**DISCUSSION PAPER - Bridge Safety Screens**

# Introduction

Urban Services recognises that there is a risk to road users from objects being intentionally thrown off bridges onto traffic passing below. In the past, these incidents have been infrequent and sporadic and were not seen as a major concern to the organisation. However, in recent times there have been a number of reported incidents both locally (and nationally) of accidents occurring as a result of objects being thrown off bridges at traffic below. This has highlighted the need for Urban Services to reassess these risks in light of these recent events to ensure that the likelihood of potential accidents caused from an object being thrown off a bridge at a vehicle passing below was minimised. Thus the objective of this document is

1. To confirm our assessment of the risk,
2. Discuss issues that might arise from our risk assessment and what impacts this might have to Roads ACT and other government stakeholders,
3. To identify, and prioritise the levels of risk with the likelihood (consequence) of accidents occurring as a result of objects being thrown off bridges,
4. To present the options available for ameliorating these risks; and
5. To develop a methodology aimed at ameliorating some of the identified risks.

## Background

The incidence of objects being thrown or dropped from a footway over a roadway is not a recent occurrence. In the ACT there is circumstantial evidence from discussions with the AFP that whilst these incidents have occurred in the past there has been no recorded events on the police databases, as no complaints have been officially lodged relating to property damage or injury.

Evidence from other jurisdictions suggests that the incidence of throwing objects from bridges is sporadic, and there is no reliable data available on the location and frequency of these incidents, although there was a relationship between frequency of these incidents and school holidays.

In 1999, Urban Services undertook a *“risk analysis”* using the Australian Standard(AS/NZS 4360:1999)to determine whether or not the installation of safety measures aimed at restricting these events from occurring were justified. After formal discussions with key stakeholder groups (including the AFP) it was decided that the likelihood of a vehicle being hit by an object thrown off a bridge was *“rare”* and the consequence of this action presented a *“low risk”* to the organisation at the time.

**1.2 Current Situation**

On 10 September 2003, a member from the public travelling along Erindale Drive by car was struck by an object thrown from the footway bridge above the road and sustained extensive damage to her windscreen. This matter was also reported to the AFP and appeared in the local *“Southside Chronicle”* newspaper, which highlighted the risks associated with accidents as a result of objects being thrown off bridges. ACTION has also reported incidences of objects being thrown off bridges at buses.

Further investigation undertaken by Urban Services into this matter showed that the AFP was aware of similar incidents occurring at this (and other) location(s), which were not recorded in the AFP databases as they did not involve injury and/or substantial damage to the driver and/or the vehicle. This prompted Urban Services to review its stance regarding the provision of safety measures relating to vehicles passing under bridges.

The RTA-NSW has recently developed a policy for the installation of safety screens on bridges, following a fatality and a number of accidents occurring as a result of objects thrown off bridges at passing vehicles. The policy incorporates a detailed assessment of bridges, pedestrian traffic and vehicle movements under bridges, and is based on a warrant system for assessing (and ranking) locations that satisfied the criteria for the installation of these safety screens on bridges. The RTA has also adopted design standards for safety screens, which are to be incorporated in all new bridge construction, where the bridge crosses over a trafficked road. VicRoads and other jurisdictions contacted have adopted similar criteria to the RTA for assessing the requirement of providing safety screens on bridges.

In light of the recent events involving thrown objects occurring in the ACT and work undertaken by the RTA-NSW and other jurisdictions, Urban Services is considering adopting similar measures for improving the safety of vehicles to ensure the risks associated with objects thrown of bridges are minimised.

## Risk

This document applies to Urban Services infrastructure and involves assessing bridges for the likelihood (and consequence) of objects being thrown onto the roadway underneath. Urban Services has assessed footway bridges as presenting the highest risk due to the level of pedestrian activity generated, whilst traffic only and multi-mode traffic bridges have been identified as medium and low risk bridges due to the surveillance provided by other traffic modes and a lower level of pedestrian activity.

