

# Engineering for Road Safety – Design Guidelines 8<sup>th</sup> Sept 2016



# SARF

better roads



South African Road Federation

# What is the next step?

- ▶ Need for a common goal - **Agree** or **Disagree**?
- ▶ Have we put the cart before the horse with SAN 51317 without a design guideline?
- ▶ Maybe the publication of SANS 51317 is the encouragement we need to develop a SA Design Guideline – But who ?

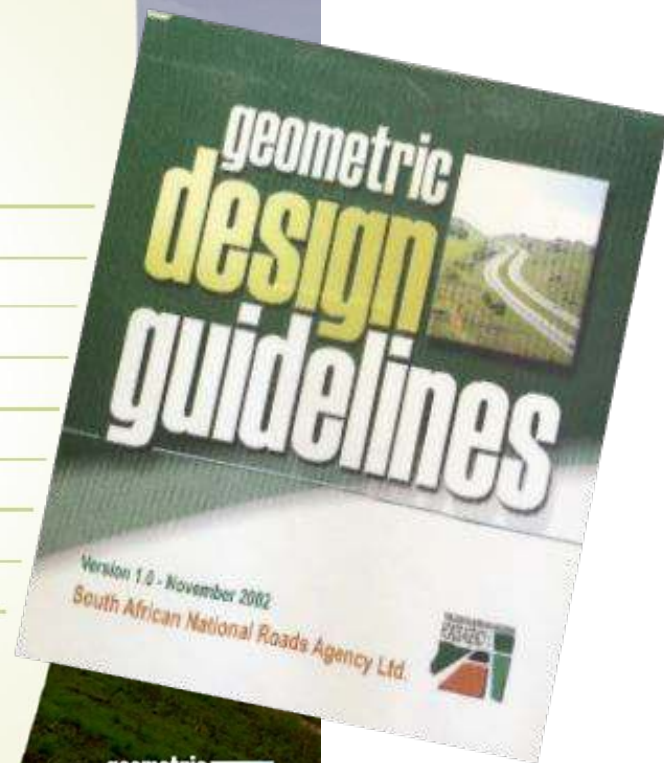
# So where to now – Phase 1?

- ▶ Does South Africa need design guidelines.
- ▶ Yes, but first we need to agree on
  - ▶ The design philosophy
  - ▶ The design standards of all restraint systems
- ▶ Then we need to develop the required geometric design guideline

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| <b>Table 8.1 Design elements that influence road safety</b> |   |
|---|---|
| <b>Category</b>   | <b>Design Element</b>   |
| Horizontal Alignment  | Curve radius<br>Curve length<br>Superelevation<br>Runoff length/transition  |
| Vertical Alignment  | Grade<br>Critical length of grade<br>Vertical curves (sag and crest)  |
| Cross-section   | Number of lanes<br>Lane width<br>Shoulder type<br>Shoulder width<br>Median type<br>Median width                                   |
| Roadside  | Side slopes<br>Horizontal clearance to obstruction (clear zone)<br>Ditch design<br>Traffic barriers (roadside)<br>Median barriers |
| Intersection  | Sight triangle  |
| Interchange   | Ramp terminal sight triangle<br>Taper rate/length<br>Successive exits/entrances   |

