Session 5.2 RSA Road Restraint Systems

Conducting Road Safety Audits & Appraisals

Presented by: RTS & AGTT

January 2022

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Focus of this presentation: Barriers Crash cushions Arrestor Beds

Recap: RSA Reporting and Key Concepts

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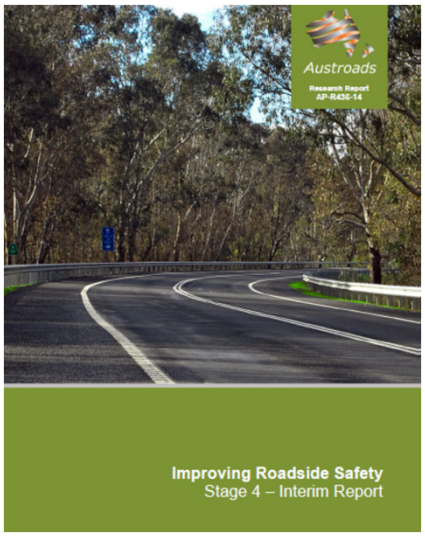
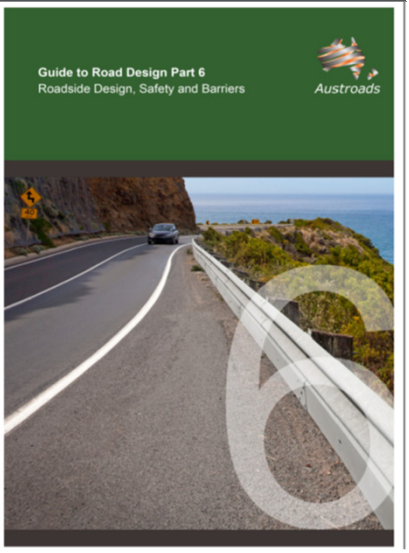
Austroads research and design





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Road Restraint Systems

Permanent and temporary safety barriers, vehicle parapets, terminals, transitions, crash cushions, pedestrian parapets, pedestrian guardrails, vehicle arrester beds, anti- glare screens

What we need to provide when there is the risk of failure to keep the vehicle on the road

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Obvious needs for RRS: Policy or risk assessment

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Road Safety Report – Issuing the report

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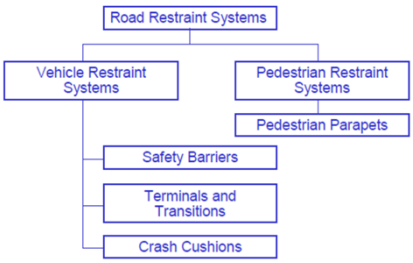

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A road authority must provide a reasonably safe road for the reasonable road user.

Bill of Rights in the South African Constitution:
24. Everyone has the right-
(a) to an environment that is not harmful to their health or well-being.

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Safety objectives: "Forgiving Roadside" and clear zone concept.
Clear zone elements, factors influencing the clear zone design domain, determine the width of the clear zone.
The need for roadside furniture (signs and light posts) and the design and location criteria for sign supports and light posts.
This leads to the need for safety barriers and looks at the longitudinal roadside and median barriers.
Design and selection of impact attenuators for fixed objects.
Provision of escape ramps, location of runaway-vehicle facilities and arrestor bed design features

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Maintain what is there!

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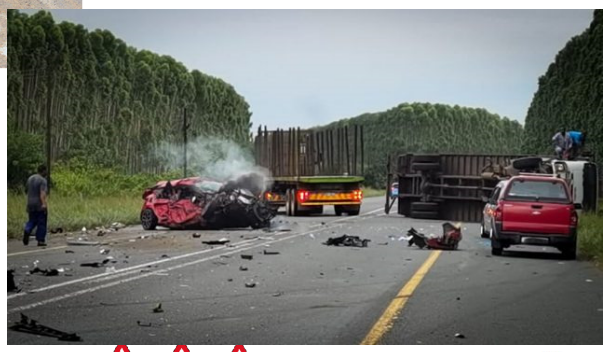
Understanding all risks and the relevance of standards

Is there such a thing as a safe speed?



