Worksite Safety Barrier Screens (WSBS)

RDN 06-12
Version 3.0

1 Purpose

This Road Design Note (RDN) provides guidance on the requirements for the provision of Worksite Safety Barrier Screens (WSBS), commonly known as anti-gawking or anti-debris screens (herein referred to as Screens) installed at worksites on declared roads in Victoria.

Screens are used at worksites to minimise visibility and help prevent distraction of construction activities to the travelling public, to protect workers in close proximity of passing traffic from flying debris and to provide a physical partition between the worksite and roadway.

Screens are typically used on high-speed roads or where safety barriers are used on heavily trafficked roads (generally volumes higher than 20,000 vehicles per day). The Code of Practice Worksite Safety – Traffic Management 2010 provides practical guidance to any person conducting works on a road in Victoria, including the use of Screens.

2 Background

The Department of Transport and Planning (DTP) does not maintain a list of accepted worksite safety barrier screens. Proprietary Screens should only be adopted or developed by a project/supplier with due consideration of this RDN and an engineering assessment as required by AS/NZS 3845.1 being undertaken.

If a Screen is attached to a safety barrier or is within the working width of a safety barrier, then the conditions of use specified in Section 3 must be met.

Screens are considered to be an attachment to a road safety barrier and are therefore subject to the provisions in AS/NZS 3845.1 Clause 2.5.5. Due to its status as an attachment, a Screen must demonstrate that it is suitable for use by crash testing or by assessment as a modification. Screens must not modify the performance of the safety barrier system to which it is to be attached or create an additional hazard to the worksite or road users.

Screens may also be independently located behind the longitudinal barrier (i.e. freestanding), outside the limit of the dynamic deflection of the barrier and may be combined with a Longitudinal Channelisation Device. The distance between the Screen and barrier product should be determined by a site-specific risk assessment that considers the deflection distance. Crash testing of the Screen in this circumstance is not required.

3 Conditions of Use

3.1 Acceptance

It is the responsibility of the Works Manager (as defined in the Road Management Act 2004) to review the project specific use of Screens, with due consideration of this RDN and any relevant Codes and provide approval for their use.

3.2 General

Screens must comply with the following:

- Have sufficient height (minimum 2 m above the pavement) and opacity to function as a screen.
- Have a smooth and visually uncluttered surface of uniform colour.
- All joints are welded or similarly connected. Mechanical fixings such as pipe clamp, bolted joints, etc. are not to be used.
- Not comprise horizontal members that may dislodge and act as a spear.
- Not adversely affect or alter the performance of the barrier system.
- Not present an undue risk to workers and other road users during an impact, e.g., by spearing/penetrating the vehicle passenger compartment.
- Perform in a predictable manner when impacted and not shatter or create debris which could become a hazard to workers and/or road users.
- Is resistant to vandalism and vehicle damage.
- Is easy to repair.
- Screens and their supporting structures can accommodate all environmental loads imposed during normal operating conditions.
- Not protrude or lean into the vehicle path, especially when subject to wind loading, including the effects of cyclic wind action and buffeting from passing vehicles.
- Address the need for emergency access, e.g., provision of a form of access gate in the screen if necessary.
- If applied to the Screen, advertising and project branding as per relevant Government branding guidelines and contract specifications.

3.3 Specific Requirements

3.3.1 Crash Testing / Analysis

“Full scale crash testing provides the most robust evidence of the effectiveness of a modification.” (AS/NZS 3845.1)

Full scale crash testing of the Screen must be conducted with it attached to the barrier, with results evaluated against the performance requirements of AS/NZS 3845.

Crash testing and/or other analysis techniques must demonstrate performance of the Screen in accordance with the below requirements:

- That the Screen does not compromise the performance of the safety barrier system to which it is to be attached:
  - under most circumstances this would be considered to be the capacity of the vehicle for the relevant test criteria (i.e., MASH, NCHRP 350, etc.). For example, for a NCHRP 350 TL-4 rated barrier, the capacity vehicles would be test designation 4-12 (8000 kg).
- That the Screen does not itself pose a hazard in the worksite or to road users when the barrier is impacted.
- That the Screen has suitable performance or failure mechanism when impacted by a high centre of gravity vehicle.
- Where the Screen is within the vehicle roll allowance, that the Screen does not itself pose an additional hazard to the worksite or road users and any effects on barrier working width are documented. Refer to Section 3.3.7 for further guidance regarding working width.

