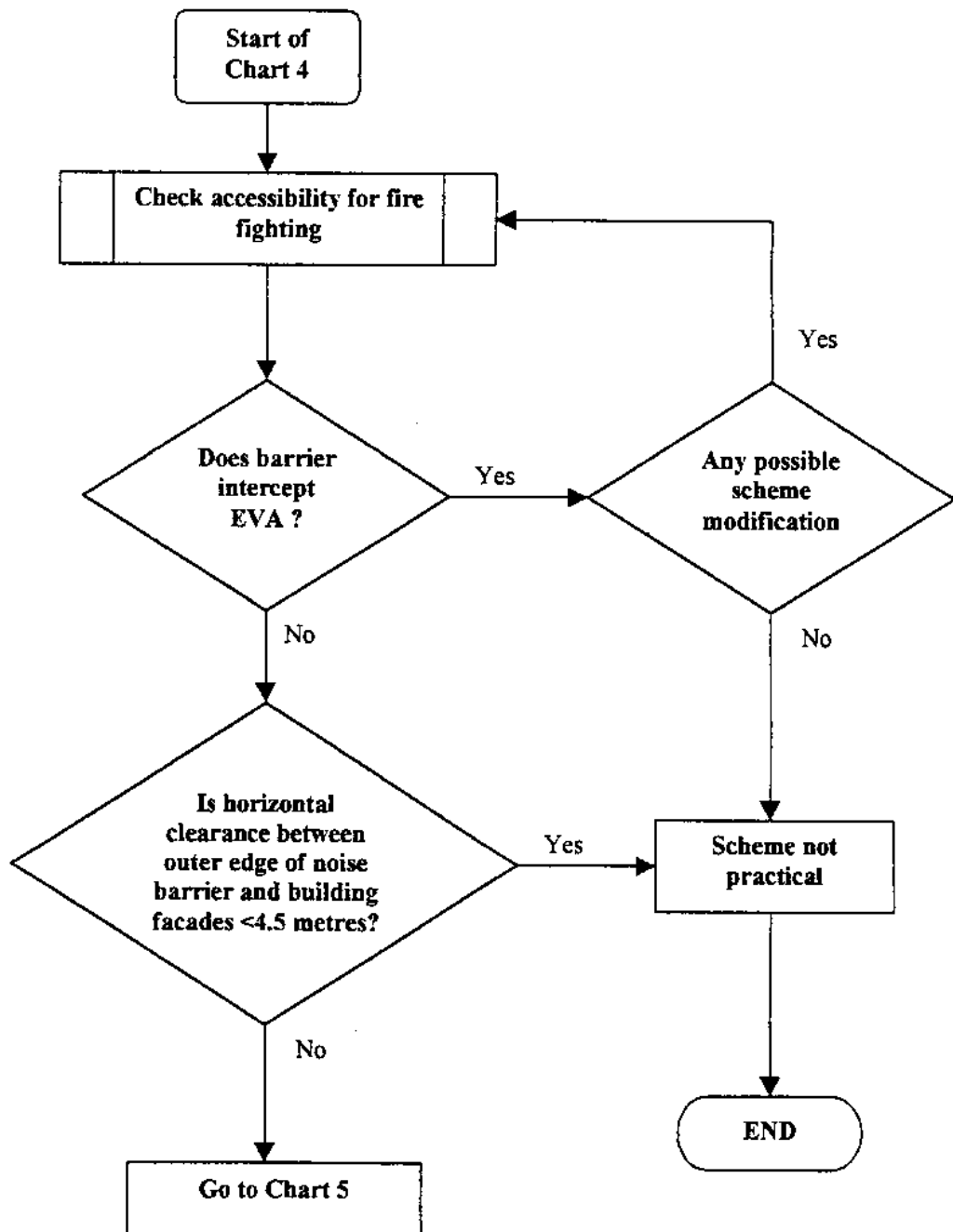
Chart 3 - Space/Land Availability



Note 1 : Adequate structural space shall be provided for the installation of independent structure. In general, at least 3.5 m width strip of land will be required for locating the foundation of independent structure with reasonable maintenance clearance.