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Understand the interaction of RRS with other road safety problems

Table C-1: Selection criteria for a traffic barrier system (1)

CRITERIA	COMMENTS
1. Performance capability	The traffic barrier system should be structurally able to • contain the design vehicle • redirect the design vehicle
2. Deflection	The available room to deflect should not be less than the expected traffic barrier deflection
3. Site conditions	Conditions influencing the barrier type choice include: • Slope approaching the barrier system • Distance from traffic lane
4. Compatibility	The system should be compatible with adjacent systems (like bridge railings) and end-treatments
5. Cost	The full life cycle cost should be considered in the economic evaluation of alternative systems. A system with a relatively low installation cost typically requires significantly more maintenance following impacts.
6. Maintenance	
6a. Routine	Routine maintenance for W-guardrail systems for example, includes checking of bolts, posts and soil stability.
6b. Collision	Flexible and semi-flexible systems requires in general significantly more maintenance than rigid systems
6c. Materials storage	Storage includes inventory items and storage space
6d. Simplicity	Simpler designs are more likely to be installed correctly by field personnel
7. Field experience	Existing systems should be monitored in terms of performance and maintenance requirements to identify problems that can be reduced or eliminated by the use of a different barrier system.

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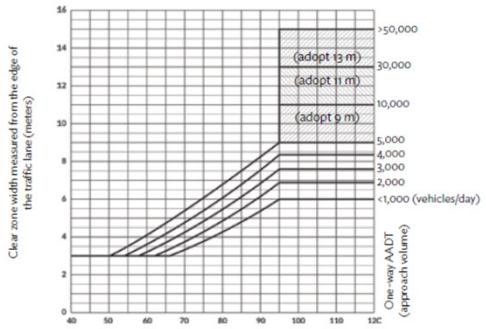
Figure 1: Clear Zone for Straight Roads



Example 1: If the operating speed is 80 km/h and the one-way AADT is 4,000 vehicles/day, the clear zone width is 6 m.

Example 2: If the operating speed is 100km/h and the one-way AADT is 20,000 vehicles/day, the clear zone width is 11 m (adopt range 10,000–30,000 vehicles/day)

AADT = annual average daily traffic, km/h = kilometer per hour, m = meter.

Source: VicRoads. 2011. *Supplement to Austroads Guide to Road Design – Part 6 (Roadside Design, Safety and Barriers)*. Sydney, Australia.

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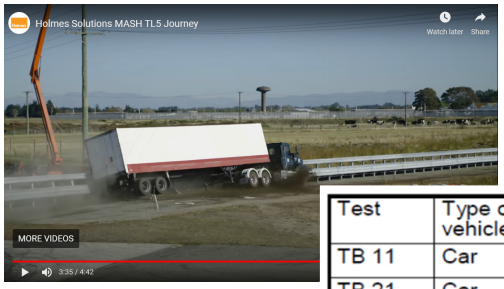
A good knowledge of road safety engineering is essential



EN1317

TEST

Test	Type of vehicle	Mass (kg)	Speed (km/h)	Angle (°)
TB 11	Car	900	100	20
TB 21	Car	1300	80	8
TB 22	Car	1300	80	15
TB 31	Car	1500	80	20
TB 32	Car	1500	110	20
TB 41	Rigid truck	10 000	70	8
TB 42	Rigid truck	10 000	70	15
TB 51	Bus	13 000	70	20
TB 61	Rigid truck	16 000	80	20
TB 71	Rigid truck	30 000	65	20
TB 81	Articulated truck	30 000	65	20

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Impact severity class	ASI		Other criteria
A	≤ 1,0	and	THIV ≤ 33 km/h
B	≤ 1,4		
C	≤ 1,9		PHD ≤ 20g