Note: In-field, the type of impact conditions and distribution of vehicles on the road are broader than those used during crash testing. As such, it is recognised that taller vehicles will interact with the Screen and any potential risk to workers must be mitigated or controlled.

- That the Screen can withstand an impact test when attached to the barrier as described below.

  Impact tests, with the Screen attached to the safety barrier, should demonstrate that it will shield the worksite and not pose a hazard if impacted by debris. At a minimum, such an impact test must demonstrate the ability to restrain a mass of 68 kg (i.e., a typical tyre and wheel) at 80 km/h and 10° at critical impact points determined by the Supplier. Where Suppliers have opted to undertake higher energy impact tests (i.e., impacts with great mass or impact speeds), these conditions are often listed within the product manual for consideration.

Notwithstanding these requirements, it is expected that Screens will be independently mounted on each barrier unit, i.e., panels will not be connected together across couplings between barrier units. Further, gaps between the Screens need to be minimal.

3.3.2 Horizontal Members

The erection of fencing with horizontal members in any location where there is the possibility of impaling an impacting vehicle is prohibited. Horizontal members are not permitted due to the potential spearing effect they may pose.

3.3.3 Design to be Robust and Durable

Screens should be constructed from materials that are robust and durable. Screens should be:

- Composed of materials that do not create a hazard, e.g., by shattering or disintegration into sharp edged fragments which would be a hazard to persons.
- Durable, e.g., are resistant to ignition by cigarettes or similar, or defacement by sharp implements.
- Resistant to fatigue failure, e.g., due to cyclic wind loading including buffeting from passing vehicles.
- Subject to the above, materials used should be appropriate for the design life of the screen.

3.3.4 Stability

Screens may destabilise the barrier system to which they are attached. The stability of Screens and the safety barriers must be considered under all conditions at the worksite including the effect of buffeting by passing vehicles, the height of the Screen and the length of the system.

Screens must be designed to withstand design wind loads in accordance with AS5100.2 including reference to AS/NZS 1170.2, without toppling, displacing or becoming detached from the barrier system to which it is attached.

3.3.5 Delineation

It is recommended that Screens not compromise the ability of a barrier system to display delineation.

Consideration should be given to the reflectivity of the Screen faces, with particular attention to the impacts of headlight glare under wet conditions.

3.3.6 Installation and Maintenance

Screens must be maintained, removed or replaced when damaged or have deteriorated through prolonged use. Contractors are encouraged to attend to damaged or deteriorated Screens as soon as practicable. Any damaged or deteriorated Screens that pose any risk to the worksite or roads users must be rectified immediately. Any graffiti is to be painted over within 24 hours, or the screen replaced. Manufacturers should consider ease of handling and installation, and the method of removal in an emergency during the design and installation of the system.

3.3.7 Working Width

If a Screen is attached to the barrier, it must be attached such that the vehicle would not normally interact with it, i.e. it is located outside the working width. Mounting the Screen may affect the working width and this should be evaluated as per the crash testing and analysis requirements of this RDN.

Testing and/or analysis of the barrier and Screen combination should consider and document the effects on deflection so that worksites have appropriate work zones that provide the area required for the barrier and Screen combination to perform as anticipated.

In addition to an allowance for vehicle roll, Screens must be designed such that panels do not fall on any roadway or in the work area, if the barriers are impacted.

3.3.8 Sight Distance

Consideration must be given to the effect of a Screen on all relevant sight distance requirements, including stopping sight distance along the road. Consideration should also be given to the effect of a Screen on available sight distance of drivers of construction vehicles when entering the traffic stream from the worksite.