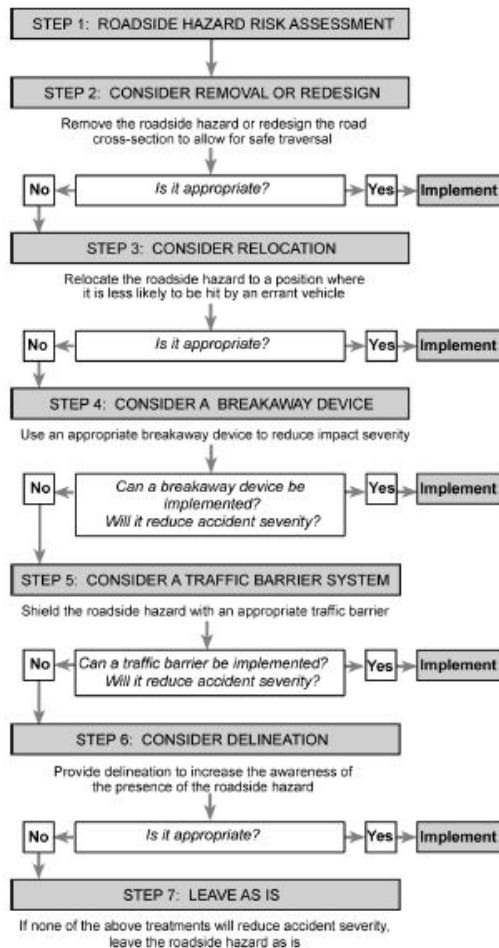
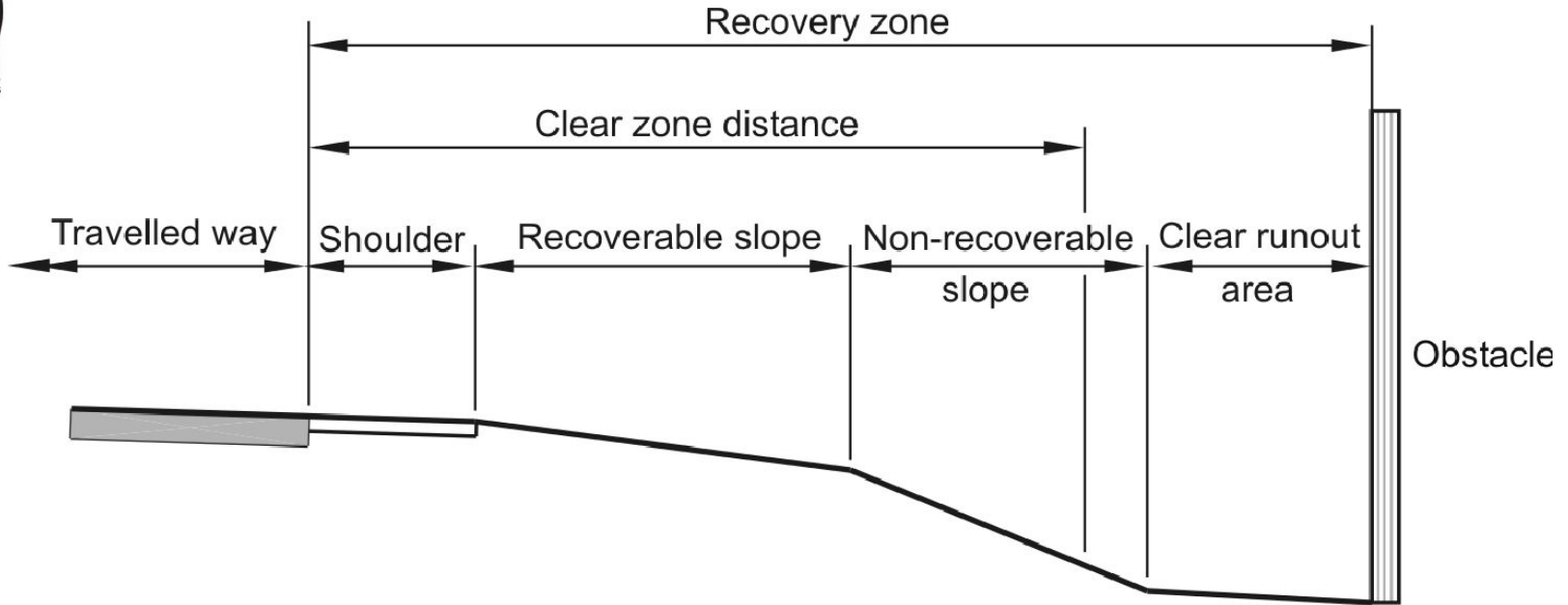


Figure 8.1: Roadside safety analysis



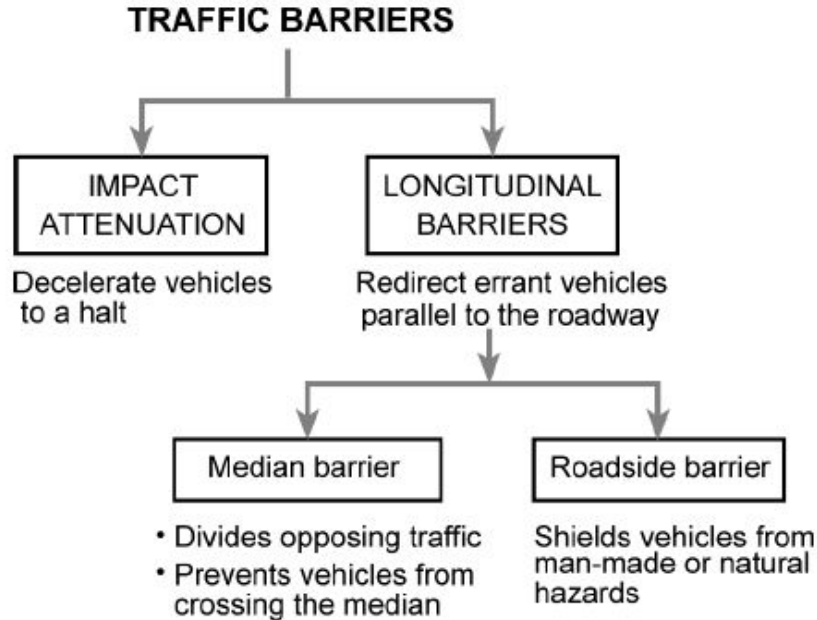
Note:  
 If the clear zone distance ends on a non-recoverable slope a clear runout area is required