Bridges noted as low risk will be analysed separately and/or treated with *“alternative treatment options”* as noted in Section 2.0 (below). If approved and endorsed by stakeholders, it is intended that the mitigation strategy for bridges ranked as high and medium risk would involve:

1. Progressively installing safety screens on selected bridges based on an assessment of the public safety risk. The high risk pedestrian only bridges over roadways would be dealt with firstly and then all multi mode bridges on a ranking or as needs basis if there is reported incidences

# Alternative Treatment Options

There are a number of alternative measures which should also be considered initially at assessed *“low risk”* locations or used as combinations with safety screens at *“high risk”* locations to enhance the level of safety of the amenity. These alternative measures include:

1. The implementation of maintenance practices around, and in the vicinity of bridges to remove loose stones, concrete fragments and other loose debris that could potentially be thrown off bridges;
2. Replacement of timber and metal delineator posts in the immediate vicinity of the structures with lightweight plastic alternatives;
3. Modification and removal of roadside furniture that could be used as projectiles;
4. Covering stony embankments (grade permitting) with inorganic/bushfire retardant mulch with the possible inclusion of small shrubs;
5. Installation of lighting and/or enhanced lighting;
6. Awareness of issues and discussions with local authorities and community groups;
7. Undertaking a media campaign through advertisements in the newspaper, newsletters and neighbourhood planning initiatives advising residents regarding the danger of throwing objects from bridges and the likely consequences of such an act (both for the perpetrator and the effected road user(s));
8. Reducing the speed limits of the road under the bridge – in most cases this is not an option due to the road hierarchy and enforcement issues;
9. Lowering the bridge – this can be done in the design phase, however the bridge will still require adequate headroom to provide for heavy vehicle and bus access underneath.

*Note:* Whilst some of these options could be implemented, they do not remove the risk to the motorist.

## Proposed Policy

If endorsed, the main objective of the final bridge safety screen policy would be aimed at addressing the public safety issues associated with accidents caused from objects thrown off bridges through the provision of safety screens and/or alternative safety measures implemented on bridges.

It is intended that bridges assessed as *“high risk”* (AS/NZS 4360:1999) would require a formal assessment of the associated risks using a warrant system similar to the one adopted by the RTA-NSW. Alternative treatment options will also be considered in isolation or as a combination.

Once there is an agreement that a bridge screen policy is warranted, bridges screens will be installed using the methodology below including:

* Prioritise the screening requirements for bridges based on highest risk
* Develop a criteria for the prioritisation of screening requirements on road bridges with pedestrian access using a warrant system

(Attachment A- Bridge Safety Screen Warrant System- Explanation Table).

* Explore other options available to achieve the objectives of safety screens.

# Proposed Selection Criteria

For a bridge to be considered as a candidate location for safety screening the road being over-passed should have a posted speed limit of 80 km/h or more for a rural road and 70 km/h for an urban road environment. In addition, at least one of the following criteria should also be satisfied:

1. Incidents of objects being thrown or dropped from or near the bridge have been reported.
2. Incidents of significant graffiti or other vandalism has been recorded and are evident.
3. Bridges over motorways, restricted access roads\* and major public roads over heavily trafficked roads. (i.e. Annual Average Daily Traffic (AADT) approximately 5000 vehicles per day)
4. Bridges over roadways, restricted access roads and major public roads, which are within 2 kms of a school, club or hotel.

There may be some instances where it may be undesirable to add safety screens on visual impact grounds, or where the quality of the bridge design may be compromised by the addition of such screens and would have negative implications to a particular community, or bridges are located within or over designated land. In such cases Urban Services will finalise the treatment of these bridges through a formal consultation process with ACTPLA and/or NCA.

*\* Note: Restricted Access Roads include bus and taxi lanes etc.*

## Prioritisation of Existing Bridges using a warrant system

Prioritisation for retrofitting screening to existing sites and design for new infrastructure would be a formal process, which would involve an assessment of the pedestrian bridges using a warrant system included in Attachment A. The warrant system would be based on the risk profile weighting of factors contributing to the throwing of objects from bridges. The factors likely to contribute to an incident involving objects being thrown off bridges include:

1. Ease of pedestrian access
2. Type of road underneath (arterial, major/minor collector)
3. Speed regime of the road underneath and number of vehicles
4. Proximity of schools, hotels, clubs or youth attractors (shopping centres and parks)
5. Proximity of pedestrian generators
6. Lighting
7. Exposure to buildings
8. Exposure to traffic
9. History of incidents/and or signs of graffiti at the site (or in the vicinity)
10. Amount of loose material nearby

The above factors have been sourced from the RTA Policy for safety screening of bridges – Technical Direction for Road Safety Practitioners TD 2002 – RS02 October 2002

**4 Issues**

**4.1 General Issues**

The risk of a serious injury associated with these incidents is dependent on two road-related parameters, the height of the bridge and the speed of the vehicle hit by the object. Thus reducing the speed limit (or lowering the bridge) would result in a reduction in the extent of damage that may be caused. However, reducing the speed limit would reduce the serviceability of the road, and lowering the bridge would be a very expensive option and has consequences to freight routes thus these options will not be explored.

