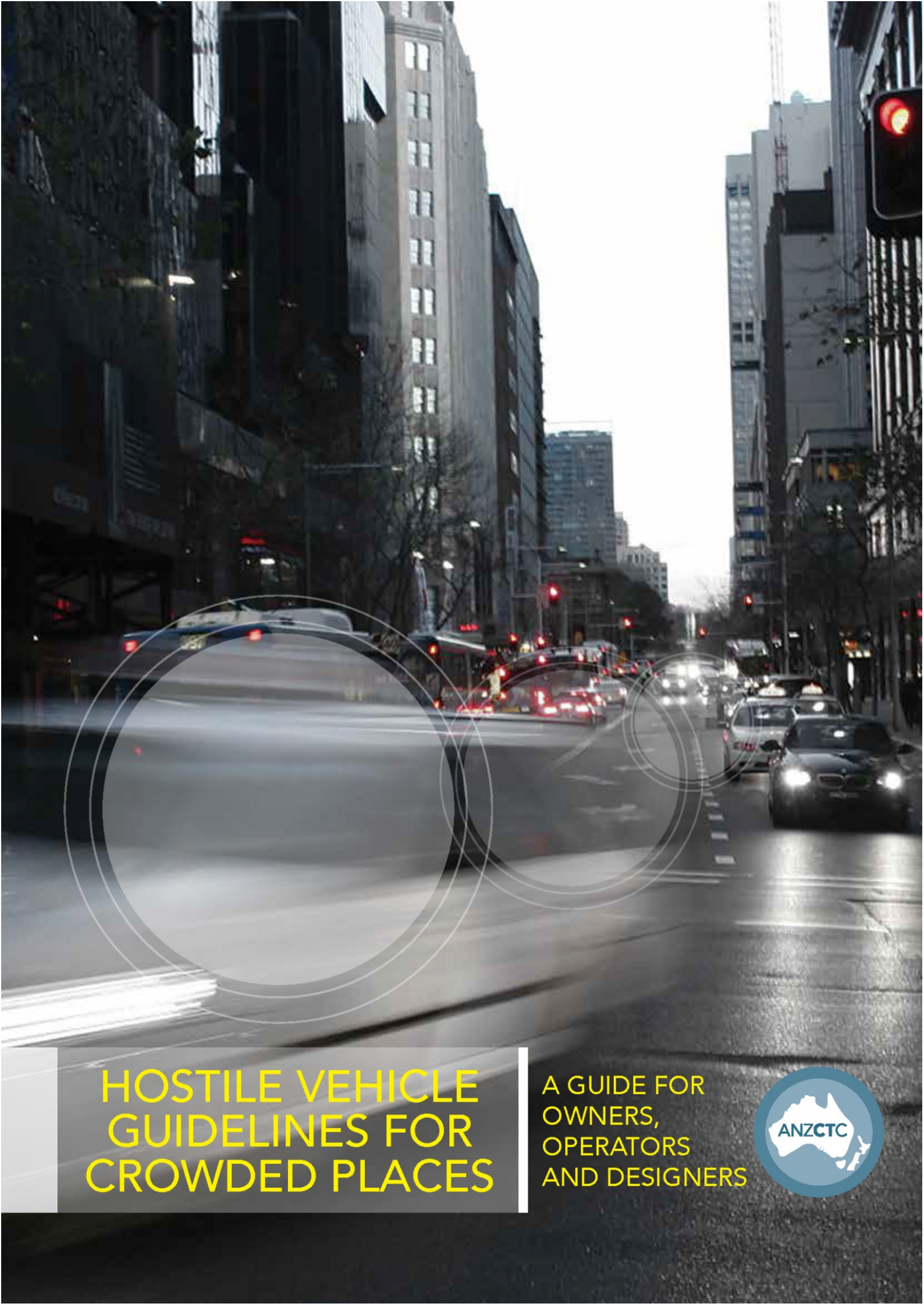


HOSTILE VEHICLE GUIDELINES FOR CROWDED PLACES

A GUIDE FOR OWNERS, OPERATORS AND DESIGNERS

ANZCTC

Contents

Who

Who should read this and why – vehicles as weapons

This publication provides an overview of hostile vehicle mitigation to all owners and operators responsible for the management of crowded places.

It offers insight into how protective measures can be integrated into public and private places in order to mitigate and reduce the impact of vehicles being used as weapons.

Owners and operators of crowded places want their site to be as safe as reasonably possible for their staff and the public.

Organisational reputation, business continuity, and legal requirements for publicly accessible areas to be safe are all important reasons for owners and operators to understand and mitigate the risk posed by hostile vehicles.

