MARAUDING TERRORIST ATTACKS

Supplementary Guidance – Physical Barriers to Delay and Discourage Attackers

CPNI
Centre for the Protection of National Infrastructure

COUNTER TERRORISM POLICING

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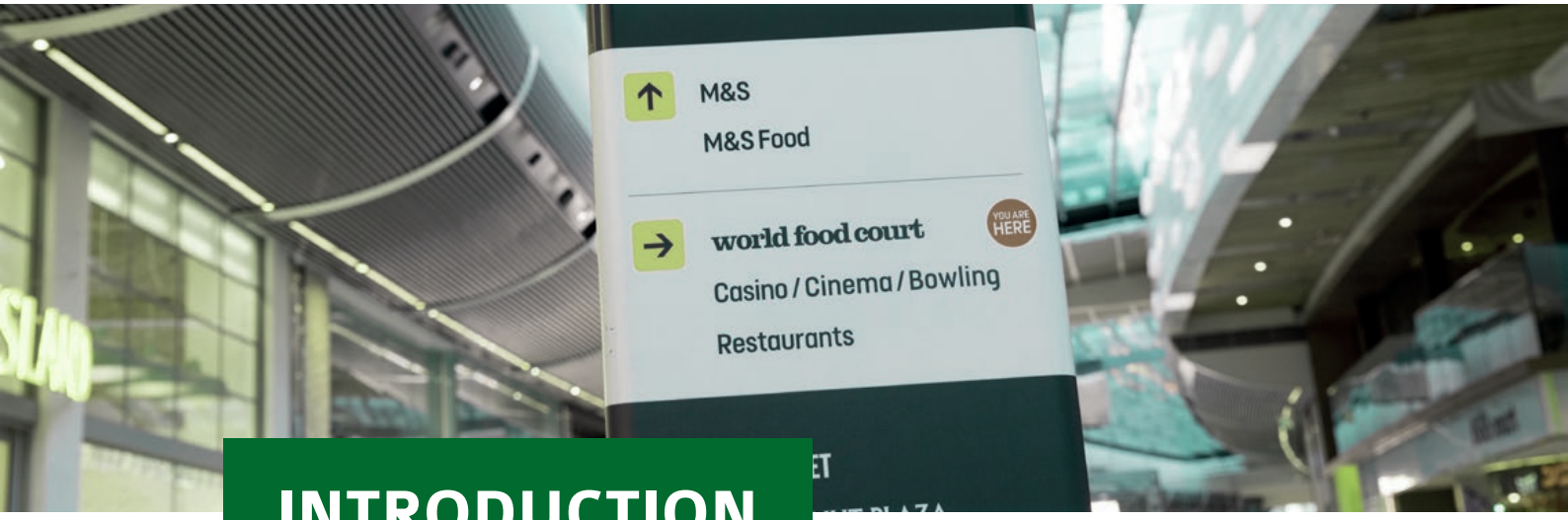


INTRODUCTION

Intended audience

This document is intended for organisations in the public, private and third sectors. It is most useful for Physical Security Managers and Physical Security Advisers and Consultants.

Scope

Marauding Terrorist Attacks (MTAs) are fast-moving, violent attacks where assailants move through a location aiming to find and kill as many people as possible. Most deaths occur within the first few minutes, before police are able to respond.

This document is supplementary to *Marauding Terrorist Attacks: Making your organisation ready*, which discusses how your organisation can recognise an attack, take immediate action and assist the police.

Physical barriers include doors, turnstiles and shutters and are not limited to devices specifically designed for security.

The document outlines how **any** locked physical barrier in locations such as offices, shopping centres and theatres can delay and frustrate attackers and then discusses considerations for specific types of barrier.

