
Appendix 5B
Accessway standards and guidelines

Introduction

This Appendix sets out Transit's safety standards for accessways onto state highways. Transit will seek to have these standards incorporated into RMA plan rules as appropriate. The Appendix contains the following sections:

1. General accessway safety considerations.
2. Sight distances.
3. Accessway spacing standards.
4. Accessway geometric design diagrams.
5. Trip generation rates.
6. Accident effects of accessways.
7. Checklist of techniques to reduce adverse safety impacts of accessways on state highways.

App5B.1

Accessway safety considerations

Accessway safety considerations

All new accessways to state highways must meet acceptable standards for road safety and must not place road users, users of the accessway, or pedestrians at significant risk of injury. In determining the acceptability of a proposed accessway, Transit will consider:

- Whether or not it is practicable for access to the site to be provided from a local road rather than directly from the state highway;
- Compliance with Transit's standards for sight distances, as set out in App5B.2 below;
- Consistency with Transit's guidelines for spacing between the accessway and adjacent accessways and intersections, as set out in App5B.3 below;
- Compliance with Transit's standards for the geometric design of accessways, set out in App5B.4 below;
- The type (including the proportion of heavy commercial vehicles) and volume of traffic using the accessway and the state highway;
- The Regional State Highway Strategy and/or Network Management Plan for the state highway and in particular whether any changes to posted speed limit, additional lanes or other road improvements are anticipated;
- The safety record of the state highway in the vicinity of the site;
- The optimum location of any accessway onto the state highway for that particular site, whether there are already any accessways from the site directly to a state highway and whether there is a need to limit the number of accessways (including by closing any existing accessways) or separate entry and exit;
- The provision for manoeuvring on site and whether or not any reverse manoeuvring onto or from the state highway would be required;
- The adequacy of queuing and parking provision on site and in particular whether or not vehicles would be likely to queue over vehicle crossings or onto the state highway;
- Whether particular mitigation measures such as a deceleration or turning lane are required;
- Any cumulative effects of the proposed accessway and other new accessways on the safety or function of the state highway; and
- The particular safety needs of cyclists and pedestrians.

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Wider issues **The ability of a proposed accessway to meet acceptable safety standards does not necessarily mean Transit support for a development proposal under the RMA will be forthcoming.**

Accessway safety is just one of a number of factors that Transit will assess before determining its support or otherwise for a development proposal. In particular, Transit will generally refuse direct access to motorways and has a strong presumption against private access to expressways, bypasses and other state highways with more than 2 lanes in rural and peri-urban areas. Section 5.2 of the PPM sets out Transit’s policy on development and access.

District plans Transit will generally seek for district and where appropriate regional, plans to classify all developments involving direct access to any state highway according to the suggested rules set out in Appendix 4B. These include suggested rules relating to the accessway safety standards set out in this Appendix.

App5B.2 Sight distances

Sight distances Required sight distances for accessways are determined with reference to the **85th percentile operational speed¹**. This should be measured at the accessway location. However, where the 85th percentile operating speed has not been measured, Transit will generally use the state highway’s **posted speed plus 10km/h** as an approximation for the 85th percentile operational speed, because this generally reflects driving behaviour in New Zealand.

Required minimum sight distances on this basis are set out in table App5B/1 below and illustrated in Diagram A and Perspective A. Transit will generally object to developments and/or (where a proposed accessway is to/from a state highway that is a Limited Access Road) refuse to authorise a crossing place if those crossing places do not comply with these standards.

Table App5B/1 – Sight distance standards²

Posted speed limit (km/h)	85 th percentile operating speed, measured at the site (or if above not known, posted speed plus 10 km/h)	Minimum sight distance standard (m)
Not applicable	50	89
50	60	113
60	70	140
70	80	170
80	90	203
90	100	240
100	110	282

¹ Refer Appendix 1 - Glossary. 85th percentile operational speed must be measured at the site.

² Based on Absolute Minimum Safe Intersection Sight Distances (SISD) in Austroads Guide to Traffic Engineering Practice Part 5, Intersections at Grade, 2005 (table 6.3). The 85th percentile operating speed is used instead of design speed in this table.

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Example *An accessway to/from a state highway with a 100km/h posted speed limit will generally require 282m sight distances in both directions. If however the 85th percentile operating speed measured at the location is 100km/h, sight distances of 240m will be required.*

Grade corrections These minimum sight distances may be increased or decreased for roads with gradients of 2% or more, as follows:

Table App5B/2 – Grade corrections to sight distance standards³

Posted speed limit (km/h)	85 th percentile operating speed (or if above not known, posted speed plus 10 km/h)	Sight distance grade corrections (m)							
		Upgrade				Downgrade			
		2%	4%	6%	8%	2%	4%	6%	8%
Not applicable	50	-	-1	-2	-3	-	2	3	4
50	60	-1	-2	-3	-4	1	3	4	6
60	70	-2	-4	-5	-7	2	4	7	9
70	80	-3	-5	-7	-9	3	6	10	13
80	90	-4	-7	-10	-13	4	8	13	19
90	100	-5	-9	-14	-17	6	12	18	26
100	110	-7	-13	-18	-23	7	16	25	36

Example *An accessway to/from a state highway on a 6% gradient with a 70km/h posted speed limit will generally require:*

When uphill of the accessway:

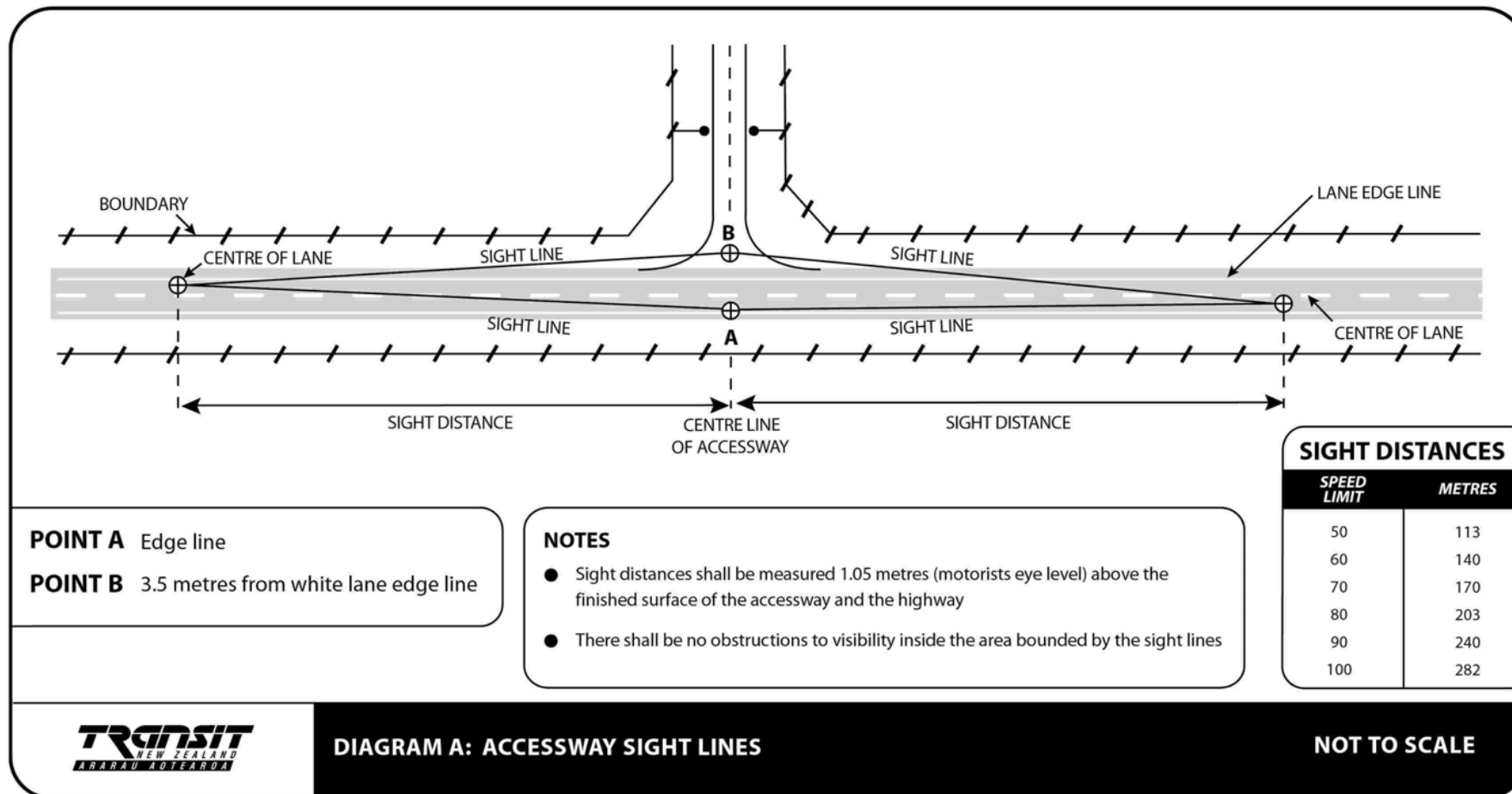
Sight distance required = 203 + 10 = 213m