The aim of this document is to provide those responsible for crowded places with knowledge to inform security design considerations and decisions. It is intended to be a starting point to the development of effective and aesthetically complementary designs that help protect crowded places from hostile vehicles.

Section 1

Key hot spots

Commercial hubs, shopping centres, special events, stadiums, hotels, CBDs

About this publication – When and where vehicles collide with pedestrians

Protecting people in crowded places requires attention to the vehicle management, urban design and architectural features of a space. This document addresses the ways in which vehicles are being used as weapons to harm people in public spaces, and how these threats can be mitigated.

Section 1 defines hostile vehicles and the nature of the threats they may pose to people in crowded places.

Section 2 provides guidelines on how to prevent hostile vehicles from injuring people. It provides examples of physical barriers and traffic management solutions to prevent hostile vehicles entering crowded places.

The Conclusion outlines the advantages of early implementation in relation to cost and overall protection when designing an effective mitigation strategy, and provides contact details for further information.

1.01 Threat Context

What is the threat context?

The use of a vehicle as a weapon in a terrorist attack is not new. For some time, this tactic has been considered and used by violent extremists – including in Western countries.

Recent terrorist incidents and violent extremist propaganda demonstrate that hostile vehicle attacks continue to be of interest to violent extremists globally.

Attacks of this nature require minimal capability, but can have a devastating impact if targeted towards crowded places.

The terrorist attack on the Bastille Day parade in Nice in July 2016 and subsequent vehicle attacks in Germany and the United Kingdom have attracted global attention. Terrorist propaganda has glorified these attacks, including the methods and tactics used, and called for emulation around the world.

The potential for hostile vehicle attacks is not limited to Islamist extremists – any violence-prone group or individual could use a vehicle as a weapon should it suit their objectives.

1.02 Hostile Vehicles

What is a hostile vehicle?

A hostile vehicle is generally one whose driver is determined to access a restricted or unauthorised area or location in order to cause injury/death to people, disrupt business or effect publicity for a cause. A hostile vehicle may be used to carry an explosive device or the vehicle itself, travelling at speed, may present the primary danger.

The most likely targets of hostile vehicles are spaces occupied by a critical mass of people at a particular time, where the aim of an attack is to cause death/injury to large numbers of people.

The driver of a hostile vehicle may not necessarily obey traffic road rules. There is an inherent danger in not taking this into account when conducting a site assessment. All too often, security measures have been installed under the assumption that a vehicle will not, for example, travel the wrong way down a one-way street.

This document focuses on preventing vehicular access to crowded places to help mitigate the risk of a terrorist attack. The suggested counter-measures may also be valuable in other situations, such as protecting pedestrians on footpaths from dangerous or drunk drivers.

The methods of hostile vehicle attack may include:

- Parked (containing material to cause harm ie explosives)
- Encroachment;
    - Exploiting gaps in site defences (no impact)
    - Tailgating through an active barrier system; and
    - Tampering with vehicle barriers to later provide unlawful access.
- Penetrative Impact (ramming people & structures)
- Entry by deception to access restricted areas (trojan vehicle)
- Duress (against a security guard or employee to open a barrier)

1.03 Hostile Vehicle Mitigation

What is a crowded place?

Crowded places are locations or environments which are easily accessible by large numbers of people on a predictable basis. Crowded places include, but are not limited to, sports stadia, transport hubs, shopping centres, hotels, clubs, places of worship, tourist attractions, movie theatres, and civic spaces. Crowded places do not have to be buildings and can include open spaces such as parks and pedestrian malls. A crowded place will not necessarily be crowded at all times: crowd densities may vary between day and night, by season, and may be temporary, as in the case of sporting events, open air festivals, or one-off events.

Security should be proportionate to threat

Security measures can be resource intensive, costly and, if not correctly managed and communicated, can alienate staff and the public and significantly disrupt the day-to-day operations of a crowded place. This is why expert specialist advice is essential and why careful consideration and planning is required before implementing any protective security measures.

It is important to take a holistic approach to security consistent with the foreseeable risks to your venue or asset. Applying security measures to counter the vehicle risk in isolation can inadvertently create a vulnerability to another risk, such as crowd crush.

Understanding the hostile vehicle risk is crucial to ensure your security measures are not over or under engineered.

Section 2

How to separate hostile traffic from pedestrians – Hot spots such as outdoor markets, parades, festivals and sporting events

In designing and applying measures to mitigate hostile vehicle risks in public spaces, it is important to consider equally the needs of the normal users of the space. Spaces must be safe but they must also be functional, such that the level of security is proportionate to the level of risk.