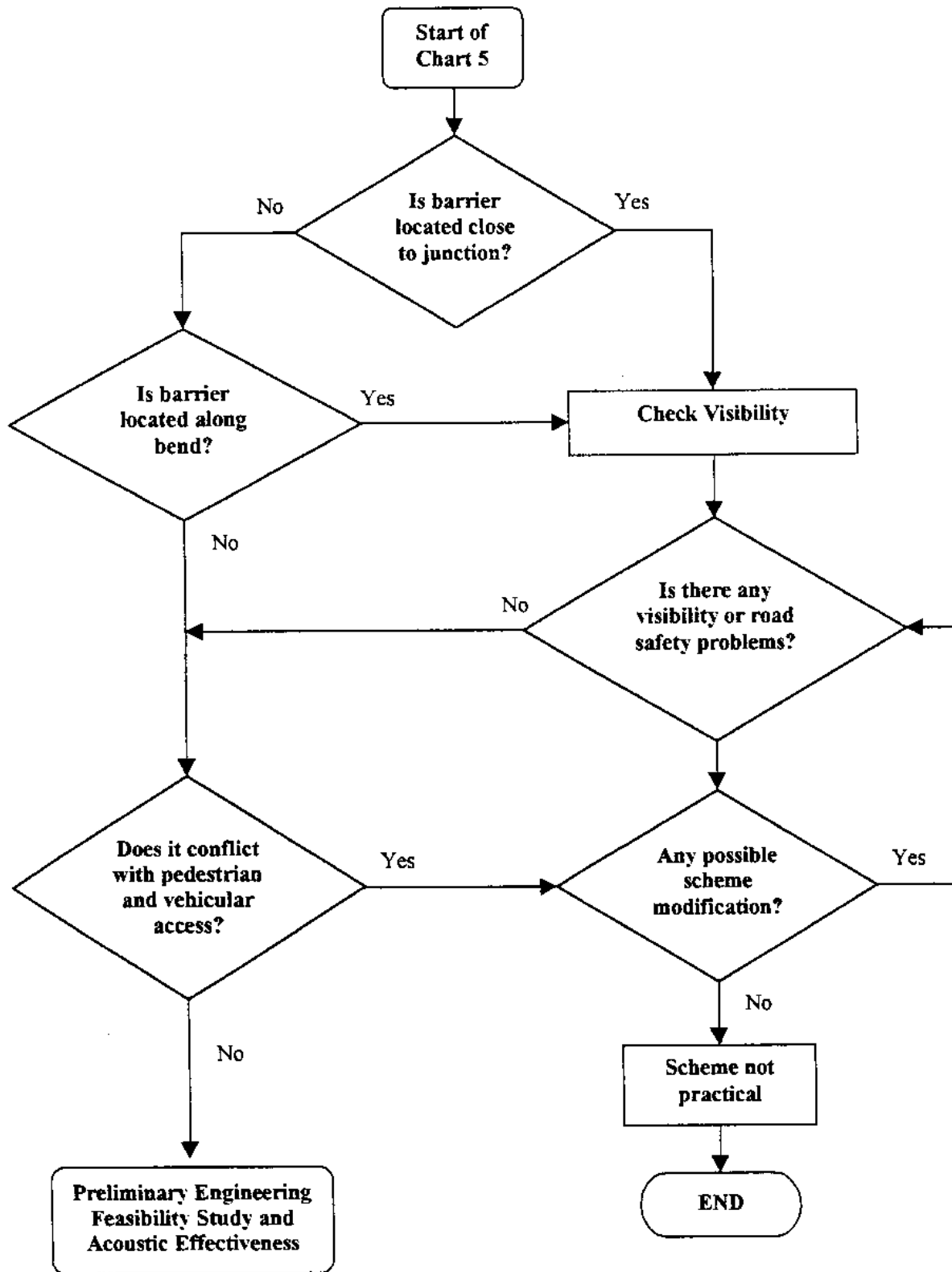
Note 2 : Adequate construction space shall be provided for the foundation works of the independent structure. At least 10 m width strip of land will be required for the operation of piling plants and excavation.

Chart 4 - Emergency Access and Fire Fighting Considerations



Note : EVA - Emergency Vehicular Access for fire fighting.

Chart 5 - Road Safety Considerations



Preliminary Engineering Feasibility Study and Acoustic Effectiveness

	<p>Recommend for preliminary engineering feasibility study</p> <p>Items include</p> <ul style="list-style-type: none"> <input type="checkbox"/> Traffic engineering and road safety appraisal <input type="checkbox"/> Interfacing with utilities <input type="checkbox"/> Structural engineering appraisal <input type="checkbox"/> Landscaping appraisal <input type="checkbox"/> Air quality assessment <input type="checkbox"/> Side Effects <input type="checkbox"/> Costing <input type="checkbox"/> Implementation strategy <p>Conduct Noise Assessment and Evaluate the Level of Protection to the NSRs</p>	
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(a) Two-lane Single Carriageway

Assume:

Volume of Traffic (Q)	= 800 veh/hr.
Speed Correction	= +3.5dB(A)
Angle of View Correction	= 160 degrees

Basic Noise Level	= $10 \times \log 800 + 41.2 + 3.5 = 73.7\text{dB(A)}$
Angle of view correction	= - 0.5dB(A)
Facade correction	= +2.5dB(A)

In order that the $L_{10}(1\text{hr})$ at facade be reduced to 70dB(A), the distance correction must be

$$= 73.7 - 0.5 + 2.5 - 70$$

$$= 5.7\text{dB(A)}$$

Therefore, the distance required = 45m

(b) Four-lane Dual Carriageway

Assume:

Volume of traffic	= 5,200veh/hr
Speed correction	= +4.5dB(A)
Angle of view	= 160 degrees

Basic Noise Level	= $10 \log 5,200 + 41.2 + 4.5 \text{ dB(A)} = 82.9 \text{ dB(A)}$
Angle of view correction	= - 0.5 dB(A)
Facade correction	= +2.5 dB(A)

In order that the $L_{10}(10\text{hr})$ at facade be reduced to 70 dB(A), the distance correction must be

$$= 82.9 - 0.5 + 2.5 - 70$$

$$= 14.9 \text{ dB(A)}$$

Therefore, the distance required = 400m

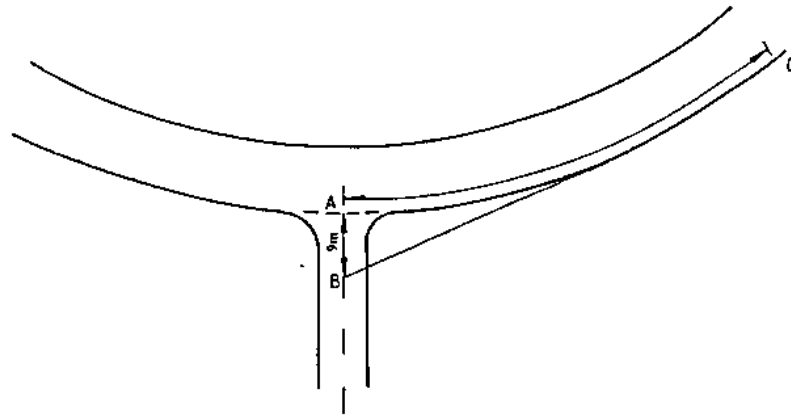
Form of Barrier ⁽¹⁾	Vertical Height of Barrier (m) ⁽²⁾	No. of Floors Protected excluding ground floor ⁽³⁾
Plain Barrier	3	3
	4	4
	5	5
Cantilevered Barrier	5.6	7
	6.4	10
	4.7	6
Partial Enclosures/Full Enclosures	N/A	>10

Note:

1. Assume barrier is erected at 18m from the affected facades and 3m from the road kerb.
2. The height is measured from ground to the highest point of barrier.
3. Indicate the number of floors within the shadow zone of the barrier. Assume 2.8m per floor and ground floor is non-residential.

- (a) The visibility should be available between points 1.05m above the road level and provided by means of a visibility splay whose area is defined by lines joining the points A, B and C as shown in Diagram No. 4.3.8.1 of T.P.D.M.V. 2.4.
- (b) For roads within estates and other local roads of minor nature or experiencing low speeds the distance AC above relating to the 50 km/h design speed may be reduced to 50m.
- (c) In difficult situations the dimension AB may be reduced to 4.5m and in exceptional circumstances 2m but the distance AC as recommended above should always be provided. If AB is greater than 15m high minor road approach speeds can be expected and this situation should receive special consideration. (The dimensions of lines AB and AC also govern the need for "stop" control as opposed to "give way" control).

Visibility Area at Run-ins



(a) Visibility from a run-in should be obtainable between points 1.05m above the road and run-in level over the area described by ABCD in Diagrams 3.6.3.4 of T.P.D.M.V. 2.3

- (i) AC is a line 4.5m in length measured along the centre line of the run-in from the continuation of the nearer edge of the carriageway of the road to which the run-in has access, and
- (ii) BC and CD, are "x"m in length, and "x" is in accordance with the following table and is measured along the nearer edge of the road to which the run-in has access.

Length of Visibility Line "x"

<u>Design Speed of Main Road (km/h)</u>	<u>x(m)</u>
80 or over	150
70	130
60	120
50	60