When downhill of the accessway:

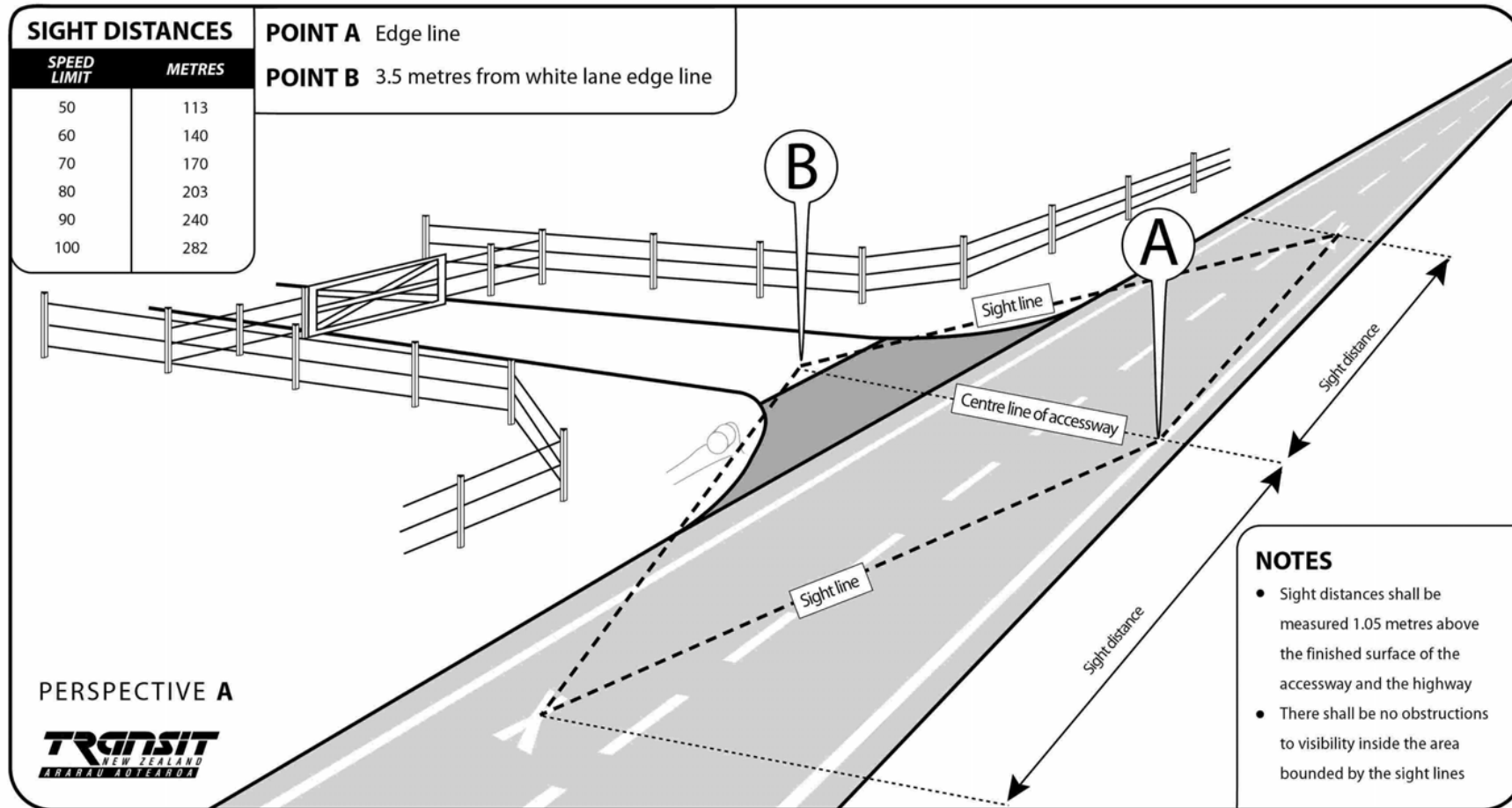
Sight distance required = 203 - 7 = 196m

³ Based on Austroads Guide to Traffic Engineering Practice Part 5, Intersections at Grade, 2005 (table 6.4). The 85th percentile operating speed is used instead of design speed in this table.

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App5B.3

Accessway spacing guidelines

Accessway spacing and safety

Accessway spacing has an influence over both network efficiency and road safety, as set out in section App5B.6 below. The denser the spacing, the more turning movements are likely to take place. This may reduce the average speed of traffic on the main road and increase the number of crashes, particularly:

- as the volume of traffic on the main road increases, by reducing the average following distances between vehicles and increasing the likelihood of rear-end collisions;
- as the volume of vehicles using the accessway increases, by increasing the frequency of turning movements;
- as the proportion of slow, heavy or long vehicles using the accessway increases, since these take longer to turn; and/or
- at higher speeds.

Accessway geometric design

The geometric design of an accessway and in particular whether provision is made for left turn acceleration/deceleration lanes or right turn bays, will affect the extent to which following vehicles must slow down for a turning vehicle. This in turn influences the probability of collisions. Guidance on geometric design is provided in section App5B.4 below.

Accessway spacing and spacing between accessways and intersections

The minimum spacing between a proposed new accessway and adjacent accessways and intersections will be determined on a case-by-case basis in accordance with the accessway safety considerations set out in App5B.1. In particular the following factors will be taken into account:

- the category of the road under state highway categorisation;
- the volume of traffic on the state highway, including at peak times;
- the number and type of vehicles using the accessway, including at peak times;
- the geometric design of the accessway; and
- the posted speed.

Medium to high volume accessways

Accessways that are likely to generate 100 or more ecm/day, or have peak hour flows of 20 or more ecm/hr, will normally be treated as intersections for the purposes of access safety and will be expected to comply with the intersection spacing policy set out in section 3.5 of the PPM.