As such, a 'one size fits all' approach is not effective: mitigation solutions must be tailored to the physical and practical context. Additionally, since threat levels and terrorist methods evolve over time (often in response to security methods), both current and future security needs must be taken into account and security measures reviewed periodically for effectiveness.

For most existing locations and in some new build designs, there are issues that should be considered to maximise both the functionality of the space and effectiveness of the HVM measures, such as:

- Business needs (e.g. budget, health and safety);
- Logistics (e.g. traffic management, operational requirements);
- Pedestrian and traffic throughput;
- Disability legislation; and
- Building (e.g. appearance, planning consent)

In this case a risk management plan, including a vulnerability assessment, should be conducted to understand what impact the functional needs of the space has on the proposed HVM measures.

Crowded places – Outdoor special events

It is important to take a holistic approach to the security of an outdoor special event where large crowds are expected. Your initial assessment must consider all foreseeable threats which should inform your decision in selecting an appropriate venue.

For vehicle risks, and where possible, it's considered good business practice to select a venue that contains existing natural barriers, e.g. large bolders, well established dense trees lines, natural berms, ditches, running rivers or creeks. This will reduce the amount and ultimately the cost of hiring re-deployable vehicle barriers.

Remember to consider other risks when installing security measures so not to introduce vulnerabilities to other risks.

Safe places by design

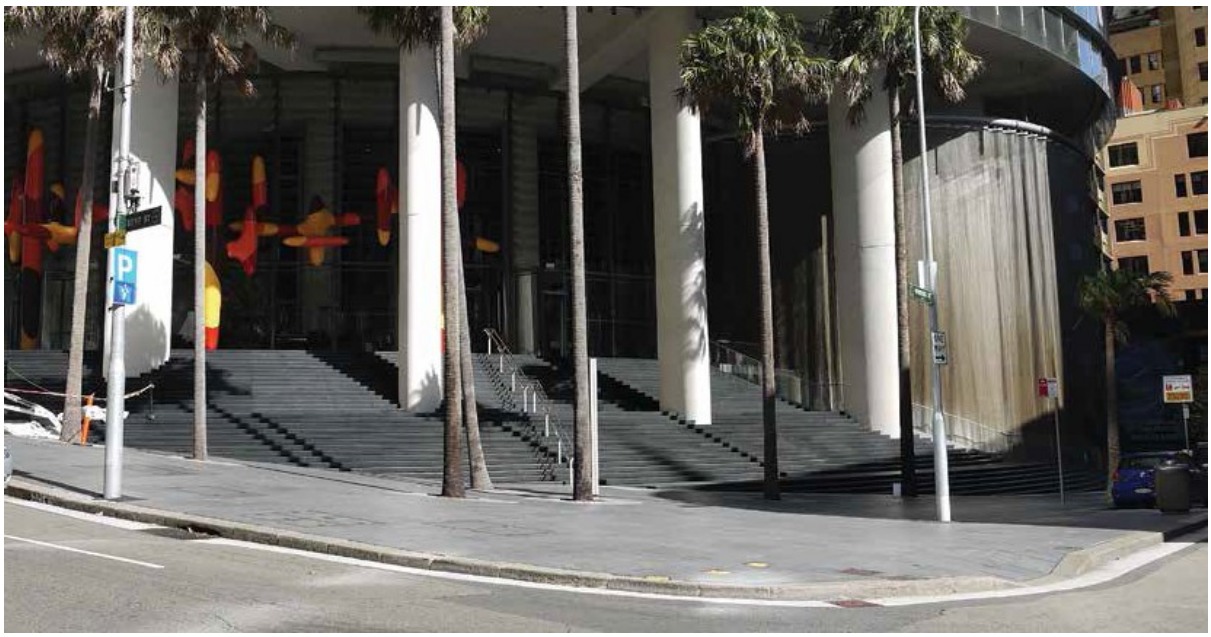
The strategic integration of steps, columns and sculptures into the building's design offers a good example of how hostile vehicle mitigation can be applied in a subtle way. A flight of steps leading into a building can restrict access to most conventional vehicles, presenting the building as a less desirable target.

Strategically placed mitigation devices such as spheres, planter boxes, seats, or bollards on the pavement surrounding the entrance of the building provides additional protection against unauthorised vehicle intrusion while increasing the standoff distance. It is important to ensure

that barrier solutions that may not be purpose built (e.g. planter boxes, sculptures) are properly mounted and reinforced against impact. This may require advice from a qualified engineer with experience in HVM.

The bottom two images on the following page are computer generated images demonstrating how a combination of planter boxes and spherical balls might enhance and protect the area. Please note that these are suggestions only.