DESIGN SPEED OF MAJOR ROAD (kph)	120	100	85	70	60	50
DISTANCE AC (m)	300	225	165	125	95	70

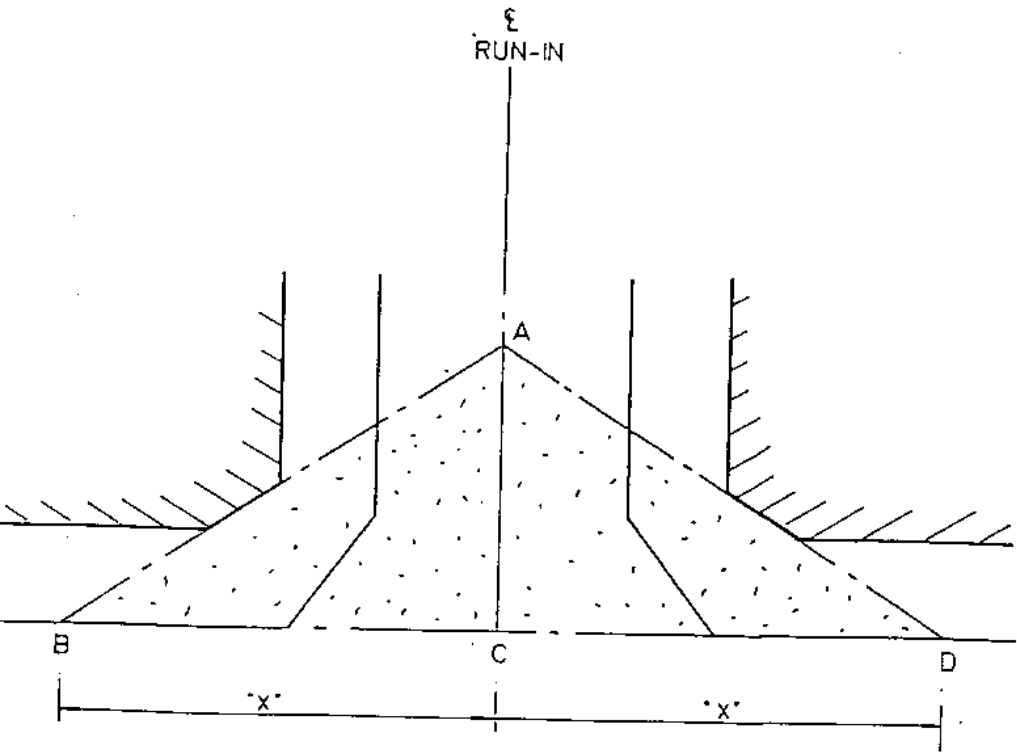
VISIBILITY SPLAYS AT PRIORITY JUNCTIONS

Grade Separated Interchange

(a) Visibility distance are related to the design speed of the road as shown in the following table

Visibility Distances at Grade Separated Interchanges

Design Speed (km/h)	Desirable Minimum (m)	Absolute Minimum (m)
120	300	225
100	225	165
85	165	125
70	125	95
60	95	70
50	70	50
40	50	40
30	40	30



VISIBILITY AREA AT RUN-INS

Siting of Signal Equipments

- (a) The minimum requirement is one traffic signal installed 1m from the stopline, on the nearside of the carriageway. If at all possible a second primary signal is installed if there is a central island or central divider, at the other end of and 1m beyond the stopline. Minimum visibility distances from the primary signals as given in the following table should be satisfied for achieving a safe layout.

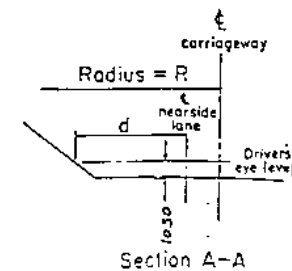
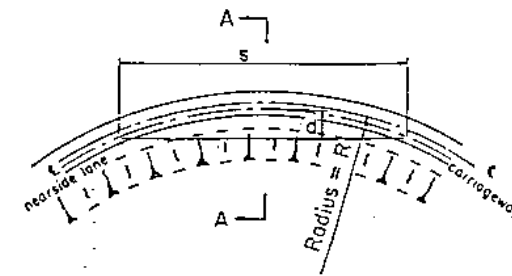
<u>85 percentile approach speed</u>	<u>Visibility distance</u>
50 km/h	70m
60km/h	95m
70 km/h	125m
85 km/h	165m
100 km/h	225m

Sight Distance

- (a) The following table shows the sight distance that should be provided on the approaches to junctions or accesses. Sight distance should be measured between a minimum drivers' eye height of 1.05m, to an object height of 1.05m, both above the centre line of each lane. It follows that junction and accesses should not be provided on sharp curves, where extensive widening of verges, cutting and bridge structures would be required to provide the required visibility. For lower speed Urban Roads, where there are little or no restrictions on pedestrians and accesses, the sight distances shown in the table should be provided throughout the road.

Sight Distance

<u>Design Speed (km/h)</u>	<u>Desirable Minimum (m)</u>	<u>Absolute Minimum (m)</u>
120	300	225
100	225	165
85	165	125
70	125	95
60	95	70