Accessway spacing on high volume national state highways

Where an accessway to/from a *national* state highway that is operating at a high volume (over 10,000 vpd) is proposed, Transit will generally seek accessway spacings that are significantly greater than those it will seek on other state highways.

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Guideline spacings Other accessways will normally be expected to meet the accessway spacings set out in table App5B/3 and illustrated in diagram B and perspective B below.

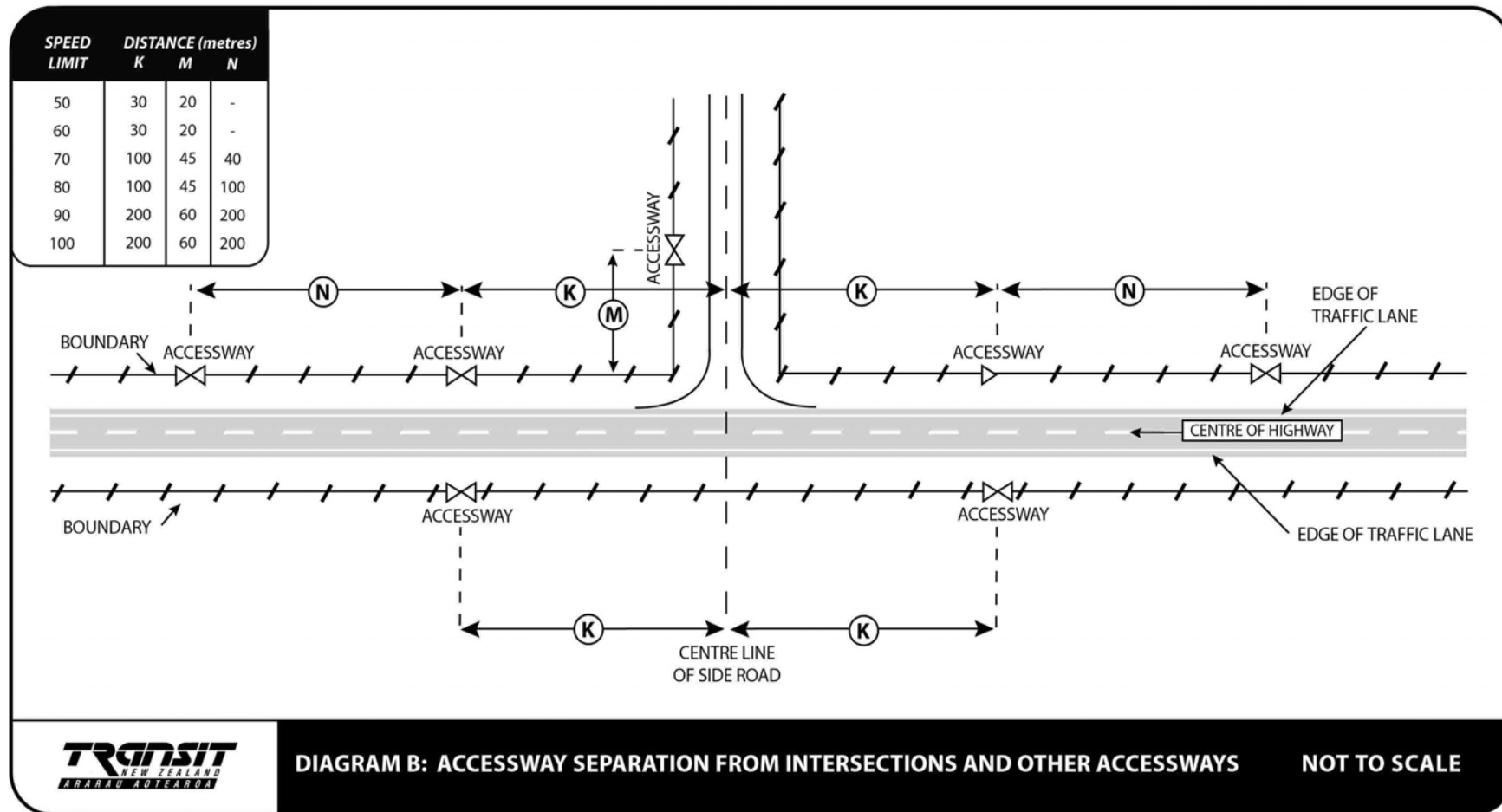
Table App5B/3 – Guidelines for minimum accessway spacings

Posted speed limit (km/h)	85 th percentile operating speed (or if not known, posted speed plus 10 km/h)	Recommended minimum distance between accessway and nearest intersection (m)	Recommended minimum distance between local road accessway and intersection (m)	Recommended minimum distance between accessways (m)	Desirable ⁴ spacings between accessways and between intersections and accessways on national state highways carrying over 10,000 vpd.
Not applicable	50	30	20	-	125
50	60	30	20	-	160
60	70	30	20	-	220
70	80	100	45	40	305
80	90	100	45	100	400
90	100	200	60	200	500
100	110	200	60	200	500

⁴ Based on Entering Sight Distances (ESD) in Austroads Guide to Traffic Engineering Practice Part 5, Intersections at Grade, 2005 (table 6.3). The 85th percentile operating speed is used instead of design speed in this table.

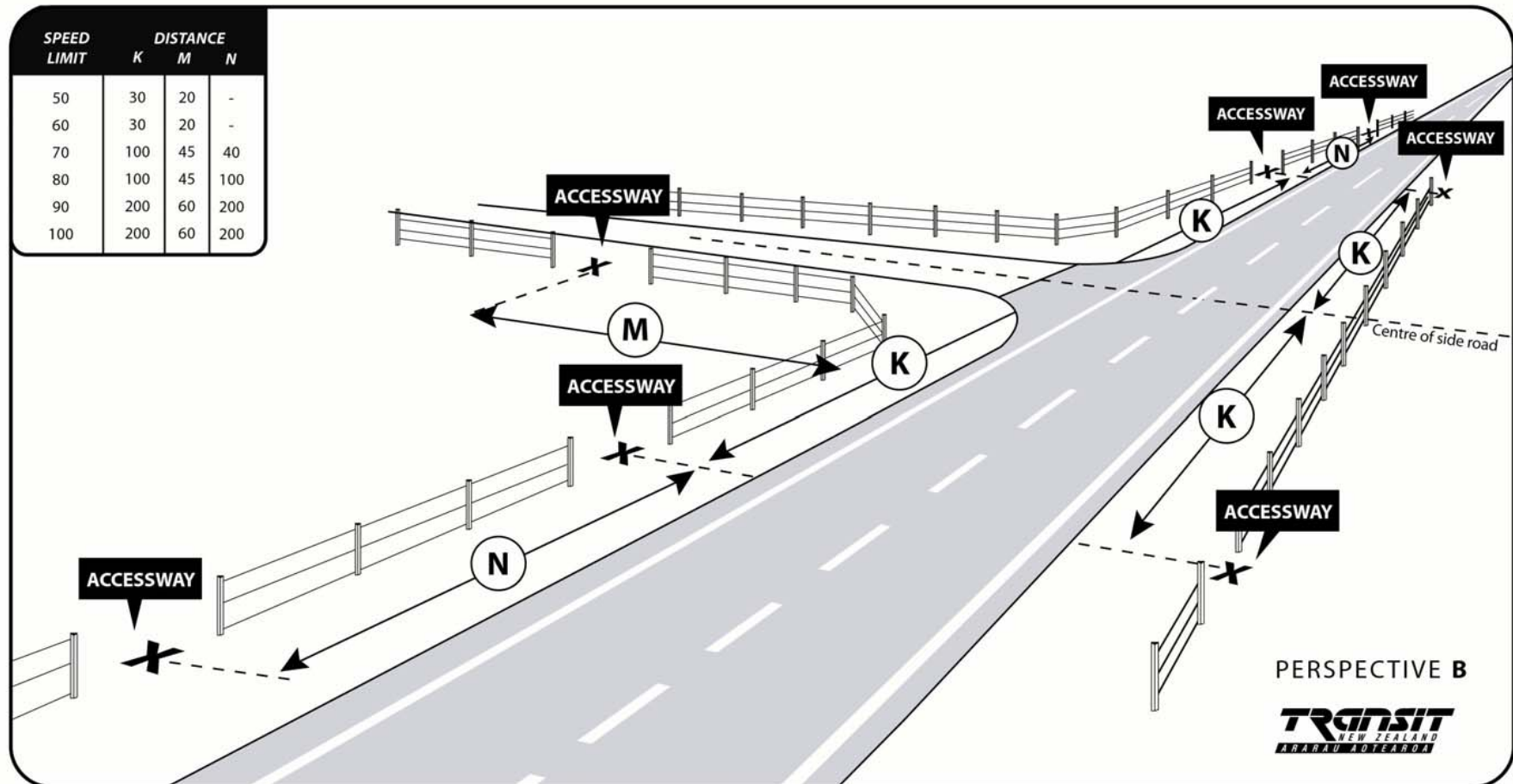
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Diagram B – Accessway separation from intersections and other accessways