Current design:



Enhancements Example 1:

Enhancements Example 2:

2.01 Barriers

Vehicle Security Barriers (VSBs)

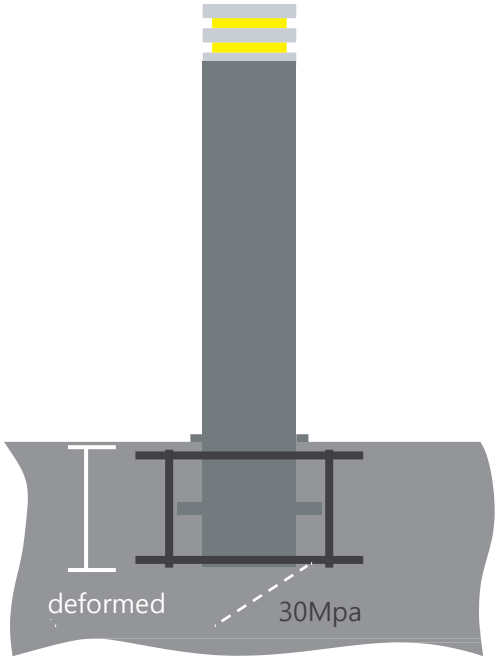
VSBs can be passive (static) or active (functioning/ mechanical) in their operation. Active devices are susceptible to mechanical failures and human error/ deception techniques, and require maintenance and ongoing costs; accordingly, passive barriers are preferred when there is no operational requirement to provide vehicle access into an area.

When selecting a barrier the foundation and installation is just as important to consider as the barrier itself. Poorly designed foundations can compromise the performance of a barrier in resisting high-energy hostile vehicle impacts.

Manufacturers offering an impact-tested VSB should also be able to offer a tested and approved foundation design for that product. Other considerations when installing a VSB include:

- The presence of underground obstructions
- Ground conditions
- The perceived calculated impact loading
- Protection to underground services in close proximity

Foundation requirements:



Passive barriers

There are a great number of options for creating effective passive barriers around an asset. They need not be costly to install and can easily fulfil aesthetic requirements of the space and its patrons, as well as the requirements of HVM.

A balance should be struck between proportionate security measures, the needs of the local businesses and functionality of public space. It is possible to integrate bespoke HVM measures into most public realm features.

Urban elements that can be used include:

- Landscape features (e.g. sculpted or clad earthworks, steep verges)
- Shrouded bollards (i.e. designed to match local architecture)
- Decorative, structural or energy absorbing planters (i.e. more aesthetically acceptable)
- Strengthened 'light' structures (e.g. bus or smoking shelter, information sign)
- Large immovable landmarks (e.g. statues, walls)
- Integrated street furniture (e.g. lighting column, traffic signal, seating, cycle rack)
- Level changes (e.g. steps, high kerbs)
- Water features (e.g. fountain, pond or pool)

Defining vehicle and pedestrian spaces

Designing and protecting pedestrian-only areas around assets is essential not only to protect pedestrians who would ordinarily use the space, but has the added benefit of restricting vehicle access to the buildings, creating standoff and natural barriers.

The best way to protect pedestrians is to create clearly defined pathways separate from vehicles. This can be achieved through the use of barriers along the edge of footpaths or by integrating walkways into new developments that limit vehicle accessibility but maintain easy access for

pedestrians ensuring their safety. Designs like these may also help reduce the opportunity for accidental collisions between pedestrians and cars, which are quite common in carparks.

There are various designs that can help to define and reinforce pedestrian areas but should not be relied upon as the sole source of protection. These can include:

- Raised footpath
- Cobbles near gutter
- Lights on the ground (car parks)
- Verge; and
- Medium strip

Stairs will stop most but not all vehicles and can be used to add a level of protection to high-pedestrian areas or gathering points. Their main use is in mitigating out of control vehicles, or slowing down determined vehicles; they may also act as a visual deterrent (target hardening). However, they should not be solely relied upon to protect critical infrastructure, since some vehicles (short wheel base and high front end) can easily mount stairs.

The images to the left show Civic Pavilion precinct in Sydney which incorporates a combination of stairs, a sculptured garden structure, and bollards to separate the pedestrian space from vehicles.

Access for emergency and maintenance vehicles into the space is managed through the use of removable bollards.

The venue provides a good example of how effective but subtle vehicle mitigation options can be integrated into the design, establishing a pedestrian environment safe from the risk of hostile vehicles.

Separating vehicle and pedestrian spaces can be achieved by strategically placing vehicle security barriers to define those spaces. Installing metal bollards on the edge of the roadway, in the image below, provides protection for pedestrians against a vehicle attack.