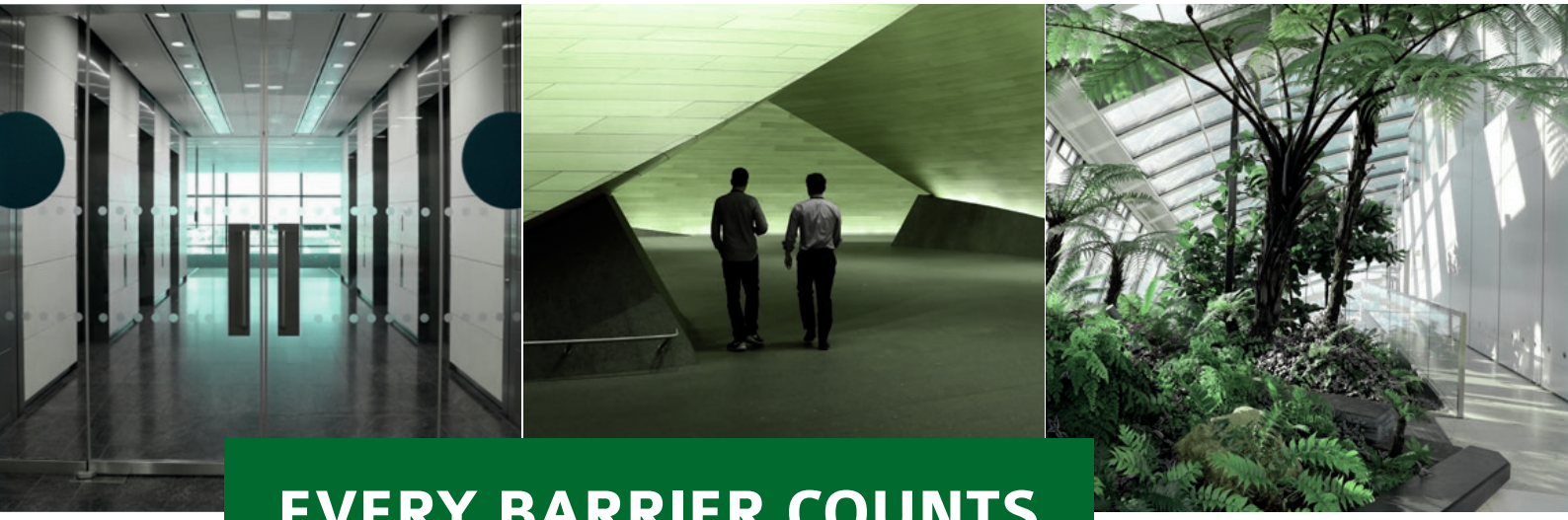
This document helps organisations to:

- Assess how effectively their existing barriers are able to delay and discourage attackers
- Ensure existing barriers are configured to offer the longest delay possible
- Understand what to look for in relation to defending against marauding terrorist attacks when choosing new barriers.

Deploying and using physical barriers is only one aspect of an organisation's defence against marauding terrorist attack and must be considered in conjunction with other aspects of an organisation's response. Refer to other documents in this guidance suite.

The document does not discuss:

- Testing standards for physical barriers; see CPNI's ***Marauding Terrorist Attack Standard*** (MTAS, to be published Autumn 2020)
- Vehicle barriers or other means of defending against a vehicle-based attack; see CPNI's guidance on ***Hostile Vehicle Mitigation***
- Walls; see ***A Guide to Security Walling Systems for the Protection of Important Assets***
- Active Delay Systems such as security fog; see ***Marauding Terrorist Attacks: Supplementary Guidance – Active Delay Systems***
- Planning considerations for instigating lockdown using physical barriers; see ***Marauding Terrorist Attacks: Supplementary Guidance – Lockdown***
- Planning considerations relevant to defending against the use of fire as a weapon
- Compliance with legal requirements such as fire safety, building standards and health and safety regulations, building standards; see ***Marauding Terrorist Attacks: Supplementary Guidance – Lockdown***.



EVERY BARRIER COUNTS

The rapid pace of marauding terrorist attacks makes them particularly devastating, especially when the attackers are using firearms.