Visibility at Roundabout

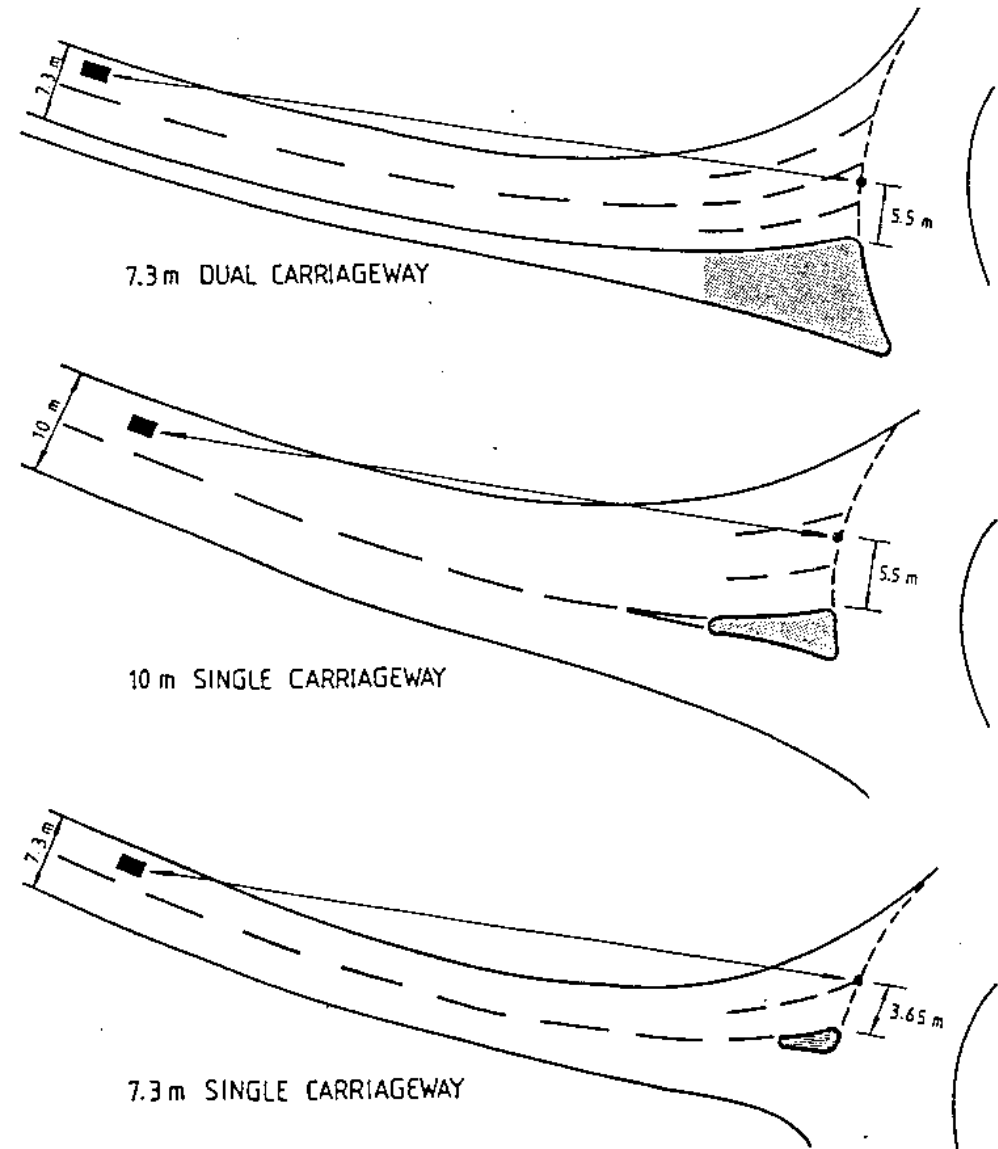
- (a) Visibility distance should be measured between a driver's eye height of 1.05m and an object height of 1.05m, both measured from the centre line of each lane.
- (b) the forward visibility at the approach to a roundabout shall not be less than that shown below. The visibility distance should be measured to the "Give Way" line as shown in Diagram 4.5.11.1 of T.P.D.M.V. 2.4.

Sight Distance

Design Speed (km/h)	100	85	70	60	50
Desirable Minimum (m)	225	165	125	95	70
Absolute Minimum (m)	165	125	95	70	50

- (c) No noise mitigation measures shall be erected at a roundabout within a distance of 15m back from the "Give Way" line as shown in Diagram No. 4.5.11.2, 4.5.11.3 and 4.5.11.4 of T.P.D.M.V. 2.4.
- (d) During the detailed design stage, where a pedestrian crossing is located across the entry to a roundabout, drivers approaching the roundabout should have visibility to the crossing of a distance not less than that shown in (b). Additionally, drivers at the "Give Way" line of one entry should be able to see the full width of a crossing located at the next entry if this is within 50m of the roundabout. This requirements, illustrated in Diagram No. 4.5.11.5 of T.P.D.M.V. 2.4, may be difficult to achieve in urban areas owing to adjacent roadside development.