Appendix 5B – Accessway standards and guidelines

Perspective B– Accessway separation from intersections and other accessways



App5B.3 Accessway geometric design

Geometric design

Every accessway to/from a state highway should be designed on a case-by-case basis, with regard to the considerations set out in the general accessway safety considerations in App5B.1 above. In particular the following parameters should be taken into account when designing the accessway:

- the type of traffic using the accessway (and in particular the likely numbers of and proportion of use by, slow, heavy or long vehicles);
- the volume and frequency of traffic likely to use the accessway, including at peak times;
- the volume of traffic on the state highway, including at peak times; and
- whether the state highway is two-lane and the current and proposed facilities for passing and overtaking at that location (as described in Regional Passing and Overtaking Plans).

Proposed accessway designs provided to Transit for review should include details of:

- accessway seal widths, curve radii, tapers, approach gradient and the recessing of gates.
 - any proposed requirements for seal widening, left turning slip roads, right turning bays, or other alterations to the state highway.
-

Medium to high volume accessways

As for accessway spacing, accessways that are likely to generate 100 or more ecm/day, or have peak hour flows of 20 or more ecm/hr, will normally be treated as intersections for the purposes of accessway safety and will generally be required to comply with the intersection design standards contained within the relevant Austroads guides, which are listed in the draft SHGDM.

Accessways on or near passing and overtaking facilities

Accessways proposed on or near locations where passing and overtaking facilities are provided or planned (such as passing lanes, slow vehicle bays, or 2+1 lanes) are subject to special consideration and are not covered by the geometric designs set out below.

Other accessways

Accessways that fall below the thresholds above in *rural* and *peri-urban* areas will normally be categorised as follows:

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Table App5B/4 – Accessway types

Type of traffic using accessway (more than one slow, heavy or long vehicle movements per week?)	Volume of traffic using accessway (ecm/day ⁵)	Volume of traffic using state highway (vpd)	Accessway type
No	1-30	< 10,000	Diagram and Perspective C
		>=10,000	Diagram and Perspective D
	31-100	< 10,000	Diagram and Perspective D
		>=10,000	Diagram and Perspective E
Yes	1-30	All	Diagram and Perspective D
	31-100	All	Diagram and Perspective E

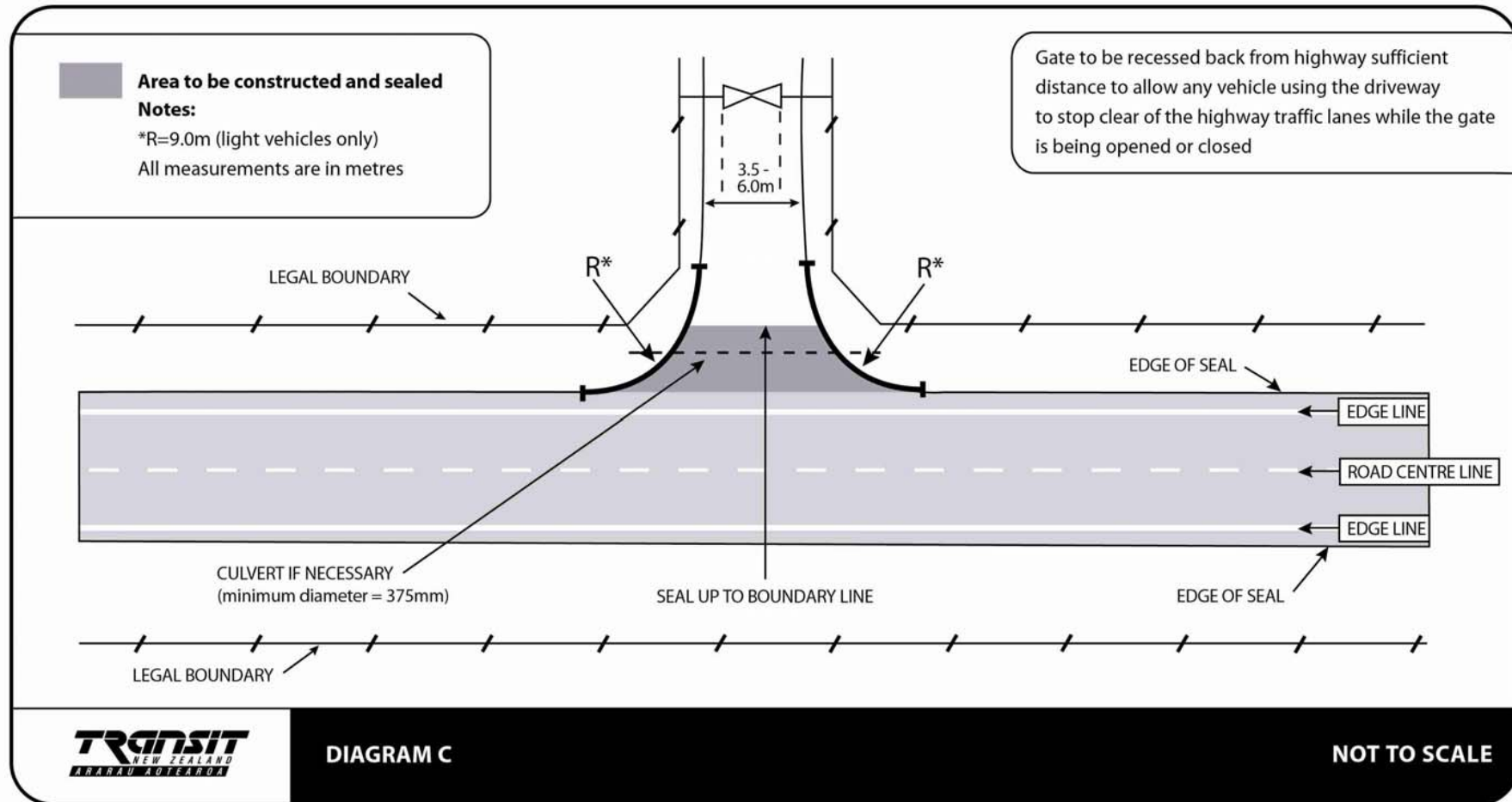
Other accessway geometric design detail

Guidance on other aspects of accessway geometric design, such as the requirements where culverts are likely to be needed to accommodate a watercourse or drain, may be found in Transit’s Geometric Design Manual available on www.transit.govt.nz.