However, CPNI's research as well as analysis of previous attacks show that all barriers can reduce casualties by:

- Deterring an attacker from entering an area if they perceive a barrier as too difficult or time-consuming to overcome
- Delaying attackers' progress, giving potential victims more time to escape or hide
- Hiding potential victims from an attacker's view
- Fatiguing and disheartening attackers
- Depleting an attacker's resources if they damage knives, spend bullets or detonate explosive devices attempting to defeat a barrier.

Figure 1: Attackers armed with assault rifle and explosives

EVERY SECOND COUNTS

Unobstructed, attackers can make rapid progress through an area, reaching many victims before they have become aware of the attack and taken action to escape or hide. Slowing that progress can be achieved without significant investment or specialist security equipment.

A barrier that takes 30 seconds to overcome is highly valuable. This means that even barriers that do not meet other security needs can make your site more resistant to a marauding terrorist attack.

Using multiple locked barriers means that the attackers are delayed by each one they encounter, knowing that with every second that passes, armed police are a second closer to arriving.

Figure 2: Closed roller shutter delaying progress of attackers

HOW BARRIERS MAY BE OVERCOME

Terrorists may overcome barriers using:

- Opportunism: exploiting doors left unlocked or that have been propped open
- Coercion: forcing someone to open a barrier
- Deception: impersonating people who are authorised to enter an area
- Force: breaking through a barrier using use their own bodyweight, their weapons, tools they have brought with them or items that are to hand, such as fire extinguishers
- Stolen keys or access control cards
- Activation of fire safety systems that are configured to automatically disengage locks.

CPNI's analysis of terrorists operating in the UK has shown that their attack planning is unlikely to include detailed preparation for overcoming physical barriers.

The ability of attackers to overcome physical barriers by force depends on their sophistication as well as the properties of the barrier itself. The skills, tools and weapons likely to be used by terrorists of different levels of sophistication are summarised in the figure below. The threat varies between organisations and also between different sites.

Attackers armed with guns or explosives may be reluctant to use limited supplies of ammunition and charges to overcome barriers, instead intending to use them to kill people during the attack.