DESIRABLE / MINIMUM VISIBILITY DISTANCE FOR APPROACH ROAD DESIGN SPEED



MEASUREMENT OF APPROACH VISIBILITY

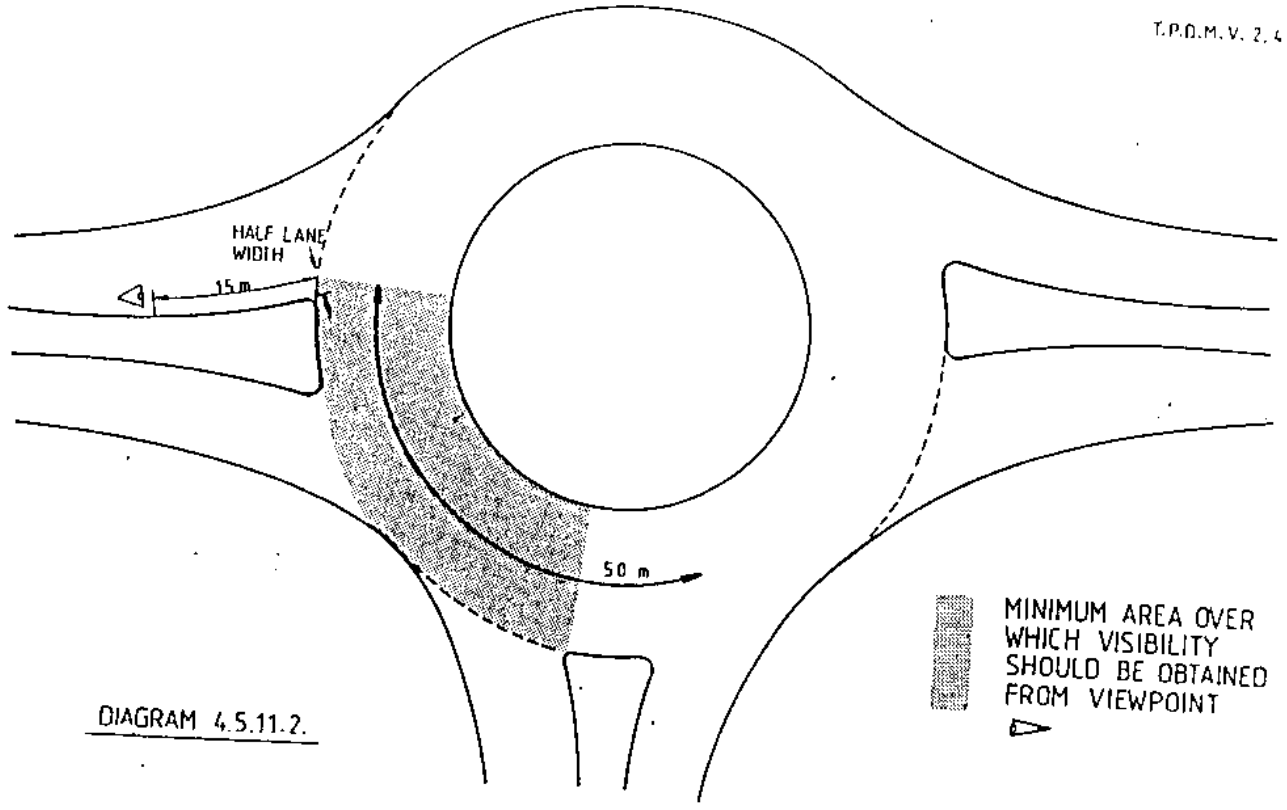


DIAGRAM 4.5.11.2.