The large pedestrian space between the building and roadway creates additional stand-off distance that significantly reduces the building's vulnerability to a vehicle-borne improvised explosive device (VBIED).

The option of seating as a mitigation device at this location would not be appropriate, since the absence of a raised gutter between the roadway and pedestrian pavement increases the risk of injury to pedestrians in the event of a vehicle impact.

In designing pedestrian only spaces, consideration must be given to the volume of people (including wheelchairs and prams) movement in and out of a venue, together with access to the space by emergency and maintenance vehicles. This coupled with a comprehensive vehicle dynamics assessment should influence the shape and style of appropriate vehicle security barriers.

Semi structural

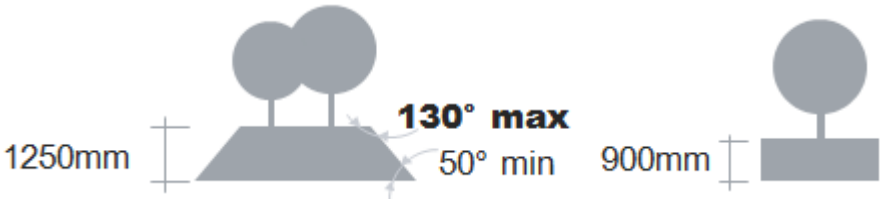
Sculpture and street

Riverside upgrade: sculptured feature

Water feature

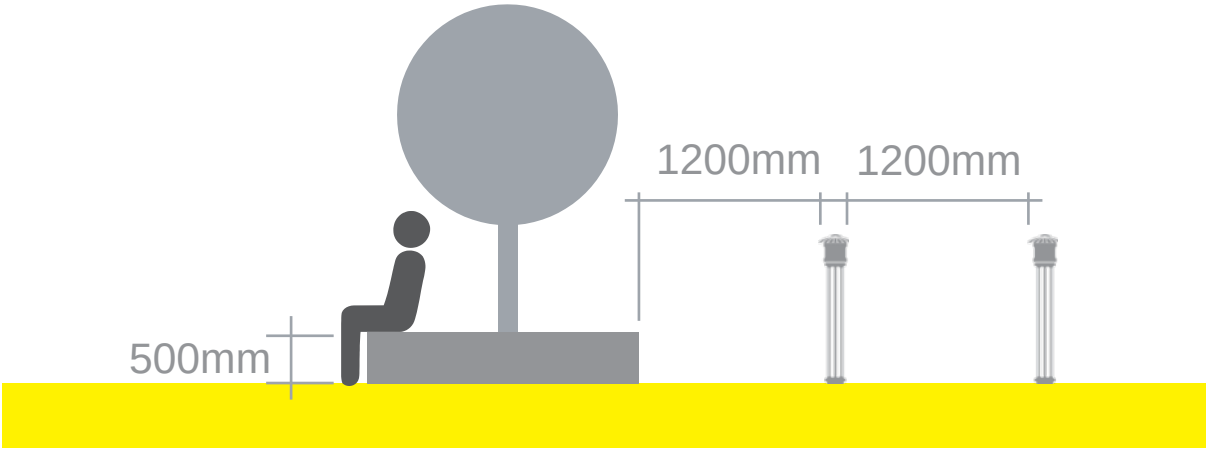
Suitable space for passive barriers

Steps on a pedestrian street



Remember

- For effective barrier placement the maximum clearance between two barriers should be no wider than 1200mm
- The barriers should also have a minimum height of 500mm



There may be naturally formed barriers located around a site that could be used as part of a secure perimeter. Natural barriers could include rivers, ponds, lakes, densely wooded areas, steep slopes or changes in ground level that will either divert attack or preclude vehicle passage.

Where these features do not naturally occur it may be feasible to engineer them. In these cases, consideration must be given to access and egress paths for pedestrians and general crowd management around the venue or asset.

The recommended solutions are to construct a ditch, bund or combination of the two. Considerations such as cost (and long-term cost benefit), availability of materials/production facilities, ground conditions and architectural advantage will influence the choice of options.

Trees and fences

Trees

The use of individual trees as a VSB is not generally recommended. This is because full-scale impact testing of trees has indicated that trees do not necessarily perform well against a determined hostile vehicle impact.

Where an existing tree cannot be moved and forms part of the physical perimeter, a number of factors should be considered:

- Tree health

- Stability of local ground conditions around the tree roots
- Trimming of branches to remove climbing aids (e.g. over a perimeter fence); and
- Lines of sight for guard-forces and CCTV surveillance.