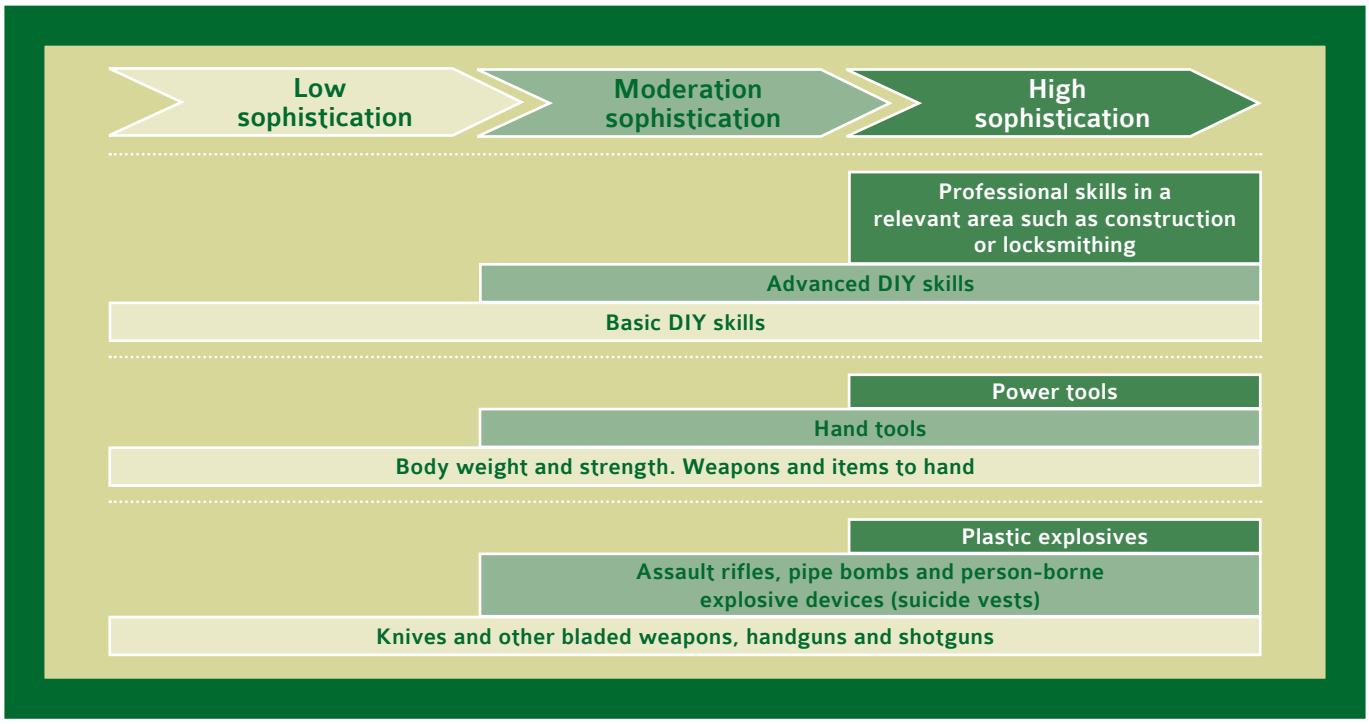


Figure 3: Skills, tools and weapons likely to be used by terrorists of different levels of sophistication

CHOOSING PHYSICAL BARRIERS

Discouraging and delaying an attacker from entering an area is typically the primary aim of a barrier in the event of a marauding terrorist attack. The ability to stop bullets, which is much more difficult and costly to achieve, is not usually required since stopping the attacker at a barrier allows personnel and members of the public to move out of sight or out of range.

Understand what a barrier needs to achieve in response to all security risks including crime prevention. Barriers specifically designed for security are likely to provide strong protection but can be expensive and may not be practical for many sites. Modifying existing barriers can be an effective and cost-efficient approach.

Prioritise barriers that would block attackers' entry to likely target areas to maximise time for personnel and members of the public to escape or hide. These are often barriers at points of entry or on main thoroughfares.

The delay a barrier offers is determined by a combination of its design, its materials and manufacture, its locking mechanisms, how they are configured and how the door is installed. Variations in these make it difficult to predict exactly how long it would take to defeat a particular barrier installed in a particular place. However, CPNI's research has shown that some designs, materials, locks and configurations consistently offer better resistance to forcible attack. The following sections of the document discuss locks and glazing, aspects relevant to all types of barrier, before discussing these factors for specific types of barrier.

LOCKING MECHANISMS

The delay to forcible attack offered by a physical barrier is only relevant if that barrier is locked at the time of the attack. Barriers that are open or unlocked when an attack begins must be quickly closed and secured. This means that locking mechanisms need to be simple and fast to operate as well as being strong enough to resist entry by force.

Locking barriers safely

Ensure the safety of the person using the lock.

Remote activation of a lock is ideal to minimise the exposure of the person locking it. With electrically operated locks this could be achieved by:

- Using a centralised locking system
- Providing a wireless remote control or panic button so that the lock can be engaged whilst the operator escapes
- Installing locking mechanism controls away from the barrier on the protected side (the side to which the barrier blocks access by an attacker); for example, allowing a roller shutter to be closed from behind a reception desk rather than requiring someone to stand at the entrance holding down a button.

Locking mechanism controls should be positioned to allow the operator to maintain awareness of the situation; for example, locating the control at chest height rather than forcing the operator to stretch up or crouch down.

Make locking reversible

Circumstances may change during the attack, for example if there were a fire. It may be essential to reopen a locked barrier to allow personnel and members of the public to escape. Key-operated locks are undesirable since the person with the key may have fled the area or been killed.

The method for unlocking should be obvious to someone unfamiliar with the door and easy to use at a time when the person will be under severe stress. For example, push bars or pads that use multi-point locking are ideal for thoroughfares where people may be moving at speed. Controls such as an interior handle that operates a latch bolt or a thumb-turn at waist height that operates a dead bolt work well in many locations.