Figure 8.2 Roadside recovery zone

**Table 8.2 Clear zone distances (metres)**

| Design Speed<br>(km/h) | Design ADT  | Fill slopes |                | Cut slopes |                |
|------------------------|-------------|-------------|----------------|------------|----------------|
|                        |             | 1:4 to 1:5  | 1:6 or flatter | 1:4 to 1:5 | 1:6 or flatter |
| <60                    | <750        | 2,0 – 3,0   | 2,0 – 3,0      | 2,0 – 3,0  | 2,0 – 3,0      |
|                        | 750 – 1500  | 3,5 – 4,5   | 3,0 – 3,5      | 3,0 – 3,5  | 3,0 – 3,5      |
|                        | 1500 – 6000 | 4,5 – 5,0   | 3,5 – 4,5      | 3,5 – 4,5  | 3,5 – 4,5      |
|                        | >6000       | 5,0 – 5,5   | 4,5 – 5,0      | 4,5 – 5,0  | 4,5 – 5,0      |
| 70 – 80                | <750        | 3,5 – 4,5   | 3,0 – 3,5      | 2,5 – 3,0  | 3,0 – 3,5      |
|                        | 750 – 1500  | 5,0 – 6,0   | 4,5 – 5,0      | 3,5 – 4,5  | 4,5 – 5,0      |
|                        | 1500 – 6000 | 6,0 – 8,0   | 5,0 – 5,5      | 4,5 – 5,0  | 5,0 – 5,5      |
|                        | >6000       | 7,5 – 8,5   | 6,0 – 6,5      | 5,5 – 6,0  | 6,0 – 6,5      |
| 90                     | <750        | 4,5 – 5,5   | 3,5 – 4,5      | 3,0 – 3,5  | 3,0 – 3,5      |
|                        | 750 – 1500  | 6,0 – 7,5   | 5,0 – 5,5      | 4,5 – 5,0  | 5,0 – 5,5      |
|                        | 1500 – 6000 | 7,5 – 9,0   | 6,0 – 6,5      | 5,0 – 5,5  | 6,0 – 6,5      |
|                        | >6000       | 8,0 – 10,0  | 6,5 – 7,5      | 6,0 – 6,5  | 6,5 – 7,5      |
| 100                    | <750        | 6,0 – 7,5   | 5,0 – 5,5      | 3,5 – 4,5  | 4,5 – 5,0      |
|                        | 750 – 1500  | 8,0 – 10,0  | 6,0 – 7,5      | 5,0 – 5,5  | 6,0 – 6,5      |
|                        | 1500 – 6000 | 10,0 – 12,0 | 8,0 – 9,0      | 5,5 – 6,5  | 7,5 – 8,0      |
|                        | >6000       | 11,0 – 13,5 | 9,0 – 10,0     | 7,5 – 8,0  | 8,0 – 8,5      |
| >110                   | <750        | 6,0 – 8,0   | 5,5 – 6,0      | 4,5 – 5,0  | 4,5 – 4,9      |
|                        | 750 – 1500  | 8,5 – 11,0  | 7,5 – 8,0      | 5,5 – 6,0  | 6,0 – 6,5      |
|                        | 1500 – 4000 | 10,5 – 13,0 | 8,5 – 10,0     | 6,5 – 7,5  | 8,0 – 8,5      |
|                        | >6000       | 11,5 – 14,0 | 9,0 – 10,5     | 8,0 – 9,0  | 8,5 – 9,0      |