Where areas of bush, forest or other densely packed trees are present to form a natural barrier, the combined resistance will likely be more effective against determined vehicular impact. In this instance, any gaps between trees may only require lower grade infill HVM measures to prevent a slow speed encroachment attack.

Fences

Most conventional fences are not a viable option for a HVM measure; they are easily breached by vehicles at low speeds and should only be used where vehicle speed is restricted by terrain or approach. Fences are better suited to assist perimeter monitoring by installing perimeter intruder detection systems (PIDS) like motion sensors on the fences.

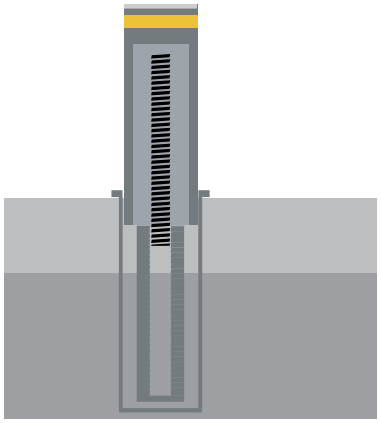
Active barriers

If vehicle access to the asset is required, then active barriers can be used to identify and monitor vehicles allowed past the standoff perimeter.

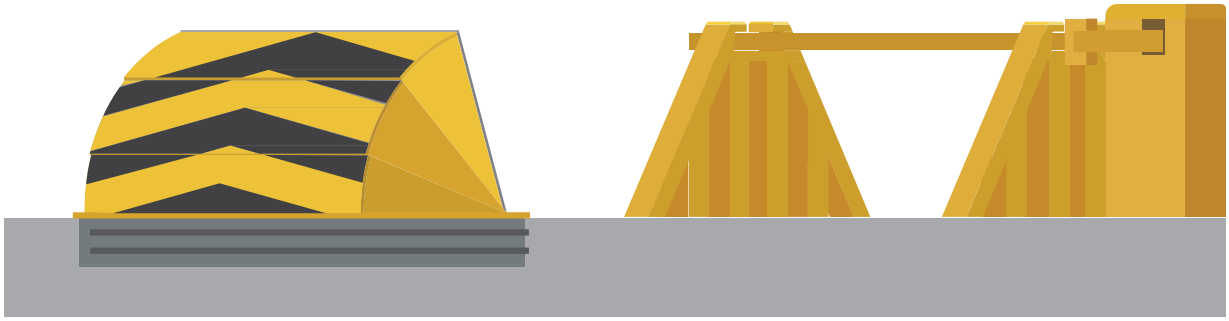
Use of an active VSB is required for control of vehicle access. The term “active” refers to the system’s ability to operate from closed (secure) to open, and could take a number of forms, such as:

- Retractable bollard;
- Retractable blocker; and
- Folding, sliding, swinging, rising-arm gate.

Retractable bollard



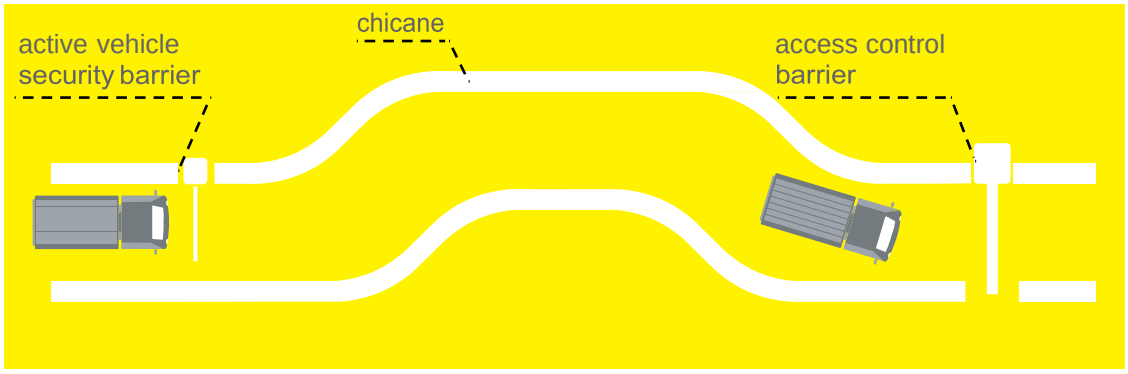
Retractable bollard and rising-arm gate



An active VSB can be manually operated by a person or powered (e.g. hydraulic power source). A VSB should be selected not only on the basis of performance or operational requirements, but also cost. Careful consideration should be made by the consultant and purchaser as to the full cost of a VSB, especially post- installation costs and long-term requirements such as:

- Training;
- Service requirements;
- Maintenance and repairs;
- Spare parts;
- Environment e.g. salt corrosion;
- Positioning of controls e.g. ensure they are secure; and not accessible by the public;
- Drainage issues.