Ensuring emergency services can unlock the barrier

The swift action of the police, fire brigade and ambulance will be required to save the lives of those in the area. Plan how emergency services would be able to reopen a locked barrier, for example through remote unlocking by security control room operators or provision of a grab bag containing keys or access control passes on their arrival.

Locking barriers quickly and easily

Ensure the person operating a lock can escape or hide as soon as possible. The person operating the lock is likely to be under severe stress and therefore the locking mechanism should be straightforward to operate. This means:

- Minimising the number of steps, clicks or keypresses to fully engage the lock
- Minimising the number of pieces of equipment, such as keys or bars to be located
- Avoiding locks that require manual dexterity at a time when the person's hands may be shaking, such as inserting a key or card into a narrow opening.

Latch bolts allow barriers to be locked as they are closed. Use latch bolts that are described as a "dead latch" or which have "deadlocking" or "anti-thrust" security features since these are typically more difficult to manipulate open.

Figure 4: Bolt operated by a thumb-turn that needs little dexterity, is operated by a single, reversible action and requires no additional equipment

Resisting forcible attack

A barrier is only as strong as its weakest point, which includes the locking mechanism.

Type of mechanism

Locking mechanisms using bolts can significantly delay attackers. Bolts should protrude a minimum of 17mm into the keep. Dead bolts offer greater resistance to an attacker than latch bolts, though the latter may be preferable for rapid operation.

For electrically operated locks, this includes:

- electromechanical solenoid locks (dead bolts)
- motorised locks (dead bolts)
- electronic strikes with mechanical locks (latch bolts).

Maglocks with a strong holding force (typically 24V models) can also offer a significant delay on outward opening doors, though are not suitable for use with very flexible materials such as glass.

Figure 5: Internal double-leaf hardwood timber fire doorset fitted with 24V maglocks

Multiple locking points

Resistance to forcible attack is increased by using multiple locking points as the force of any impact is distributed across the points rather than focussed on one.

This can be achieved by using a lock with multiple bolts, multiple maglock holding points or multiple separate locks.

Centrally located lock for single-point mechanisms

Locating a lock centrally on the opening edge of a barrier (for a door, this means at mid height rather than the top or bottom) is more resistant to attack since it makes it more difficult to flex the barrier in an attempt to disengage the locking mechanism. This is particularly important for barriers made of very flexible material such as glazing.

Surface mounted

Mounting locking hardware on the protected surface of a door gives the greatest resistance to ballistic attack as well as manual attacks on the lock mechanism, since it receives the protection of the full thickness of the doorset.

Hidden control boxes and cables for electrically operated locks

For most electrically operated locks, cutting the power releases the mechanism. Even a low sophistication attacker may attempt to damage a control box or cut exposed cables. Hide control boxes and cables where possible.

GLAZING

Reducing an attacker's visibility

Glazed façades, glazed doors, glazed walls and door vision panels can allow attackers to see potential victims within an area. Frosted glass (also called privacy glass or opaque glass) is preferable since it blocks attackers' line of sight whilst allowing much of the light to pass through. Frosted films can be retrofitted to existing glass to achieve the same effect.

Figure 6: Frosted internal glazing

Choosing glazing materials to delay attackers

Glazing can be particularly vulnerable to manual forced entry, gunshots and explosives.

Laminated glass or polycarbonate will provide the greatest delay to attack and is more effective as the inner pane of a double-glazed unit than as a single layer.

Annealed glass (also called float glass), often found in older buildings, provides very little resistance to forcible attack. Toughened glass (also called tempered glass and safety glass) is slightly stronger but still offers minimal delay to an attacker using force.

Where it is not practical to replace annealed or toughened glass, their resistance to forcible attack can be improved by fitting anti-shatter film. This holds the fragments in place when the glass breaks, which also reduces the risk to personnel and members of the public from flying glass fragments if an explosive device is detonated. Extending the film into the glazing retention system is much more effective than the more rapid method of installation where the film is installed only to the edge of the vision panel (termed "daylight filming").

