



# Safety Barriers - Design and Installation Developments and Pitfalls

Alastair de Beer  
Project Manager (Safety)  
National Roads Authority

*National Roads Authority - Standards Section  
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ARUP

**NRA**  
An tÚdarás um Bóithre Náisiúnta  
National Roads Authority

# Safety Barriers

**NRA TD 19 Safety Barriers**

**NRA BD 52 Parapets**

**Series 400 Safety Barriers and Pedestrian  
Guardrails**



# Safety Barriers

NRA APPROVAL LIST **WITHDRAWN**

All Safety Barriers to be **CE Marked!!!!!!**

CE Marking for a barrier kit does NOT mean that the barrier system is a fully compliant installation.

NRA will maintain a list of CE marked barriers for designers to obtain information on available systems

# Pre-Construction Checklist

Tender  
Document

CONFIDENTIAL

# Checklist – Pre-Construction

- Do you need a barrier (could the obstruction be removed or made passively safe)

3.9 Hazard mitigation measures shall be considered by the Designer prior to designing a safety barrier. A safety barrier shall only be introduced if the hazard cannot be mitigated. The mitigation measures for hazards within the Clear Zone are listed below in order of preference:

- a) Remove;
- b) Relocate;
- c) Re-design the hazard to reduce the risk to road users e.g. introducing a passively safe sign post;
- d) Revise the road layout or cross-section to lower the risk, e.g. increase the width of the hard shoulder, improve the road alignment, etc.;
- e) Reduce impact severity (e.g. by using a breakaway feature or by setting a culvert flush with the existing ground);
- f) Provide a suitable safety barrier.



# Checklist - Preconstruction

- Specify barrier in accordance with NRA TD 19?
  - This includes Containment (N2, H2 or H4a for rail)
  - Impact Severity (A or B, now also C)
  - Working Width (Is there anything within the working width, including passively safe products)
  - Set-back (How far the barrier should be from the road)

# Checklist – Pre-Construction

- Does the specified barrier exist?
  - For example
    - Terminal specified
      - N2 Containment
      - X1y1 displacement
- **Terminal does not exist!!!**
- Check NRA list (soon) or Highways Agency list first

# Construction Checklist





# Construction Checklist

Clause 401.2: The person responsible for the design shall ensure:

- (i) comply with this Series, Appendices 4/1, 4/3 and 4/7 and the requirements of standards NRA TD19 and NRA BD52 (as appropriate);
- (ii) are certified in accordance with IS EN 1317-5 to conform to the parameters of containment level, impact severity level and working width identified in Appendices 4/1 and 4/7; and
- (iii) are installed in accordance with the manufacturers' installation manual, attached to the relevant CE Certificate.

# Construction Checklist

- Is the barrier CE marked to EN 1317
- Has it been installed in accordance with the **test report (Installation Manual)**?

**Ask for it!!!**

# Construction Checklist

- Has the barrier been modified?
- Have the Ground Conditions been certified by an **independent Chartered Engineer**?



# TERMINALS AND TRANSITIONS

# Safety Barriers - Terminals

Full height Terminals (P4 to EN 1317 Part 4) now required upstream on all National Roads with a design speed of 100km/h or greater where the **terminal is in the direct line of traffic.**





# Safety Barriers - Terminals

- Therefore:
  - A ramped terminal is allowable where:
    - the end is buried in a cutting face or bund.
    - the terminal is not in the direct line of traffic.
- Terminating barriers shall have a flare of 1:20 away from the road.