VISIBILITY TO THE RIGHT REQUIRED AT ENTRY

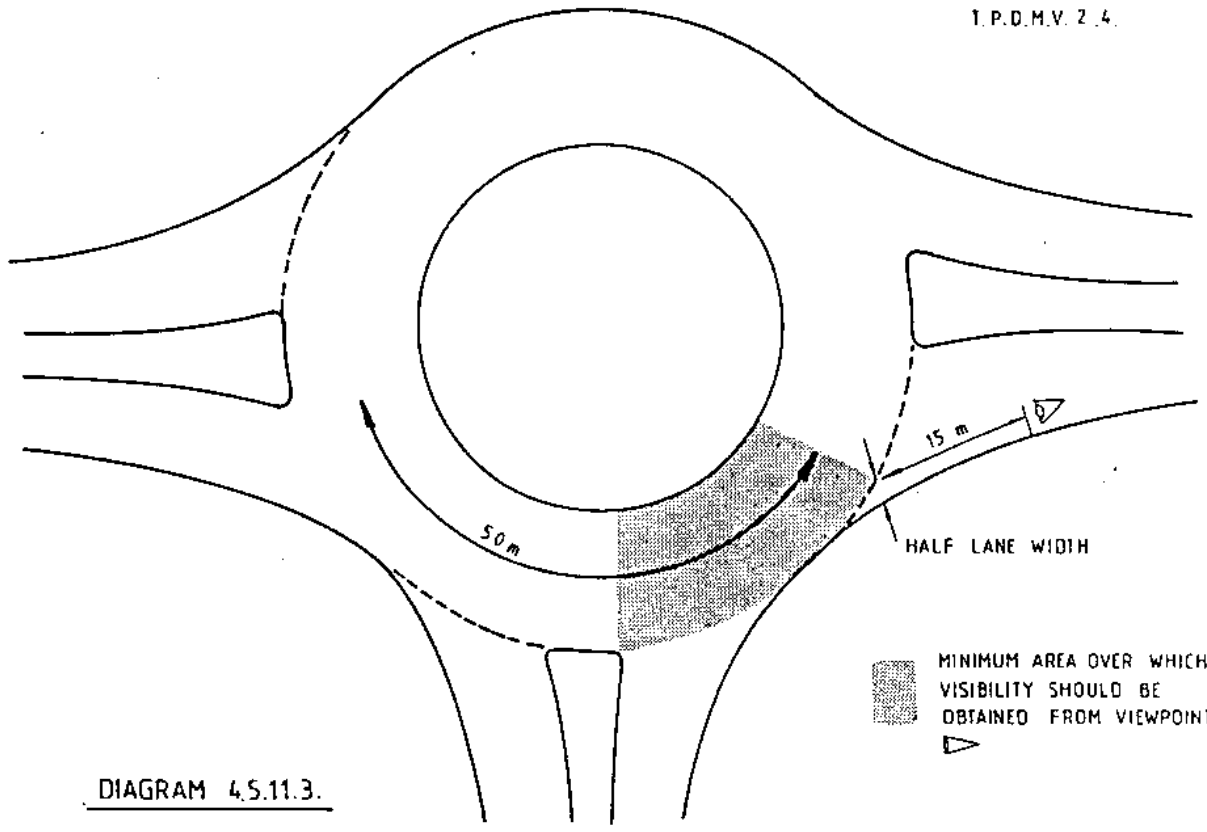
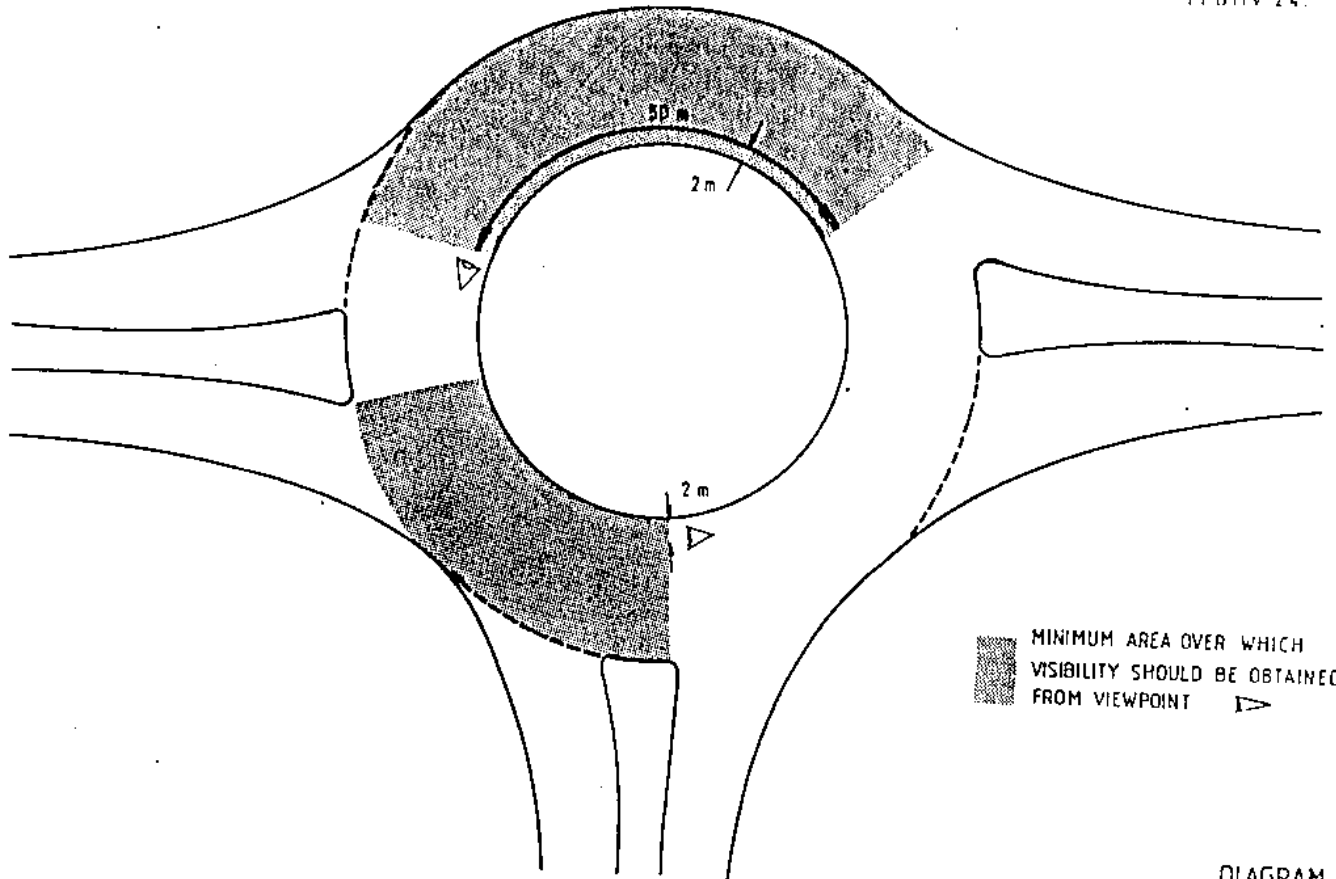


DIAGRAM 4.5.11.3.