Ensure that the glazing material and any films applied to it are suitable if fire protection is required.

DOORS

Choosing new doors

CPNI's research has shown that the following types of fire doorset (the door and frame), fitted with a suitable locking mechanism, are highly capable of delaying attackers:

- Hardwood timber
- Hardwood timber augmented with steel inserts in the leaves or frame
- Steel.

Even though bullets can pass through these types of doorset, they are unlikely to open when shot, requiring an attacker to use their bodyweight or tools to force entry. Steel constructed or augmented doorsets can even remain shut when attacked with explosives.

Where a higher risk justifies the higher cost, security doors tested to CPNI's standards provide a greater delay and resistance to bullets and explosions. Consult your local police force Counter Terrorism Security Adviser (CTSA) for more details.

Glazed doors typically offer a shorter delay than doors made of other materials. Glazing flexes significantly when impacted which can cause locking mechanisms to disengage. Their resistance to forcible attack can be maximised by:

- Using a framed door (typically a steel frame with a single glass panel), which is much less flexible than an unframed glass door
- Using glazing that is resistant to forcible attack *(see the Glazing section)*
- Using a locking mechanism that is resilient to distortion of the door, such as a bolt installed halfway up the door *(see the Resisting forcible attack section in Locking Mechanisms)*

Improving existing doors

There are relatively low-cost options for retrofitting existing doors to significantly improve the delay they offer in the event of an attack.

Adding door bolts

Door bolts, operated by a thumb-turn or key, can be retrofitted to most doors. Thumb-turns mean that no time is wasted looking for keys during an attack, making them ideal for areas where personnel and members of the public may seek shelter, such as a meeting room or a shop back-room.

Figure 7: Low-cost key-operated door bolt retrofitted to a hardwood timber door

Figure 8: Thumb-turn operated secondary door bolt fitted to an external door constructed with framed glazing

Using supplementary locking devices

Supplementary locking devices are commercially available that are designed to make hinged doors more difficult to open. These require rapid manual fitting in the event of an attack, with the parts stored next to the door.

CPNI has tested a range of devices and has found their performance to be variable. The *Nightlock Original* and *Nightlock Lockdown 2* devices, designed for single-leaf doors, were found to perform well. Similarly, the *ERA Lockdown* device performed well when tested on double-leaf doors, found in many office corridors.

Figure 9: ERA Lockdown for double-leaf doors

Many other devices, often marketed for use in hotel rooms, do not to offer any significant delay. Worse, these devices along with door chains or wedges can show an attacker that a room is occupied, encouraging them to force entry where they may have otherwise moved on.

Barricading using furniture

Furniture can be used to barricade a door effectively, though doing so risks alerting attackers that the room is occupied and attracting them by generating noise. Personnel should be trained that to be most effective, rigid pieces of furniture should be placed behind an inward opening door, filling the space to the opposite wall or something else structural such as a pillar.

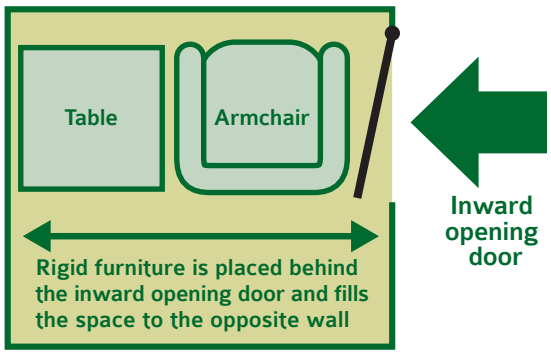


Figure 10: Using furniture to barricade a door

SPEEDGATES

Many designs of speedgate, often used at the entrances of large office buildings, offer negligible delay. It can be easy to climb over, pass underneath or even push through many designs of speedgate. When choosing speedgates look for the following features:

- Leaves at least 1.8m high above floor level
- 220mm gap or less from the floor to the bottom of the leaves
- Sloping plinths (where people would typically swipe passes) that cannot easily be used as a step to climb the barriers
- Fixed panels of a similar height to the leaves above the plinths so that attackers cannot easily pass between the sets of leaves
- For transparent leaves, using laminated glazing or polycarbonate to make it more difficult to break.