ASI = acceleration severity index

THIV = theoretical head impact velocity

PHD = post-impact head deceleration

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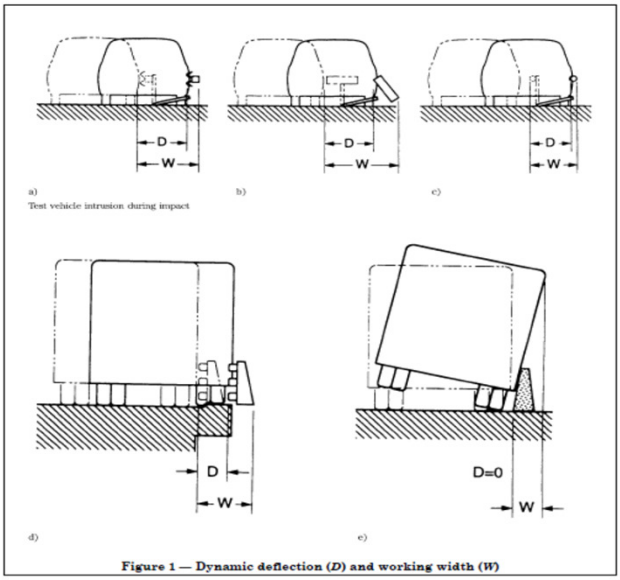

Figure 1 — Dynamic deflection (*D*) and working width (*W*)

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Definitions

The benefits of specifying a product with known performance, are more significant than being concerned over the specific test. In the real world, the variable's number is much more than what is tested, and the differences in the EN1317 versus MASH tests are less than the variance in parameters in real crashes.

Michael Dreznes iRF

Source: SARTSM, RTMC, 2012

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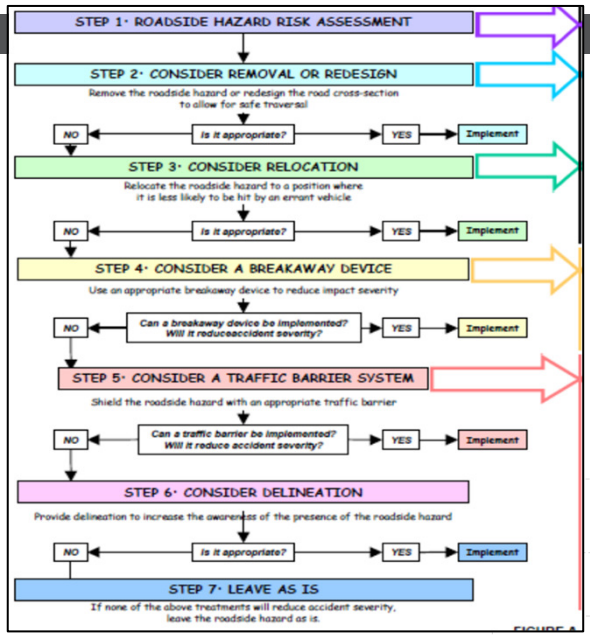

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What do we want

Consistent application of policy
National procedures
Risk based analysis
Economic analysis

Figure 2: Unprotected (or "exposed") terminals

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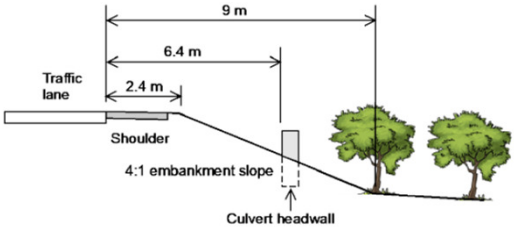

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Figure 5.5: Detail of flare rate