⁵ Equivalent car movements per day. This is calculated either as an annual average, or as a weekly average, whichever is the greater, to cater for seasonal peaks. For further detail see the glossary in Appendix 1.

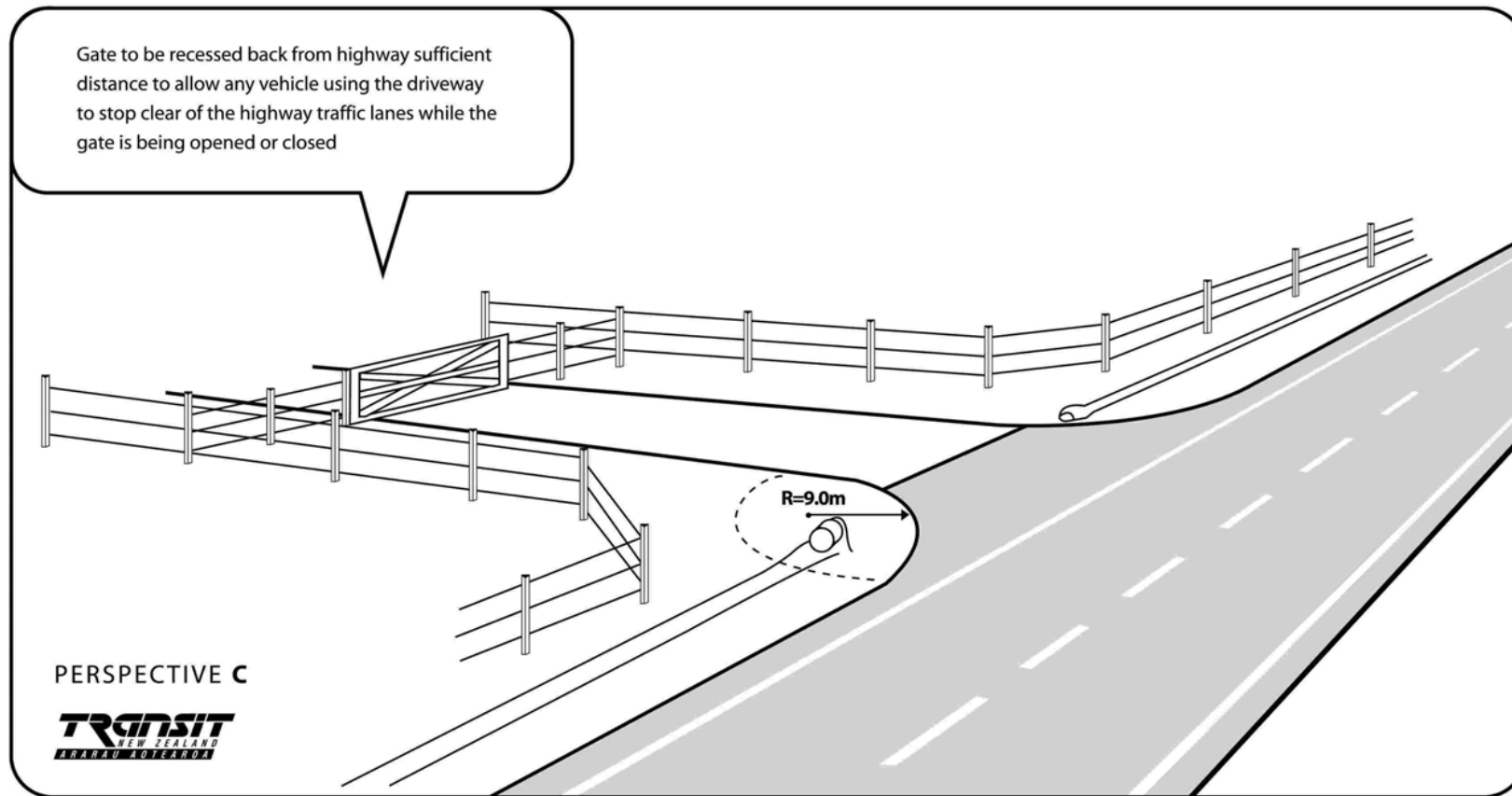
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Refer to Table App5B/4 for when this accessway type should be applied



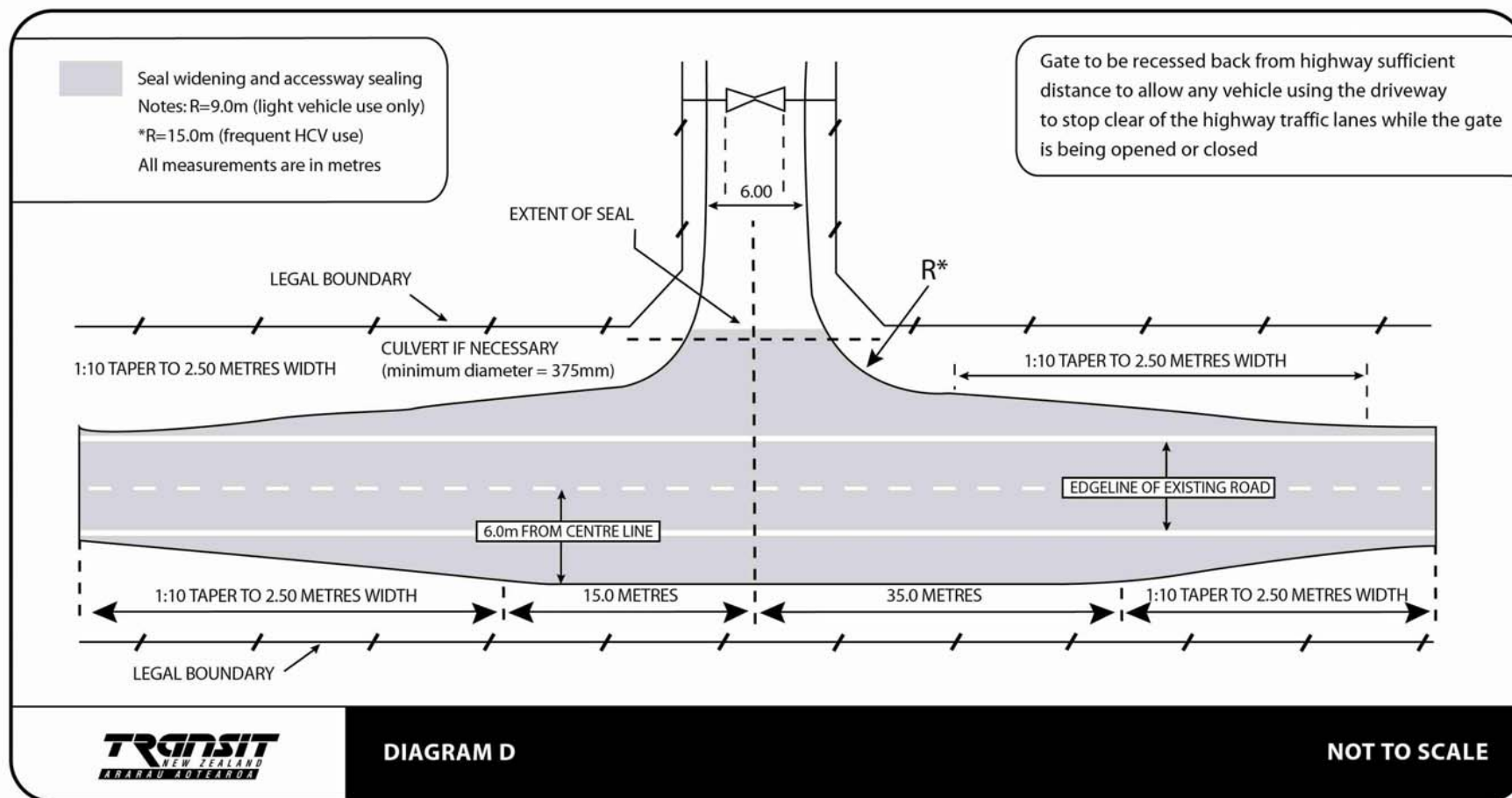
Appendix 5B – Accessway standards and guidelines