Figure 11: Speedgate design that will delay attackers

Figure 12: Speedgate design offering negligible delay

REVOLVING DOORS AND PORTALS

Revolving doors can significantly delay attackers, even those using firearms. Revolving doors should:

- Be fitted with laminated glazing or polycarbonate *(see the Glazing section)*
- *Ideally have four leaves rather than three, since CPNI's research indicates the former design is more resistant to forcible attack
- *Be lockable in a position where all the segments are open in order to prevent use of explosives inside a closed segment.

Many designs of revolving door are difficult or slow to stop and lock. Consider whether it may be possible to retrofit existing doors with mechanisms that are in line with the principles described in the section.

Figure 13: Four-leaf revolving door positioned with all segments open

Portals (often called tubestiles) also offer a significant delay, since their design means that an attacker must effectively defeat two barriers. They are typically constructed using laminated glass, which maintains a barrier even when shot.

Portals often require personnel to enter a code before entering. In the event a marauding terrorist attack this may leave people exposed. Designs that allow a person to enter quickly (for example, using an authentication token) before completing the authentication process in safety behind one of the portal's doors offer greater protection against attacks with bladed weapons.

Figure 14: Portals

ROLLER SHUTTERS AND SECURITY GRILLES

Roller shutters or security grilles (collapsible or extendable), often used for shop fronts and loading bays, will significantly delay the progress of attackers, even those with firearms and explosives. Locating controls for the shutter inside the protected area and away from the shutter itself reduces the risk to a person operating the closing mechanism in the event of an attack.

Figure 15: Roller shutter covering a window

ASSURING SECURITY CONTROL ROOM OPERATORS OF THEIR SAFETY

The actions of security control room operators (where sites have them) are crucial when responding to a marauding terrorist attack.

Historically, terrorists have not sought to gain access to security control rooms. However, personnel within that room should feel safe and confident that they will be protected whilst working to protect others. For this reason, security control rooms should be constructed to offer resistance to forcible attack. CPNI provides guidance on security walling systems and security doors. Sound-proofing a security control room and preventing smoke ingress can help the operators focus on dealing with the incident.

Security control room operators may need to open the door for responding police officers. It is essential that there is a means of verifying who is outside the control room, such as a CCTV camera.

Figure 16: Policeman identified using external CCTV camera

Further information

You may find it useful to use this document alongside other CPNI documents:

- ***Marauding Terrorist Attacks: Supplementary Guidance – Lockdown***
- ***A Guide to Security Doorsets and Associated Locking Hardware***
- ***A Guide to Security Walling Systems for the Protection of Important Assets***
- ***Control Rooms Guidance***
- A suite of documents relating to ***Windows*** and ***Glazed Façades***.

For information tailored to your organisation, contact your local police force CTSA.

ANNEXE A: BEST PRACTICES FOR DOORSETS AND LOCKING MECHANISMS

Variations in design, manufacture, materials, locking mechanism and configuration make it difficult to predict exactly how long it would take to defeat a particular door installed in a particular place. However, CPNI's research has shown that some designs, materials, locks and configurations consistently offer a better resistance to forcible attack. An overview of best-practice choices for doorsets (door and its frame) and locking mechanisms is shown in the figure below.