FORWARD VISIBILITY REQUIRED AT ENTRY





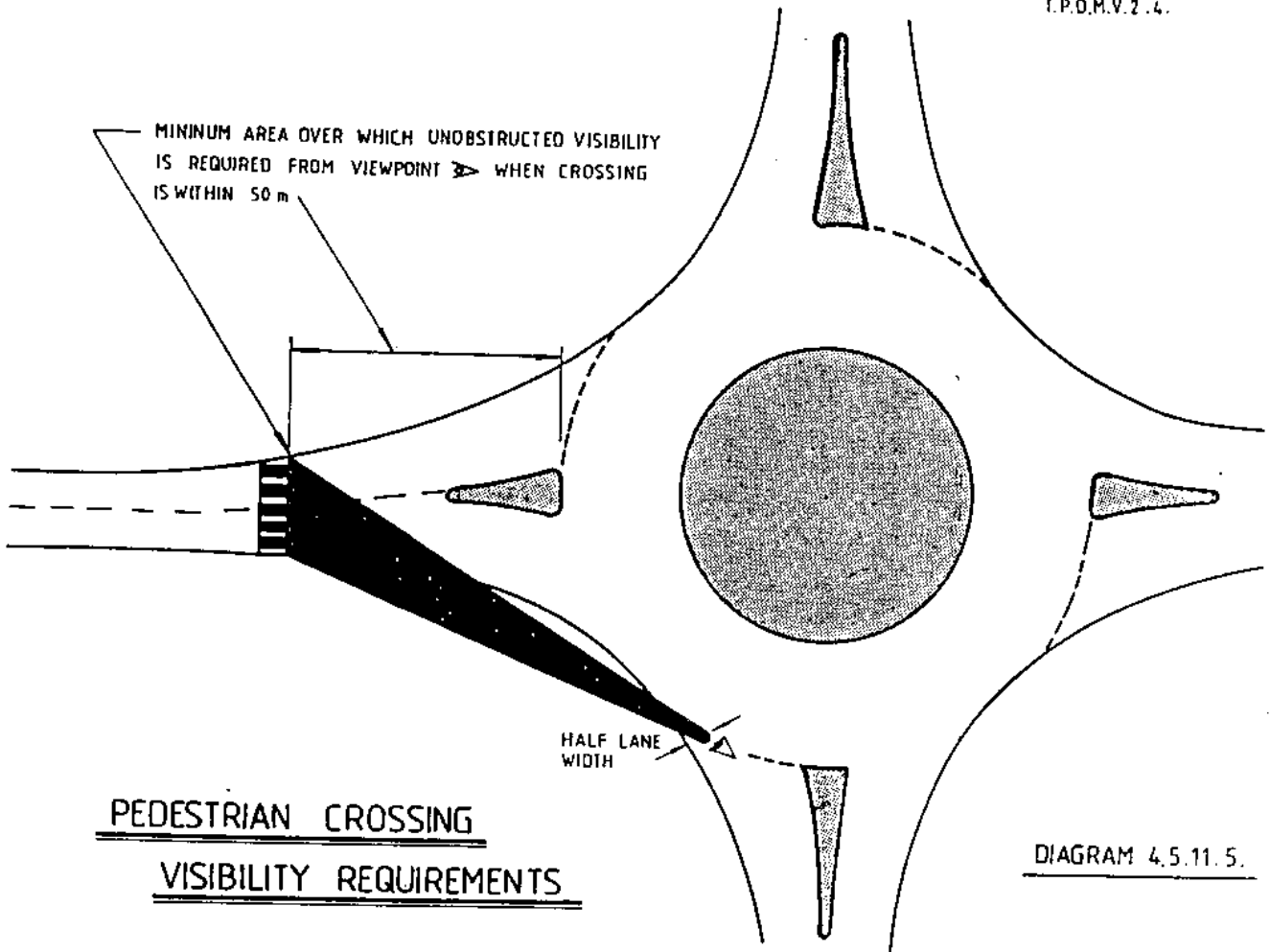

 MINIMUM AREA OVER WHICH
 VISIBILITY SHOULD BE OBTAINED
 FROM VIEWPOINT 

DIAGRAM 4.1

CIRCULATORY VISIBILITY REQUIRED



MINIMUM AREA OVER WHICH UNOBSTRUCTED VISIBILITY
 IS REQUIRED FROM VIEWPOINT  WHEN CROSSING
 IS WITHIN 50 m

HALF LANE
WIDTH

PEDESTRIAN CROSSING
VISIBILITY REQUIREMENTS

DIAGRAM 4.5.11.5.