Refer to Table App5B/4 for when this accessway type should be applied



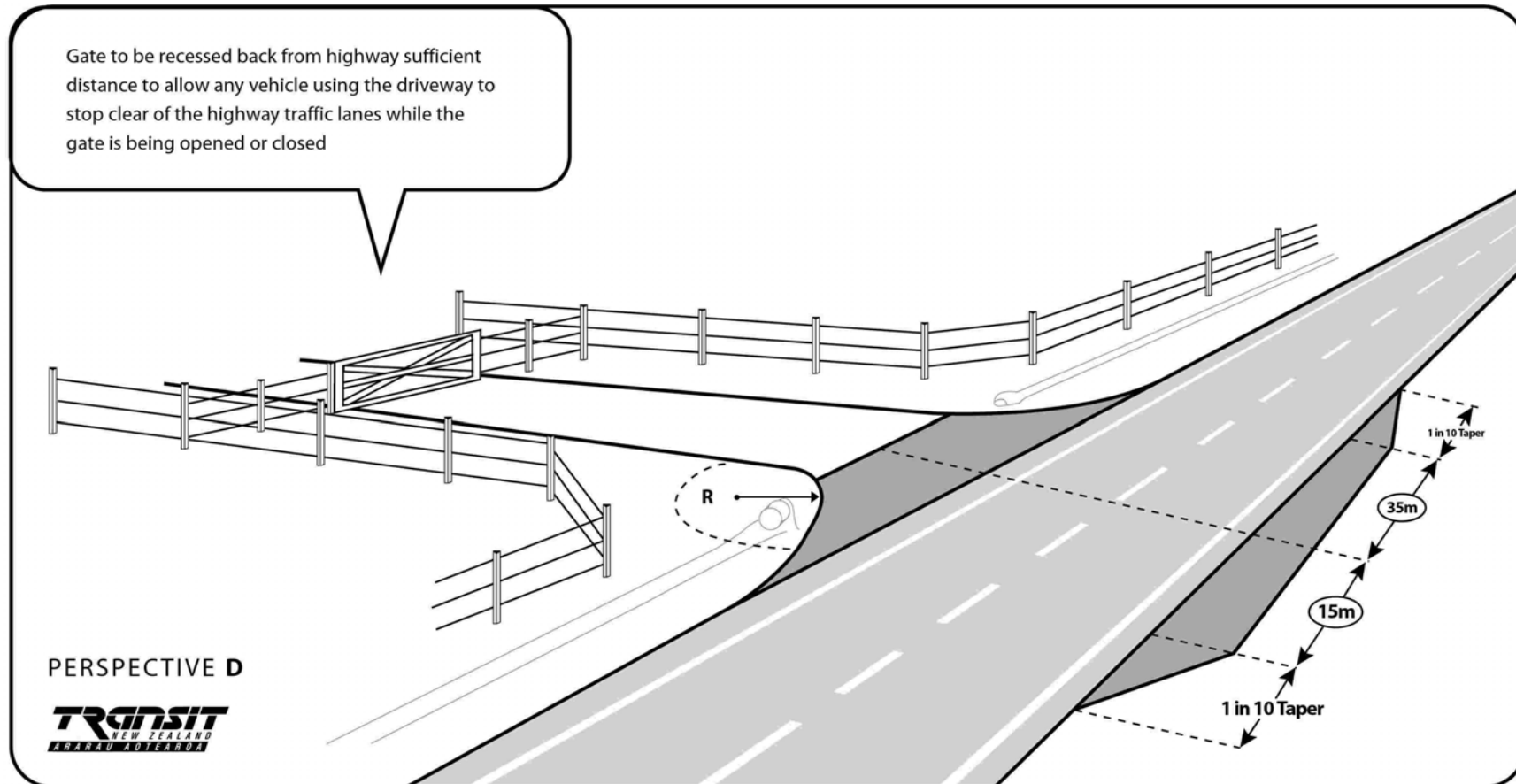
Appendix 5B – Accessway standards and guidelines

Refer to Table App5B/4 for when this accessway type should be applied



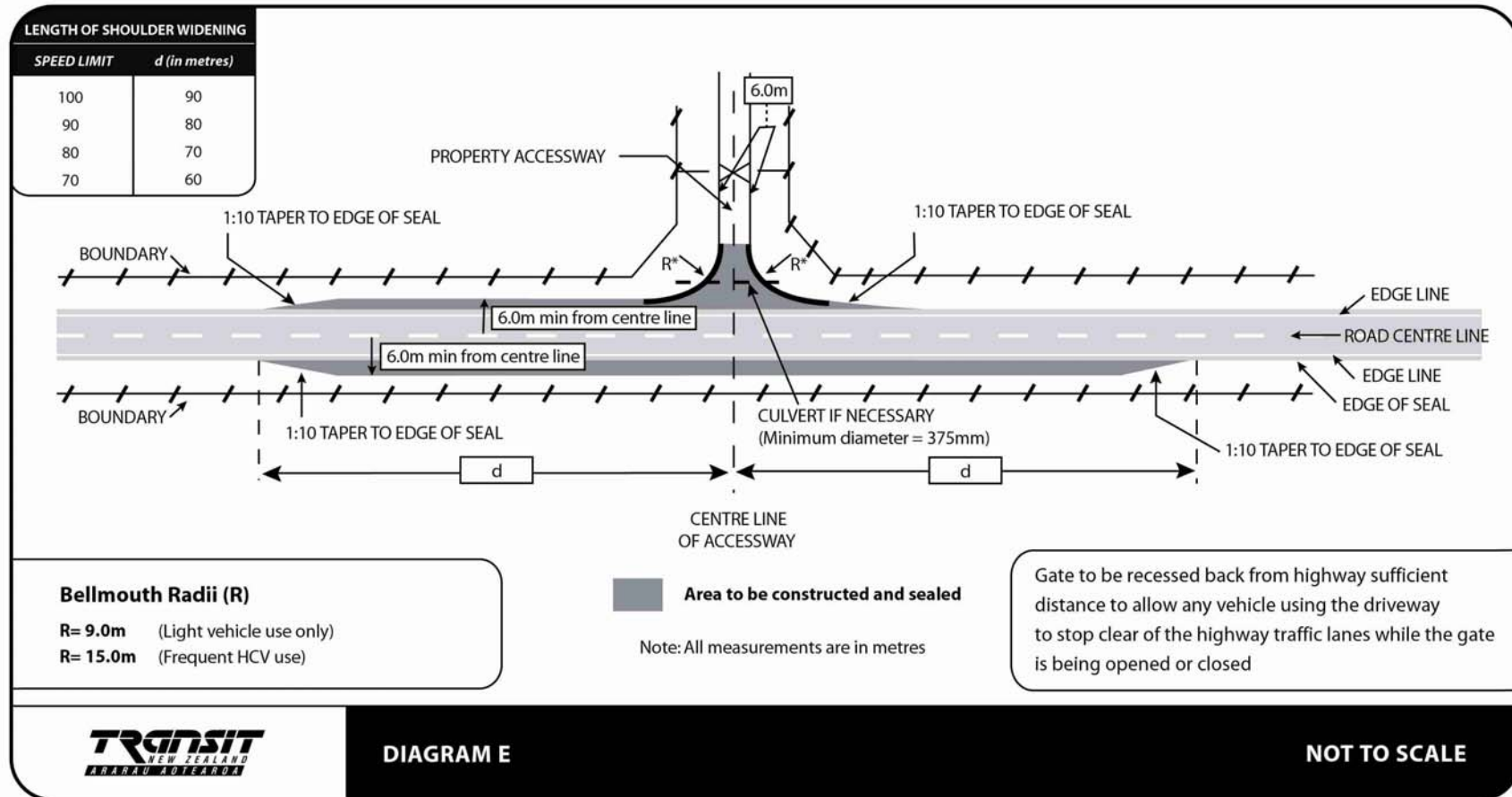
Appendix 5B – Accessway standards and guidelines