		WEAKER → STRONGER				
Door leaf construction		Glass	Particle board	Hardwood		Steel
Glazed areas		Single layer of annealed glass or toughened glass	Single glass layer with anti-shatter film installed to edge of panel	Single glass layer with anti-shatter film extended into glazing retention system	Single layer of laminated glass	Double glazed unit incorporating laminated glass or polycarbonate	No glazed areas
Door jamb construction		 Planted stops	 Rebated timber	 Folded steel		 'Filled' steel (steel around timber or concrete)
Opening direction			Swing	Inward opening		Outward opening
Locking points			Single point near top or bottom of leaf 	Single point central to leafing edge 		Multiple points 
Bolt type		No bolt	Latch	Deadlatch		Deadbolt
Lock mounting		Surface-mounted on attack side	Inside door fabric (mortise / flush)			Surface-mounted on protected side
Electrically operated lock type	**On inward opening door**	Maglocks and shear locks		Electronic strike		Electromechanical: solenoid or motorised
	On outward opening door	12V maglock	Shear lock	Electronic strike	24V maglock	Electromechanical: solenoid or motorised

ANNEXE B: PHYSICAL BARRIERS CHECKLIST

This annexe to CPNI's document *Marauding Terrorist Attack: Supplementary Guidance Physical Barriers to Delay and Discourage Attackers* provides a checklist of best-practices for locking mechanisms fitted to barriers as well as for the construction and design of several types of barrier.

LOCKING MECHANISMS

Safety

- ☐ Remotely activated to minimise the exposure of the person locking it
- ☐ Positioned to allow the person locking it to maintain awareness of the situation
- ☐ Easily unlocked by people unfamiliar with the door who are under severe stress
- ☐ Plan for how emergency services would unlock

Ease and speed of locking

- ☐ Minimal actions to engage the lock
- ☐ Minimal equipment (keys, bars etc) to find to activate the lock
- ☐ Minimal manual dexterity needed when the hands of the person locking it may be shaking

Resistance to forcible attack

- ☐ Bolts that protrude at least 17mm into the keep
- ☐ Multiple locking points
- ☐ Consider surface mounted
- ☐ Control boxes and cables hidden for electrically operated locks
- ☐ Where used, maglocks with a strong holding force (typically 24V models) for outward-opening doors (not glazed)

GLAZING

- ☐ Frosted (also called opaque or privacy) glass to block attackers' line of sight
- ☐ Laminated glass or polycarbonate for new glazing
- ☐ Doubled-glazed units with laminated glass or polycarbonate as the inner layer are preferable to single glazing
- ☐ Existing glazing retrofitted with anti-shatter film
- ☐ Consider whether materials are suitable for fire protection

DOORS

- ☐ For new doors choose fire doorsets constructed from hardwood timber, hardwood timber augmented with steel inserts or steel
- ☐ Where glazing must be used, choose framed rather than unframed doors
- ☐ Improve existing doors with secondary door bolts
- ☐ Consider supplementary locking devices
- ☐ Train personnel how to barricade effectively by filling the space to the opposite wall

SPEEDGATES

- [ ] Leaves at least 1.8m high above floor level
- [ ] 220mm gap or less from the floor to the bottom of the leaves
- [ ] Sloping plinths that cannot easily be used as a step to climb the barriers
- [ ] Fixed panels above the plinths to prevent entry between the sets of leaves
- [ ] For transparent leaves, constructed from laminated glazing or polycarbonate

REVOLVING DOORS

- [ ] Fitted with laminated glazing or polycarbonate
- [ ] Ideally have four rather than three leaves
- [ ] Lockable with all segments open
- [ ] Consider retrofitting improved locking mechanisms

PORTALS (TUBESTILES)

- [ ] Fitted with laminated glazing or polycarbonate
- [ ] Allow personnel to complete authentication process in safety behind one of the portal's doors

ROLLER SHUTTERS

- [ ] Remotely operable from within the protected area

SECURITY CONTROL ROOMS

- [ ] Protected to offer reassurance to security control room operators
- [ ] Walls constructed to offer resistance to forcible attack
- [ ] Fitted with a security door
- [ ] Means of verifying who is outside the control room such as CCTV
- [ ] Consider sound-proofing
- [ ] Consider preventing smoke ingress