* 1. **Financial Issues**

The design of bridge safety screens should give due consideration to the whole of life cycle costing of safety screens, and ensure that the screen design allows for easy access and cost effective maintenance of the bridge structure by nominated personnel, while at the same time restricting the possibility of the structure being vandalised with graffiti etc. The retro fitting of the bridge safety screens will be carried out progressively or as a separate Capital Works Upgrade project.

Capital Works funding for new construction works involving bridges will require additional funding for the costs associated with the design and installation of bridge screens.

* 1. **Aesthetic considerations**

The Urban Services’ – Final Draft *Directions and Priorities 2004-07* has highlighted the need to incorporate “artistic design” into the public realm – including the greater emphasis on public art. There is an opportunity to achieve these outcomes through incorporating some form of artwork etched on safety screens.

However, for existing bridges issues relating to *“Copyrights”* provisions on existing designs will also have to be explored.

* 1. **Urban Design Issues**

Urban Services’ will need to ensure that the provision of bridge screens does not compromise the overall urban design in the vicinity of these bridges. To this regard, extensive consultation (and approval where required) with ACT Planning and Land Authority (ACTPLA) and the National Capital Authority (NCA) is required to ensure that the urban design and planning principles implemented for specific areas are not adversely impacted.

In addition, Urban Services will be required to amend the Urban Services’ – Design Standards for Urban Infrastructure 7 – Bridges and Related Structures to reflect proposed changes once the bridge safety screen policy is approved.

ATTACHMENT A – BRIDGE SAFETY SCREEN WARRANT SYSTEM – EXPLANATION TABLE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** |  | **Category** |  | **Condition 1** |  | **Condition 2** |  | **Condition 3** |
|  |  |  |  |  |  |  |  |  |
| Factor |  | Priority rating likelihood |  | Rating Consequence |  | Rating Consequence |  | Rating Consequence |
| 1 | Type of Road Under |  | |  | | --- | | Motorway or  restricted access | | 10 | Major public road | 6 | Minor road or pedestrians | 2 |
|  | Speed limit > 80 km/h | 10 |  |  |  |  |  |  |
|  | Speed limit > 60 –80 km/h | 9 |  |  |  |  |  |  |
|  | Speed limit 60 or lower | 8 |  |  |  |  |  |  |
| 2 | Pedestrian Access | 10 | Pedestrian Only | 10 | Shared with motorists | 8 | No Access | 6 |
| 3 | Near School | 9 | Up to 200 m | 10 | 401-600m | 8 | 1001-1200m | 5 |
|  |  |  | 201-400m | 9 | 601-800m | 7 | 1201-1400m | 4 |
| 4 | Near Hotel or Club | 8 |  |  | 801-1000m | 6 | 1401-1600m | 3 |
| 5 | Near Youth attraction | 6 |  |  |  |  | 1601-1800m  1801-2000m  Beyond 2001 | 2  1  0 |
| 6 | Other pedestrian generators i.e. shopping centres, bus and train stations, high density residential areas etc. | 1 | Significant generators within 300m | 10 | Minor generators within 300m | 5 | Nil within 300m | 0 |
| 7 | Lighting | 3 | Nil | 10 | Adjacent lighting | 5 | Lighting on bridge | 0 |
| 8 | Exposure to buildings | 7 | Low | 10 | Medium | 5 | High | 0 |
| 9 | Exposure to traffic | 7 | Low | 10 | Medium | 5 | High | 0 |
| 10 | History of accidents and/or signs of graffiti | 10 | Large amount of graffiti and record of past accidents | 10 | Small amounts of graffiti | 4 | No graffiti or past incidents | 0 |
| 11 | Any loose objects | 4 | Easily attainable large rocks and objects | 10 | Few shrubs, rubbish and small rocks | 4 | None | 0 |

Note 1: Final risk scores for an overbridge is the “rating” multiplied by the priority rating divided by the total number of categories

Note 2: The Project Manager will need to provide an assessment of the ratings for new bridges. This may require estimates to be made for factors 8-11

Note 3: “Pedestrian Access” bridges shared with motorists are those bridges, which allow for multiple modes of traffic

Note 4: “Exposure to buildings” and “traffic” is defined as those situations where the bridge is over, in the vicinity of, or exposed to high occupancy buildings or high volumes of traffic.