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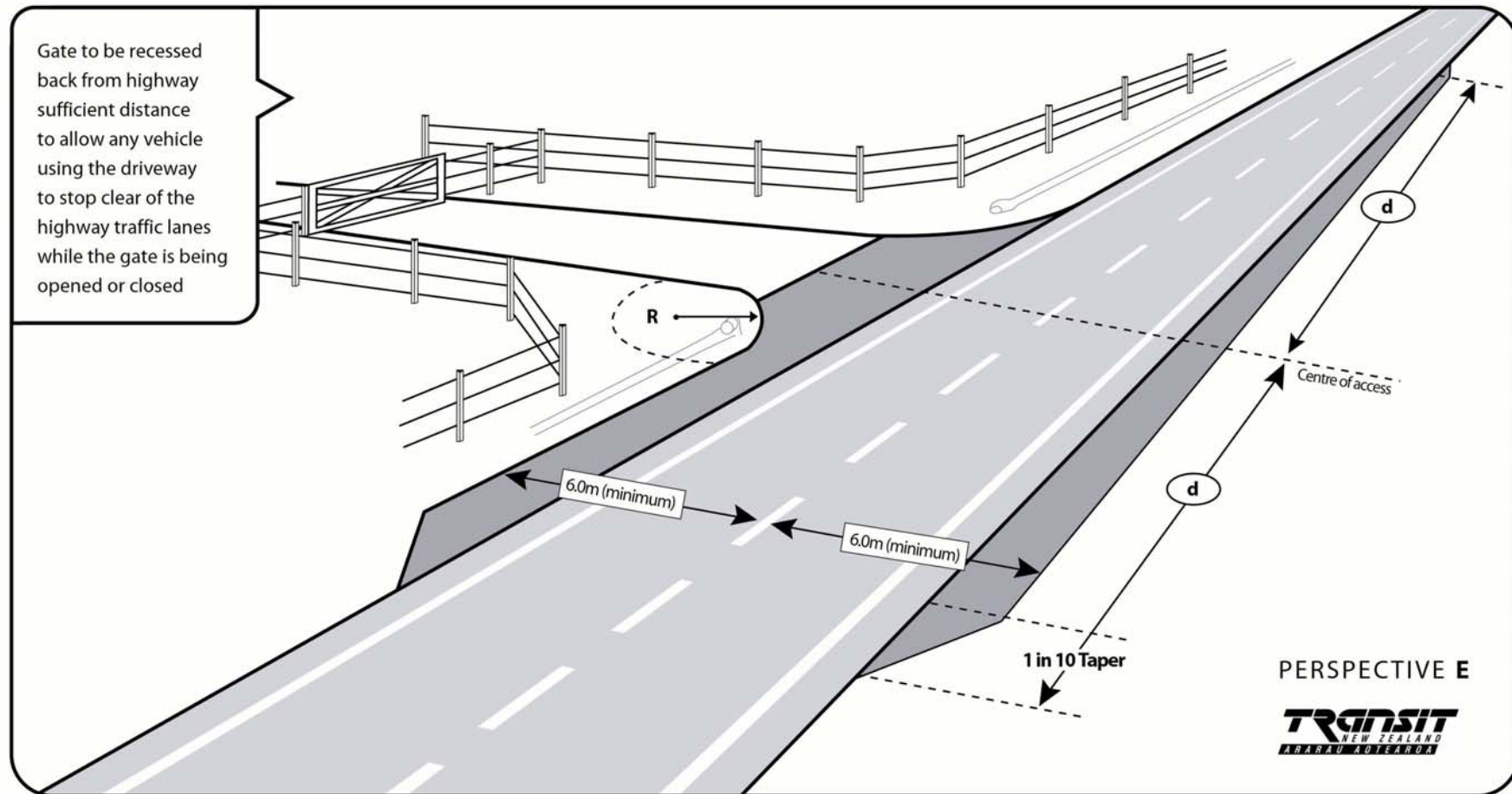
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Refer to Table App5B/4 for when this accessway type should be applied



Appendix 5B – Accessway standards and guidelines

Refer to Table App5B/4 for when this accessway type should be applied



App5B.5 Trip generation rates

Trip generation rates

The trip generation characteristics of new development proposals should be assessed on a case-by-case basis. However Transit will generally assume the following trip generation rates from development unless data is available or provided that suggests alternative rates should be used:

Table App5B/5 – Typical New Zealand trip generation rates⁶

Land Use	Trip Generation Rates	
	Daily (vpd)	Peak hour (vph)
Dwelling houses	10.4/dwelling	1.2/dwelling
Medium density residential flat building	6.8/dwelling	0.8/dwelling*
Housing for aged and disabled persons	2.0/available bed	0.5/available bed
Motels	11/occupiable unit	1.5/occupiable unit
Commercial premises/offices	20/100m ² GFA	2.0/100m ² GFA*
Shopping centres (<4,000m ²)	160/100m ² GFA	23.8/100m ² GFA
Shopping centres (4,000-10,000m ²)	87/100m ² GFA	14.5/100m ² GFA
Shopping centres (>10,000m ²)	47/100m ² GFA	9.9/100m ² GFA*
Service stations with retail facilities	600/100m ² GFA 174/filling position	120/100m ² GFA 10/filling position
Supermarkets	130/100m ² GFA	17.8/100m ² GFA
Markets	-	0.5/100m ² GFA
Bulky goods/home improvement stores	40/100m ² GFA	5.9/100m ² GFA*
Video stores	250/100m ² GFA	36/100m ² GFA*
Drive-in fast food restaurant	320/100m ² GFA	30/100m ² GFA
Restaurants	66/100m ² GFA	3.7-155.5/100m ² GFA
Gymnasiums	35/100m ² GFA	8.7/100m ² GFA
Factories	30/100m ² GFA	2.0/100m ² GFA* 0.3/100m ² SA
Road transport terminals	-	0.6/100m ² GFA*
Medical centres	58/100m ² GFA 31/doctor	6.5/doctor
Hospitals	10/100m ² GFA 12/bed	1.4/100m ² GFA 1.3/bed

GFA = gross floor area

SA = site area

* = small sample, use with caution

⁶ From Transfund New Zealand Research Report No.209 (2001) – Table 6.1.