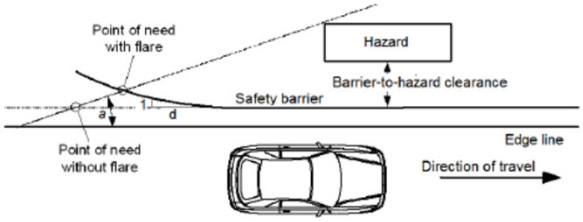

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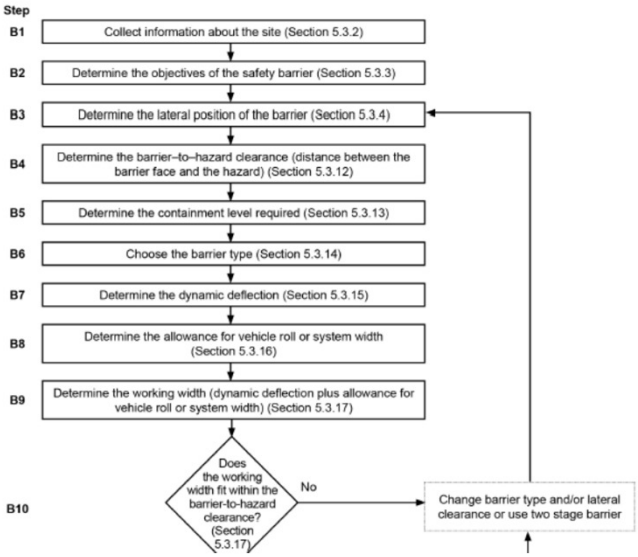
Figure 5.1: Road safety barrier design process



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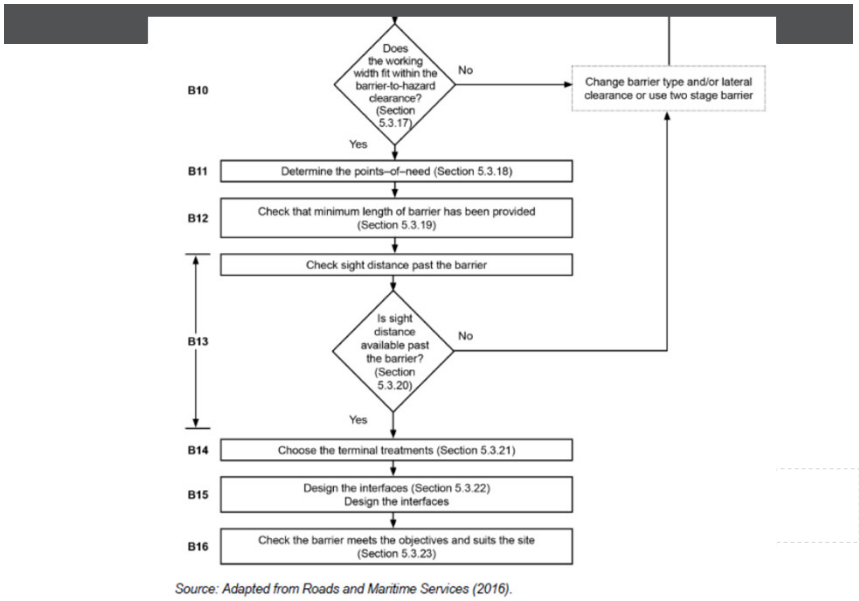

Source: Adapted from Roads and Maritime Services (2016).

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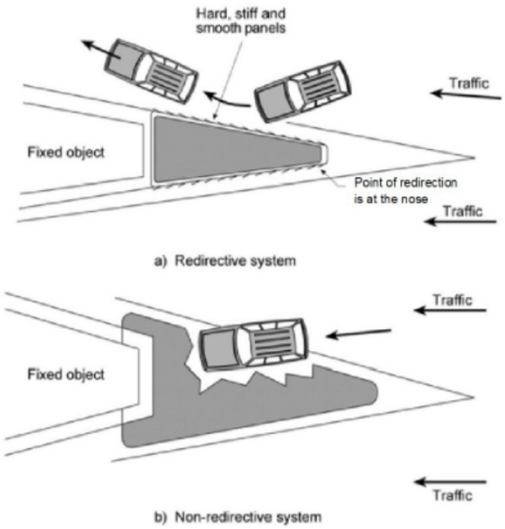
Terminals and crash cushions

Figure 5.30: Redirective and non-redirective systems



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END OF LECTURE

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