4 References

AS/NZS 3845.1: 2015: Road Safety Barrier Systems

AS/NZS 5100.2: 2004 Bridge Design, Part 2: Design loads

AS/NZS 1170.2: 2011 Structural design actions Part 2: Wind actions

Code of Practice, Worksite Safety – Traffic Management, S351 31 August 2010, Road Management Act 2004

5 Related publications

Road Design Note 06-04: Accepted Safety Barrier

Products Roadside Design Guide (AASHTO, 2011)

Traffic & Road Use Management Manual, 7.5 Anti-gawking Screens, Transport & Main Roads Queensland

For further information please contact:

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Road Design Notes are subject to periodic review and may be superseded.

Document Information

Criteria	Details
Document Title	Road Design Note 06-12 - Worksite Safety Barrier Screens (WSBS)
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Document History

Version	Date	Description
1.0	June 2015	First Release
2.0 (A)	March 2017	Improved: Crash testing / Analysis Added: Reference to AS/NZS 3845.1 2015. Acceptance. Removed: Broad reference to anti-gawking
3.0	May 2023	Updated: Debris impact test mass updated to 68 kg to reflect a common truck tyre and wheel. Transferring the responsibility of reviewing the project-specific use of WSBS Screens from the Supplier and Contract Superintendent to the Works Manager, who must also consider the RDN and any applicable Codes for approving their use. Editorial: Various editorial changes made for clarity and to ensure consistent use of the term 'must'. No changes to the intent of each requirement.

Interpretation

In this document, except where the context otherwise requires—

- The word "must" is to be understood as denoting a requirement which is mandatory.
- The word "should" is to be understood as denoting a requirement which is not mandatory but recommended.
- The word "includes" in any form is not a word of limitation. Mentioning anything after "includes" or similar expressions (including "for example") does not limit what else may be included.
- A reference to a section, clause, schedule or appendix is a reference to a clause of or schedule or appendix of this document.

Nomenclature

Where any of the following symbols are used within this document, the textual description provided to the right is its intended meaning:

ⓘ This symbol intends the accompanying text to be read as INFORMATION. Common information accompanying this symbol includes RATIONALE and GUIDANCE for the associated requirement.

Copyright

Disclaimer

Examples of Worksite Safety Barrier Screens

The following photographs show a variety of different attempts to provide WSBSs with comments in each case:

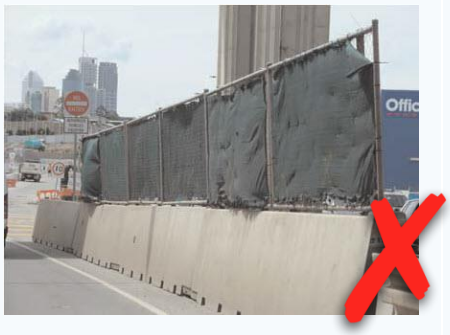
Examples of worksite safety barrier screens

*Note: Photos are for illustrative purposes only. Precast Concrete Barriers shown are not accepted for use in Victoria

Product is neat, tidy and effective. Note that vertical alignment is achieved by correct use of stabilising wedges inside the stanchion holes. Reflectivity of panel face may require attention as per Section 3.3.5 above.

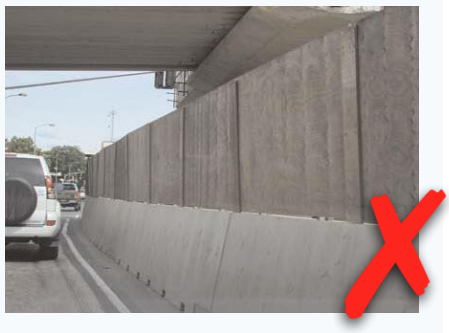
Product is distracting and poorly presented. Shade cloth solutions rarely result in an effective screen.

Timber panels need to be maintained, especially when installed for longer periods.



Temporary fence panels mounted on PCBs. Horizontal rails constitute a potential spearing hazard and are not permitted.

Temporary fence panels mounted on a steel barrier system. It is unlikely that the method of mounting is approved by the barrier manufacturer and could compromise the barrier performance. Horizontal rails constitute a potential spearing hazard and are not permitted.



Timber panels erected on PCBs. The vertical cover strips between panels present a potential hazard to road users.