App5B.6 Accident effects of accessways

Table App5B/6 – Summary of accident effects of accessways on rural roads⁷

General statements	<ul style="list-style-type: none"> • A common rule of thumb is that each extra accessways increases the accident rate by 10 accidents per 100mvkm, not including major intersection accidents. • Removal of access restrictions (say, a ten-fold increase in accessway density) can increase the accident rate⁸ 2 - 3 times or more. Typically, the comparative accident rates for no access control: partial control: high level of control will be roughly in the ratios 100:60:40. • Permitting minor intersections and a few private entrances (partial control) has been found to increase the rate 40 - 60%. One source estimates an increase of up to 15% for each new accessway. • Removal of controls on a partially-controlled highway (permitting frequent private entrances) can increase the accident rate a further 60 - 75%, or up to 10% for each new accessway. • The effect of access controls is much greater at lower traffic volumes. Adding 10 accessways per kilometre can increase the accident rate by a multiple of 4 at 2000 vehicles/day. • The increase in accident rate is greater on 4-lane undivided roads than on 2-lane or divided roads. 4-lane undivided sections have higher accident rates than 2-lane sections with the same level of access.
Effects of minor junctions	<ul style="list-style-type: none"> • Each minor junction adds about 35 accidents/100mvkm(a) to the accident rate on 2-lane highways and about 25 accidents/100mvkm on 4-lane highways. (Thus, on a typical base of 150 accs/100mvkm on 2-lane roads and 100 accidents/ 100mvkm for 4-lane roads, going from zero to one junction per km could add about 25% to the rate and from one to two would add a further 20%.) • These effects are affected by alignment. A 2-lane road with average curvature of 7 degrees will have 20-25% higher accident rate than a road with average curvature of 3 degrees, at closely-settled rural accessway spacings.
Effects of non-commercial accessways	<ul style="list-style-type: none"> • Each residential accessway adds 1-1.5% to the accident rate on low- access 2-lane rural roads. • On 4-lane rural roads, each private accessway adds 2-3% to the accident rate at low degrees of curvature. • The effect of each entrance on the accident rate could be as high as 15% with higher average degrees of curvature. Medians reduce this effect.
Effects of commercial accessways	<ul style="list-style-type: none"> • Each commercial accessway per kilometre can add 5-10% to the accident rate at low access frequencies (additional 10-15 acc/100mvkm for each accessway). • The effect is speed-related. The accident rate could be held roughly constant after adding an average of one business accessway per kilometre, if speed is reduce by 10km/h (e.g. from 90 to 80 km/h)
Effects of medians	<ul style="list-style-type: none"> • Each accessway on a 4-lane rural highway is found to be up to 10 times more hazardous without a median than with one; adding a median to a 4-lane rural road can reduce total accidents by 30-40%.

⁷ Brindle, R. *Relationship between accidents and access conditions*. Research Report ARR 320 (1998). ARRB Transport Research Ltd, Victoria, Australia.

⁸ Accidents per 100 million vehicle kilometres

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Table App5B/7 – Summary of accident effects of accessways on urban roads

General statements	<ul style="list-style-type: none"> • Removal of access limitations can increase the accident rate by up to 4 times (US data). • Australian data suggests that allowing direct access and frequent minor junctions on urban arterials can increase the casualty accident rate by 30% on divided roads and 70% on undivided roads, compared with roads with widely-spaced junctions and few property accessways. (Total rates probably increase by bigger margins).
Effects of minor junctions (assumed to include two-way service road entries and pairs of one-way service road connections)	<ul style="list-style-type: none"> • Each junction can add 5 - 10 acc/ 100mvkm on 4-lane roads (one source estimates about 20 acc/100mvkm) and about 30 acc/mvkm on 2-lane urban roads. • Increasing from 2 to 6 junctions per km leads to a 20 - 100% increase in accident rate on 4-lane roads and 50 - 100% increase on 2-lane roads. Adoption of values towards the bottom end of this range seems advisable. Reported total rates for roads with 6 junctions/km (average) range from 150 to 375 acc/100mvkm
Effects of non-commercial accessways	<ul style="list-style-type: none"> • Each minor accessway adds 1 - 2% to the accident rate on low-access 4-lane roads and 2 - 3% on 2-lane roads. The increase in accident rate is greater as the access density increases.
Effects of commercial accessways	<ul style="list-style-type: none"> • On 2-lane roads, each accessway adds about 15 acc/100mvkm. (Increasing from 0 to 10 per km adds about 80% to the accident rate and from 0 to 20 per km increases the rate 2 - 3 times.) • On 4-lane roads, commercial accessways add 5 - 10 acc/100mvkm each at low access densities and about 15 - 20 acc/100mvkm above 10 accessways per km.
Effects of medians	<ul style="list-style-type: none"> • US data suggest that medians result in 40 - 60% reduction in crashes and 40 - 50% reduction in pedestrian collisions. • Australian data varies. In Melbourne, undivided sections were found to have a 30 - 40% higher rate than divided sections for the same level of access. The effect is less at higher levels of access limitation (i.e. fewer turns). In WA, multi-lane arterials without medians are reported to have rates 3.5 times higher than those with medians.

App5B.7 Access management techniques

Table App5B/8 – Checklist of techniques to reduce adverse safety impacts of accessways on state highways

Access controls	<ul style="list-style-type: none"> • Vehicular access to alternative local roads. • Access via adjacent property driveway.
Driveway controls	<ul style="list-style-type: none"> • Location, spacing and number of driveways. • Clearance from intersections. • Common driveway for adjacent or consolidated properties. • Specify traffic volume limit at driveway. • Design, including width, speed of entry, internal conditions affecting entering and departing traffic. • One-way or two-way operation. • Conditions on crossing of foot- and bicycle paths. • Sight line controls/requirements at exits.
Local widenings	<ul style="list-style-type: none"> • Protected turns for right-turning vehicles (through median or by local deflection of through lane(s)). • Deceleration/acceleration and turning lanes for left-turning vehicles. • Manoeuvring lane for local movements (continuous left-turn lane). • Widened left lane. • Provision for parking off through lanes: kerb indents/building setbacks.
Intersection (location, spacing and control)	<ul style="list-style-type: none"> • Sight line considerations in intersection location. • Minimum spacings of minor junctions. • Prohibition of minor cross-intersections on arterial. • Spacing of controlled (signalised) intersections. • Design (splays, splitters etc). • Signalisation requirements at driveway(s).
Turn controls	<ul style="list-style-type: none"> • Left in, left out only (median and/or channelisation). • One-way entries and exits. • U-turn bans/permission.
Medians and median openings	<ul style="list-style-type: none"> • Raised median. • Minimum median break spacing. • Design of median break to limit turns. • Insertion of median barrier to limit turns. • Right-turn deceleration lane. • Acceleration lane for merging right-turn (egress) traffic. • Median storage for right-turn egress vehicles. • Painted median to permit all turns (opposed right lane turn).
Traffic control /parking controls	<ul style="list-style-type: none"> • Clearways, parking bans. • Parking clearances from driveways. • Local speed environment. • Other traffic control items at entrances/exits.