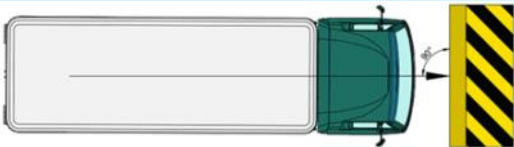
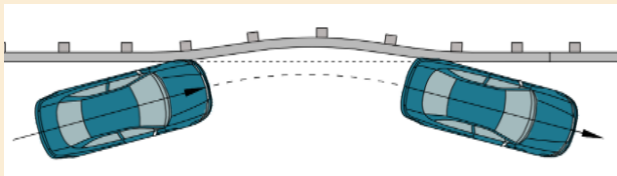




## HOSTILE VEHICLE MITIGATION

# Differences between Vehicle Security Barriers and Road Safety Barriers

This document highlights the main differences between vehicle security barriers and road safety barriers. Despite both being 'barriers', the purpose and capability of these barriers are markedly different.

| VEHICLE SECURITY BARRIER                                                                                                                                                                                                                                                                                                                                 | ROAD SAFETY BARRIER<br>(a subset of Vehicle Restraint Systems)                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                         |
| Definition                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>Vehicle Security Barrier (VSB)</b> - Barrier used to prevent hostile vehicular access to a site/area. Depending on its type, the VSB may have as part of its design a foundation and/or operating equipment.</p>                                                                                                                                   | <p><b>Vehicle Restraint System (VRS)</b> – System installed on the road to provide a level of containment for an errant vehicle.</p> <p><b>Safety Barrier</b> – Continuous VRS installed alongside or on the central reserve of a road.</p>                                                                                                                                |
| Common Types                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• Blockers &amp; bollards</li> <li>• Gates (rising and swing)</li> <li>• Planters</li> <li>• Wire rope systems</li> </ul>                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• Tensioned Corrugated Beam (TCB)</li> <li>• Open Box Beam (OBB)</li> <li>• Concrete Safety Barrier (CSB)</li> <li>• Wire Rope Safety Fence (WRSF)</li> </ul>                                                                                                                                                                       |
| Designed To                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>• Protect a site/area from the consequences of hostile vehicle access;</li> <li>• Contain, and if possible, immobilise an impacting vehicle;</li> <li>• Contain high angle impacts, such as head-on impacts (90°).</li> </ul>  | <ul style="list-style-type: none"> <li>• Protect vehicle occupants from the consequences of reaching roadside hazards;</li> <li>• Contain and redirect an errant vehicle in a controlled and safe manner for its occupant;</li> <li>• Contain low angle impacts up to 20°.</li> </ul>  |

| VEHICLE SECURITY BARRIER                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           | NOT Designed To                                                                                                                                                                                               |                 | ROAD SAFETY BARRIER |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------|--------------|-----------|-----------|--------------|---------------|----------|--------|-------|-----|----|----------|--------|-------|---------|-----|---------|--------|-------|-------------|----|---------|--------|----------------|-----------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------|-----------|--------------|-----|----|-----|-----|-----|----|-------|-----|----|----|--------|-----------|----|----|--------|-----|----|----|--------|-----------|----|----|--------|-----|----|----|--------|-----------------|
| <ul style="list-style-type: none"><li>Protect the occupants of the impacting vehicle;</li><li>Contain impacts which are over the tested capacity of the system.</li></ul>                                                                                                                                                                                                                                                                                                            |           | <ul style="list-style-type: none"><li>Contain high angle vehicle impacts in excess of 20°, such as head-on impacts (90°);</li><li>Contain impacts which are over the tested capacity of the system.</li></ul> |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| Relevant Vehicle Impact Test Standards                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                                                                                                                                                                                                               |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| <ul style="list-style-type: none"><li>ISO IWA 14-1</li><li>BSI PAS 68</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                      |           | <ul style="list-style-type: none"><li>BS EN 1317</li><li>AASHTO MASH</li><li>TRB NCHRP 350</li></ul>                                                                                                          |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| Typical Test Parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                                                                                                                                                                                                               |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| <table><tr><th>Speed (km/h)</th><th>Angle (°)</th><th>Mass (kg)</th><th>Vehicle Type</th><th>Vehicle Class</th></tr><tr><td>16 - 112</td><td>5 - 90</td><td>1,500</td><td>Car</td><td>M1</td></tr><tr><td>16 - 112</td><td>5 - 90</td><td>2,500</td><td>Pick-up</td><td>N1G</td></tr><tr><td>16 - 96</td><td>5 - 90</td><td>3,500</td><td>Flatbed LGV</td><td>N1</td></tr><tr><td>16 - 80</td><td>5 - 90</td><td>7,200 - 30,000</td><td>Rigid HGV</td><td>N2 or N3</td></tr></table> |           |                                                                                                                                                                                                               |                 |                     | Speed (km/h) | Angle (°) | Mass (kg) | Vehicle Type | Vehicle Class | 16 - 112 | 5 - 90 | 1,500 | Car | M1 | 16 - 112 | 5 - 90 | 2,500 | Pick-up | N1G | 16 - 96 | 5 - 90 | 3,500 | Flatbed LGV | N1 | 16 - 80 | 5 - 90 | 7,200 - 30,000 | Rigid HGV | N2 or N3 | <table><tr><th>Speed (km/h)</th><th>Angle (°)</th><th>Mass (kg)</th><th>Vehicle Type</th></tr><tr><td>100</td><td>20</td><td>900</td><td>Car</td></tr><tr><td>110</td><td>20</td><td>1,500</td><td>Car</td></tr><tr><td>70</td><td>15</td><td>10,000</td><td>Rigid HGV</td></tr><tr><td>70</td><td>20</td><td>13,000</td><td>Bus</td></tr><tr><td>80</td><td>20</td><td>16,000</td><td>Rigid HGV</td></tr><tr><td>65</td><td>20</td><td>30,000</td><td>HGV</td></tr><tr><td>65</td><td>20</td><td>38,000</td><td>Articulated HGV</td></tr></table> | Speed (km/h) | Angle (°) | Mass (kg) | Vehicle Type | 100 | 20 | 900 | Car | 110 | 20 | 1,500 | Car | 70 | 15 | 10,000 | Rigid HGV | 70 | 20 | 13,000 | Bus | 80 | 20 | 16,000 | Rigid HGV | 65 | 20 | 30,000 | HGV | 65 | 20 | 38,000 | Articulated HGV |
| Speed (km/h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Angle (°) | Mass (kg)                                                                                                                                                                                                     | Vehicle Type    | Vehicle Class       |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 16 - 112                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5 - 90    | 1,500                                                                                                                                                                                                         | Car             | M1                  |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 16 - 112                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5 - 90    | 2,500                                                                                                                                                                                                         | Pick-up         | N1G                 |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 16 - 96                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5 - 90    | 3,500                                                                                                                                                                                                         | Flatbed LGV     | N1                  |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 16 - 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5 - 90    | 7,200 - 30,000                                                                                                                                                                                                | Rigid HGV       | N2 or N3            |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| Speed (km/h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Angle (°) | Mass (kg)                                                                                                                                                                                                     | Vehicle Type    |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20        | 900                                                                                                                                                                                                           | Car             |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 110                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20        | 1,500                                                                                                                                                                                                         | Car             |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 15        | 10,000                                                                                                                                                                                                        | Rigid HGV       |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20        | 13,000                                                                                                                                                                                                        | Bus             |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20        | 16,000                                                                                                                                                                                                        | Rigid HGV       |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20        | 30,000                                                                                                                                                                                                        | HGV             |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20        | 38,000                                                                                                                                                                                                        | Articulated HGV |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| <p>Both barrier types are only proven to work for the tested vehicle impact conditions. Additional performance ratings (different vehicle types, speeds and angles) should not be assumed until proven through other successful vehicle impact tests.</p>                                                                                                                                                                                                                            |           |                                                                                                                                                                                                               |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
| VEHICLE SECURITY BARRIER                                                                                                                                                                                                                                                                                                                                                                                                                                                             |           | Example of Barrier Undergoing Testing                                                                                                                                                                         |                 | ROAD SAFETY BARRIER |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |
|  <p>Vehicle is immobilised</p>                                                                                                                                                                                                                                                                                                                                                                    |           |  <p>Vehicle is redirected</p>                                                                                             |                 |                     |              |           |           |              |               |          |        |       |     |    |          |        |       |         |     |         |        |       |             |    |         |        |                |           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |           |           |              |     |    |     |     |     |    |       |     |    |    |        |           |    |    |        |     |    |    |        |           |    |    |        |     |    |    |        |                 |