If an active VSB is required then a well-designed vehicle access control point ( ) should ensure that guards are not put under undue pressure or distracted by traffic management requirements that might prevent their being able to carry out security procedures safely and securely.



Vechicle access control point

The ideal VACP deploys two rows of VSB at the end of a VSB enforced chicane. One row at the start and another at the end of a VSB enforced chicane as per diagram. This creates a contained secure zone that a vehicle cannot enter or leave until authorised by the guard forces or an automatic access control system. This type of VACP uses up a lot of land space and is expensive to install and maintain; thus, while ideal, this type of VACP is only suitable to certain areas.

Imperative to control points are rejection lanes, search bays or parking facilities that have not been illustrated in this diagram.

Standards for vehicle security barriers

International Standards Organisation (ISO), International Workshop Agreement (IWA) 14-1 & 14-2. 2013.

Part 1 relates to the performance requirement, impact test method and performance rating.

IWA 14 -2 :2013
Part 2 relates to the application of vehicle security barriers.

The selection and installation of vehicle security barriers must include consideration of relevant legislation and general crowd management. For example; public access and safety, accessibility for wheelchairs and prams.

Re-deployable devices

Re-deployable devices are vehicle security barriers that are kept in storage and can be utilised when there is an increase in the level of threat to a specific location or crowded places generally. These devices are designed solely as protection measures and are generally not customisable.

There are two significant drawbacks associated with re- deployable HVM devices. The primary disadvantage is the fact that they are intelligence-driven, meaning that they are only effective if the site owner is aware of the threat: they cannot mitigate against a 'no notice' attack. A second disadvantage is their utilitarian appearance and consequent inability to respond to the aesthetic requirements of the surrounding environment, although their appearance is less of a concern if they are only operational for short periods of time, as is usually the case.

These drawbacks illustrate the importance of ensuring that permanent fixtures form part of a HVM strategy.

Rapid vehicle deployment barrier

- Temporary installation
- No assembly tools required
- Set up in less than 10 minutes
- As with permanent barriers, re-deployable barriers should be treated and rated against a recognised standard to resist the impact of the threat vehicle.

Portable barrier-in-a-box

- Impact tested: 7.5 tonne at 48km/h
- Temporary or permanent installation
- Set up in 7 minutes
- As this barrier is installed to bollards, the distance between them and their impact rating should meet the manufacturer's specifications

Rapid deployable surface mount

- Impact tested: 7.5 tonne at 48km/h
- Short to mid-term installation
- Deployed at a rate of 1 bollard every 5 minutes

Re-deployable road safety barriers

Road safety barriers such as concrete, steel and plastic water filled jersey barriers are designed to deflect vehicles from leaving the roadway or trafficable lane. These barriers are generally surface mounted and suitable for use as re-deployable traffic calming devices.

Caution must be taken not to use jersey barriers outside of their design specifications.

Improvised vehicle barriers

Vehicles have and continue to be used as improvised vehicle barriers around the world. This type of barrier is an attractive option due to its portability to close accessible gaps on roadways or paths that could be exploited by hostile vehicle attack, or to act as a gate to regulate authorised vehicle entry into a protected zone.

If using vehicles to form part of a barrier system, a comprehensive vehicle dynamics assessment must be conducted to determine suitability. The assessment must consider the size, weight and placement of the barrier vehicle relative to the size, weight and speed of the foreseeable threat (attack vehicle).

2.02 Every Metre Counts

Achieving a factor of safety

Where possible, barring vehicular access entirely – thus automatically removing threats to the site – is preferable to more elaborate vehicle management designs. This option can also have added operational benefits and reduced risk of accidents or misuse.

In selecting this method, however, consideration should be given to routine and emergency servicing requirements of the asset, as well as surrounding traffic and transport imperatives. The exclusion of traffic from a wide area may increase traffic volumes and congestion in the surrounding local transport network, thus creating a need for wider traffic management plans.

It is important to design barrier systems, both permanent and temporary that clearly define vehicle and pedestrian spaces. Street furniture in accordance with international standards can be used as mitigation, however they should be supplemented with additional traffic calming measures. Permanent and temporary barrier systems that are not supported with these additional measures as depicted in the photograph(s) only serve to increase the risk to pedestrians in or on the barriers in the event of a vehicle impact.

With all surface mounted barriers, your assessment must also include the predicted penetration distance the barrier and attack vehicle will travel post impact. This distance will inform the factor of safety that is required (space between the barrier line and crowds).