**Figure 8.5: Classification of traffic barriers**

## CLASSIFICATION OF LONGITUDINAL BARRIERS BASED ON DEFLECTION CHARACTERISTICS

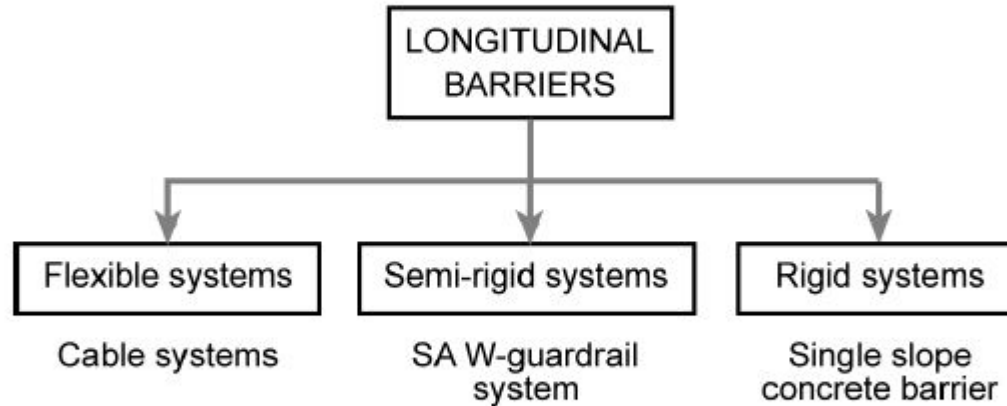


Figure 8.6: Classification of longitudinal barriers

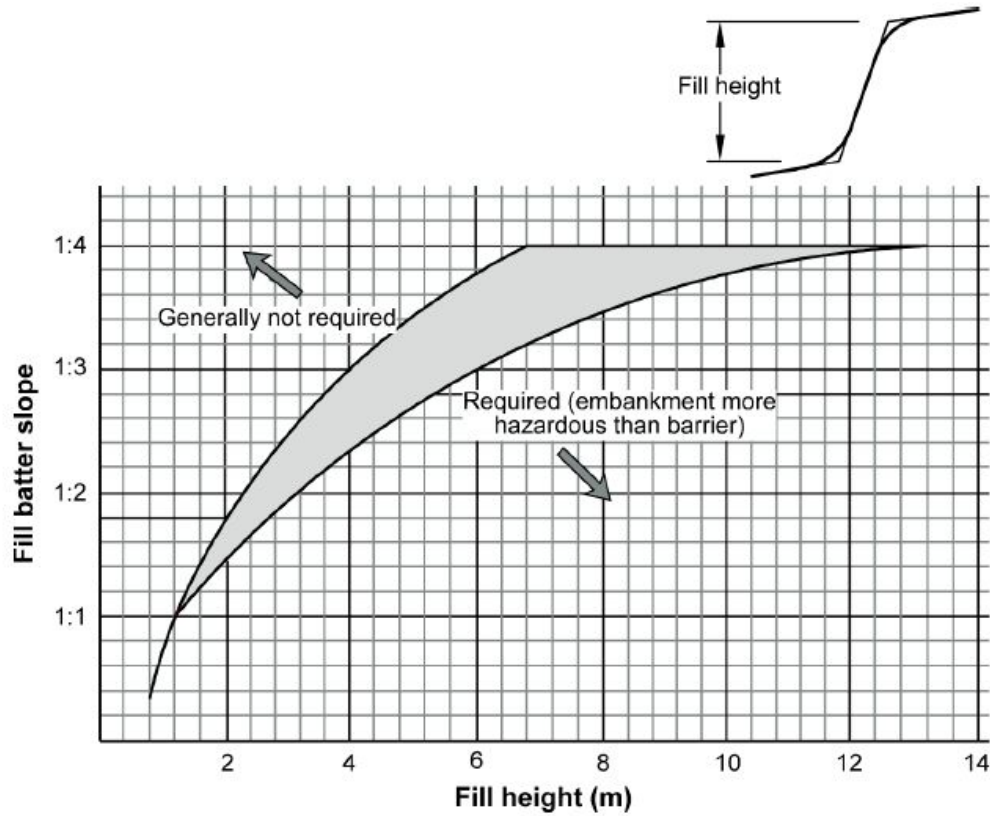


Figure 8.7: Warrants for use of roadside barriers

## So where to now – Phase 2?

- ▶ SA has thousands of kilometres of “W” beam guardrail on wooden posts
- ▶ Should these systems be scrapped and replaced with crash tested systems?
  - ▶ Not practical and not required in most installations
- ▶ But do we comply with the South African Road Design Guide?

# So where to now – Phase 3?

- ▶ When should we look at “upgrading”?
- ▶ We do not need to “fix what is not broke”
- ▶ We should only really look at improving the systems that we currently have.

▶ **Thank you**