# Terminals

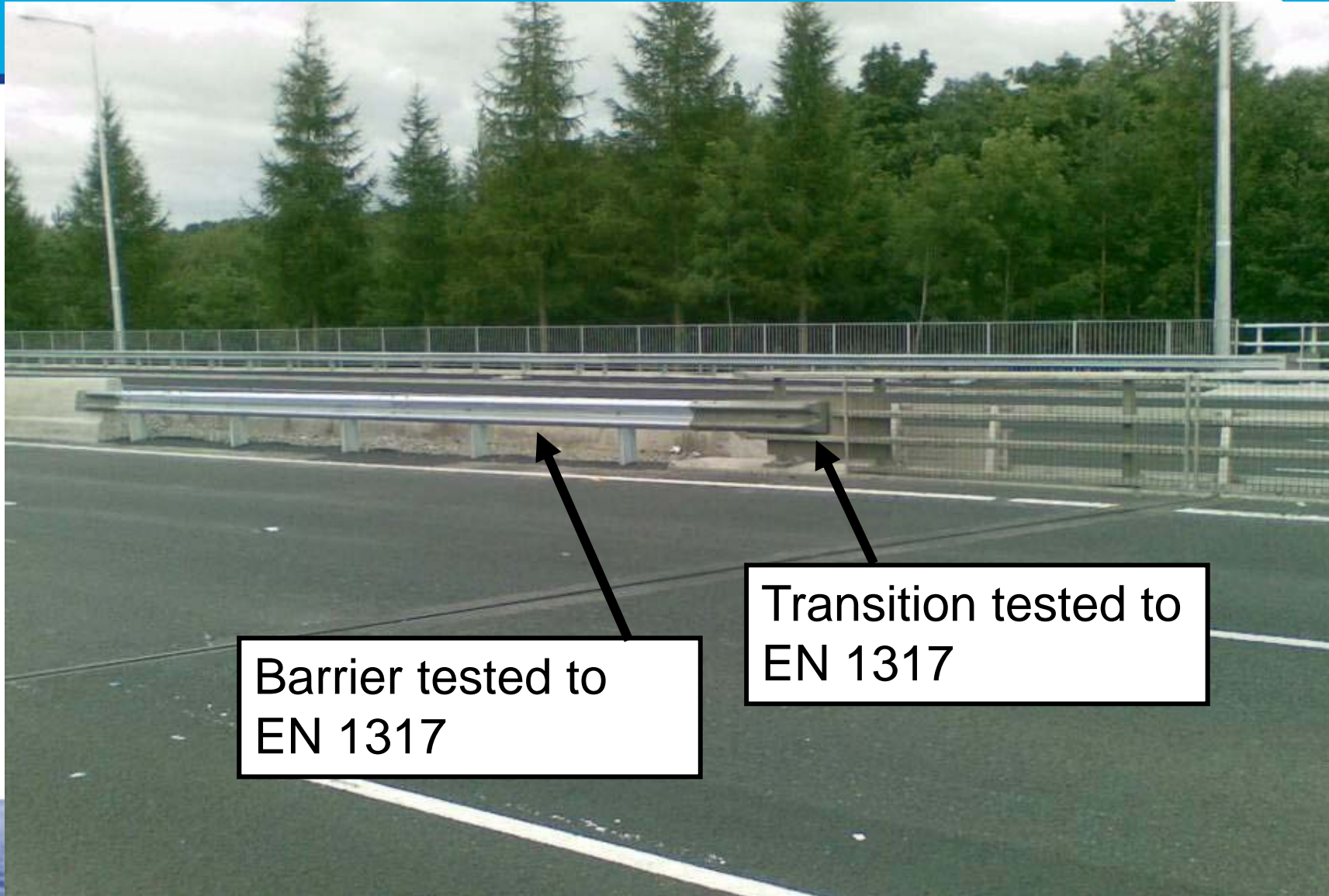
## ➤ Compatibility

- Can the terminal function adequately in combination with the type of safety barrier it is attached to.
- Contractor must check with the Safety Barrier manufacturer(s) and ensure that the proposed Safety Barrier and Terminal will act together and meet the Performance criteria.

# Safety Barriers - Transitions

- Paragraph 7.7 of NRA TD 19:  
“All transitions shall comply with the requirements of the impact assessment test criteria specified in IS EN 1317-2 and ENv 1317-4 for safety barriers and the critical impact requirements in Paragraphs 7.8 to 7.11.”
- Computer Simulation allowable as a Departure from Standard.

# Safety Barriers - Transitions



Barrier tested to  
EN 1317

Transition tested to  
EN 1317



# Safety Barriers - Transitions

Min of 10 x change in dynamic deflection  
= 10 x (WW of Parapet – WW of Concrete Barrier)  
= 10 x (0.8 – 0) = 8m

Paragraph 7.6 of NRA TD 19/09 states,  
"...Additionally the length of the transition should be sufficient to ensure that **no significant changes in the dynamic deflection occur over short lengths:...**"



# Maintenance: When to replace, repair or remove

- When to replace with EN 1317 compliant barrier:
  - Timber Post Barriers where warranted by risk assessment process

# Maintenance: When to replace, repair or remove

## ➤ When to repair:

- Any EN 1317 compliant barrier if deemed still necessary further to risk assessment

# Maintenance: When to replace, repair or remove

## ➤ Repair like for like if:

- Damaged pre-EN 1317 barrier
  - If damage is less than half of the overall length.

# Maintenance: When to replace, repair or remove

- Replace with EN 1317 barrier:
  - Damaged pre-EN 1317 barrier
    - If the overall barrier length of the barrier is less than 100m in length. Engineers discretion is advised.
    - If due to successive pavement overlays the barriers is now at an insufficient height

➤ Spot the mistakes





# Manhole location



# Working Width





# Flowing? Working Width?



# No comment





# Is a H2 barrier required?





# Construction?



# Are the bolts fastened?





# Are bolts missing?





# Installation







# Instalation



# Installation





# Installation





# Installation





# Safety Barrier Site Info

**THANK YOU**

**ANY QUESTIONS??**

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