2.03 Vehicle Approaches and Traffic Management Options

Impact angle is measured between the direction of travel of the vehicle and the impact location (between 0-90 degrees).

Owners and operators should consider a variety of traffic management options, including different forms of vehicle approaches.

Even a small reduction in the velocity of a hostile vehicle will have a significant decrease in the amount of energy that vehicle is carrying, thus reducing its impact and permitting less intrusive HVM devices, which may reduce costs.

High speed = high impact = catastrophic result.

A small decrease in speed = a large decrease in energy = reduced impact = less intrusive barriers and possible reduced cost.

There are a variety of traffic management options to help reduce vehicle speed.

Most severe	Less severe	Least severe
Head on impact	Angled impact	'In-turn' impact
This impact mode is usually the most severe. The vehicle is fully engaged and the resultant momentum generated by the mass and speed of the vehicle is directed towards the point of impact.	This impact mode is less severe than a head-on approach. The angle typically leads to speed loss by redirection of the vehicle.	This mode is the least severe. Lateral acceleration forces inhibit the capability of a vehicle to maintain or increase speed during a turn in.

Longitudinal deflections

Horizontal deflections, such as bends or chicanes, are often employed in urban or residential areas to encourage drivers to slow down. Drivers reduce vehicle speed in order to maintain ride comfort while making the required direction change; this, in turn, results in improved road user safety. Longitudinal deflections can also be used to limit the maximum speed of a vehicle operated by a determined driver.

Well-designed temporary chicanes can help to slow vehicles in the lead up to a special event area.

Remember: always use barriers within their design specification.

Vertical deflections

Vertical deflections such as road humps, speed cushions and rumble strips are often employed as a visual deterrent and to disrupt ride comfort, encouraging road users to reduce speed. These, however, typically provide negligible deterrent or speed reduction against a determined hostile vehicle attack.

Inclines

Gradient will affect the ability of a hostile vehicle to maintain speed or accelerate toward an asset, especially for larger, heavier vehicles. Steep inclines may also be used to restrict the line of sight along a potential attack route, thus introducing an element of uncertainty to the attacker.

Use of inclines will require a large amount of physical space so may not be an option unless there is natural incline available in the surrounding topography.

Conclusion

Smart design

The nature and use of hostile vehicles has evolved in recent years with terrorism and criminal activity, so too has our understanding and response. This evolution is reflected in the design and implementation of new and innovative physical protective security measures that help prevent and reduce the consequences of an attack.

No longer must we equate effective physical protective security with cold, sterile measures of austerity. Creative innovation is paving the way for seamlessly integrated protection measures that complement and enhance current needs and desires within public and private spaces.

Equally, common sense needs to be applied to the installation of HVM measures by clearly identifying and prioritising the areas that need protection, rather than areas where it is ordinarily impossible for vehicles to gain access.

It is important not to over-engineer HVM.

Innovative approach = optimised integration

By recognising and acknowledging risks during the design stages of a building or public space, it is possible to achieve an optimal, holistic approach to safety through security. This is also the most cost-effective time to implement physical security measures. The MacLeamy Curve below outlines the importance of early considerations.

Where to go next

Not all of the options provided in this document will be applicable or achievable at all sites. A specific and unique site assessment will need to be conducted to establish the most suitable device for each site even if an owner/ operator has multiple similar assets. The surrounding environment will not be the same in each instance and these differences, no matter how subtle, will impact on the nature of the HVM solutions required.

Information and advice

In the case of an emergency, dial 000 for reporting an incident or immediate advice.

Any suspicious activity or behaviours or concerns should be reported to the National Security Hotline on 1800 123 400.

For all other inquiries, please find contact details for police in your jurisdiction at www.nationalsecurity.gov.au/CrowdedPlaces.

References

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Version control

This document is endorsed by the Australia-New Zealand National Counter-Terrorism Committee (ANZCTC) and maintained by the Attorney General's Department (AGD). AGD is responsible for the version control of this document.

To preserve the integrity and currency of this document:

- major amendments must be endorsed by the ANZCTC
- minor amendments, for example to correct spelling or grammar, should be documented and forwarded to AGD to be implemented and then a revised version sent to the Crowded Places Advisory Group (CPAG) to be endorsed before it is distributed.

Images 4,7,10,16,21,22 by Alejandro Monroy 2012
Image 8 by Lucy Klippan 2012
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Enquiries: Designing Out Crime Research Centre Level 3, 235 Jones St, Ultimo University of Technology Sydney
Postal Address: PO Box 123 Broadway NSW 2007
T +61 2 9514 4968
E info@designingoutcrime.com
W www.designingoutcrime.com