| VEHICLE SECURITY BARRIER                                                       |          | Theoretical Example of Performance Rating                                                                                                                                                                                                                                |                    | ROAD SAFETY BARRIER |  |
|--------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|--|
| Standard: IWA 14-1:2013 Blocker Rating: V/7200[N3C]/64/90:7.6                  |          | Standard: EN 1317-5:2007+A2:2012                                                                                                                                                                                                                                         |                    | Rating: H1-W4-A     |  |
| Parameter                                                                      | Rating   | Parameter                                                                                                                                                                                                                                                                | Rating             |                     |  |
| VSB                                                                            | Blocker  | Containment level*                                                                                                                                                                                                                                                       | H1                 |                     |  |
| Test type (vehicle)                                                            | V        | Impact severity                                                                                                                                                                                                                                                          | A                  |                     |  |
| Test vehicle mass                                                              | 7,200 kg | Normalized working width                                                                                                                                                                                                                                                 | $W_N = W4(1.1m)$   |                     |  |
| Vehicle Classification                                                         | N3C      | Normalized dynamic deflection                                                                                                                                                                                                                                            | $D_N = 0.5m$       |                     |  |
| Impact speed                                                                   | 64 km/h  | Normalized vehicle intrusion                                                                                                                                                                                                                                             | $VI_N = VI4(1.2m)$ |                     |  |
| Impact angle                                                                   | 90°      | Note: Permanent safety barriers must be CE marked. Temporary safety barriers cannot yet be CE marked.<br><br><i>*The Containment Level is determined by the severity of the impact. Factors determining this are the impact speed, angle, vehicle type and its mass.</i> |                    |                     |  |
| Vehicle penetration distance                                                   | 7.6 m    |                                                                                                                                                                                                                                                                          |                    |                     |  |
| Note: there is no obligation for a vehicle security barrier to have a CE mark. |          |                                                                                                                                                                                                                                                                          |                    |                     |  |

Some barriers may be tested to both security and safety standards. This is often achieved by modifying an existing road safety barrier into a security barrier, as shown in the examples below. This may involve additional engineering and altering the configuration of the barrier.



*Additional wire rope added to the barrier (left and right); and the configuration changed to a 'zig-zag' shape (right).*



The specifier should check with the barrier supplier which specific design has been tested, the standard used, what ratings have been allocated. Barrier selection should be based on a security Operational Requirement and a detailed specification. See also *NPSA Guidance: Due diligence in the selection and procurement of vehicle security barriers*. When installing barriers close to public roads, a road traffic safety audit should be conducted to assess the relative risks to road users.

**NPSA recommends that sites, places or events at risk from vehicle borne attack deploy vehicle security barriers, not road safety barriers.**

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