RIBA guidance on designing for counter-terrorism

Part 1 of this document informs built environment professionals of recent government work to protect crowded places. It has particular relevance for the design of large new developments, and places where large numbers of people gather.

Part 2 of the document sets out the most common considerations when designing for counter-terrorism in the built environment. These are set alongside case studies that show the different ways built environment professionals are responding to the challenge of creating high quality places that are safer from the risk of terrorism yet still attractive to the public.

Contents

Foreword

Architects and other designers are now being required to take into consideration counter-terrorism measures when designing public access buildings and public open spaces. This extends the requirement from high risk targets to the wider environment and with it the need to deliver good design that creates a sense of security without a siege mentality. It is important that our built environment continues to reflect that we are an open and inclusive society and that in interpreting these new requirements our buildings do not convey that we are driven by security measures.

If design retreats to a bunker mentality and colludes in the restriction or exclusion of the general public from many public buildings, or the creation of a sense of unease in crowded places there will be a greater sense of alienation from all corners of society, including the disaffected and radicalised. We should not forget that recent threats have come from amongst us and that we must continue to be inclusive in education, culture and entertainment, religion and government and the buildings that contain these activities need to reflect this. We do not want to create a nation of remote window shoppers looking in on the activities of the elite in iconic buildings.

An essential approach to the design of buildings and the spaces between them will incorporate counter-terrorism measures in a discrete and proportionate way and designers should encourage their clients to adopt a proportionate and pragmatic approach in briefing. The designers' skill will be to incorporate these as constraints but not inhibitors of good design.

Evidence of counter-terrorism provisions is now a material consideration in the planning process and most architects will need to address the issue in their work. This guide is an essential brief for architects, planners and engineers. It details the key agencies, the nature of the threat and possible design solutions for counter-terrorism measures. It brings together guidance from many public bodies providing an invaluable resource that will inform briefing, design and delivery on many building types.

Ruth Reed
RIBA President

RIBA

The design, construction and operation of the built environment and critical infrastructure presents us with many challenges, not least among these is how we address the continuing threat of global and domestic terrorism.

I believe that it is incumbent upon all of us with a professional interest in the built environment, whether engineers, architects, surveyors or developers, to consider these threats and risks in detail, and then to address them in an imaginative, sustainable and proportionate way.

Clearly, the earlier in any new scheme that security and counter-terrorism requirements are considered, the more effective, and economic, the final design will be. Therefore anything that encourages and supports this early engagement is to be welcomed, and I hope that this guide will help develop a shared understanding of the concepts and options available and that it will be widely read not just by architects, but by other property professionals.

If we can achieve this understanding, we will have taken a significant step towards creating urban landscapes that meet the challenges presented by terrorism without sacrificing design innovation or turning our city centres into uninviting fortresses.

Don Kenny
Carillion Executive Director

TPS
a Carillion company

Counter-terrorism and the built environment

Our contemporary built environment faces a number of challenges. Terrorism has been and is again one such significant challenge for the UK. Designing for counter-terrorism in the built environment is complex, involving many different players and agencies. The aim of this document is to explain this landscape so that those who are considering or may need to consider counter-terrorism in their projects are able to develop their own measured response to the issue.

In high profile buildings or crowded places that may be attractive targets for terrorists, the challenge for designers is to incorporate counter-terrorism (CT) measures into their buildings and public spaces whilst maintaining quality of place.

Therefore the challenge and opportunity for architects and designers is to design in security features from the outset – when any additional cost will be minimal compared to retrofits and how they are integrated and look on site is still maintained by the design team.

Developing counter-terror protection regimes is seldom a straightforward process and when considering incorporation of CT measures, individual cases should be examined through calculated assessment of their particular merits and requirements. Each will invariably differ according to location and assessed threat. Whatever the need, embracing these differences can pose a challenge to designers, but may also provide a canvas for positive enterprise and innovative ideas to emerge. It is fundamentally this ideal of innovation in protection that underpins the aim and objectives of this design guide.

The crowded places document series

A new material consideration in the planning system

The bombing of London's transport infrastructure on 7 July 2005 and the failed Underground bombings two weeks later, along with the abortive car bomb attacks targeting a central London nightclub and Glasgow Airport in June 2007, highlighted the importance of ensuring the critical parts of the UK's national infrastructure are protected against terrorism.

Lord West of Spithead was commissioned by the government to review the UK's preparedness for future terrorist attacks. His findings identified that a new effort to 'design in' counter-terrorism protective security was needed.

In response, the Home Office and the Office for Communities and Local Government published new guidance on designing for counter-terrorism in the built environment.

The three documents, *Working together to protect crowded places*, *Crowded places: the planning system and counter-terrorism*, and *Protecting crowded places: design and technical issues*, outline advice for local authorities, police, businesses, planners and architects to reduce vulnerability in crowded places.

The documents now form a material consideration in the planning system and in some instances a design and access statement specific to counter-terrorism will be necessary.

To establish whether counter-terrorism is material to your project, and to formulate an effective strategy, specialist advice should be sought. Your first point of contact should be your local counter-terrorism security adviser (CTSA); they can be found on local police force websites. Other main sources of advice are listed on page 7.

The full government documents can be found at www.security.homeoffice.gov.uk

Local Strategic Frameworks and City of London's planning policy towards counter-terrorism:

Increasingly local authorities are being made aware that a local planning framework approach to counter-terrorism can provide a clear context for where CT is particularly relevant. For example, a local authority may consider a high street to be at an increased terrorism risk and developments in the vicinity may be asked to demonstrate its awareness of those risks.

The City of London has led many area based approaches to counter-terrorism mitigation and they now require a CT design and access statement on planning applications for large developments. This is based on the understanding that the City as a whole might be considered an appealing economic target.

HM Government

Crowded Places:
The Planning System and
Counter-Terrorism

March 2010

Crowded places and other high risk sites

What is a crowded place and why?

Crowded places remain an attractive target for international terrorists because of their ease of access, little protective security and the prospect for high casualty rates and political impact in the event of a successful attack. As such, the majority of counter-terror focus in the built environment is on crowded places.

The Home Office defines a crowded place as 'a location or environment to which members of the public have access that may be considered potentially liable to terrorist attack by virtue of its crowd density". These include transport hubs, sports stadia, pubs/club bars, shopping centres/high streets, visitor attractions, cinemas and theatres, commercial centres. Crowded places can also include the public realm such as parks and squares.

Broad outlines could be considered both by occupancy (ranging from several hundred in a place of worship or small music venue, up to several hundred thousand at an outdoor festival or multiple sports event) and also density (where the activity/focus encourages close proximity of significant numbers of people).

These could also be sub-divided in to two categories by physical attributes;

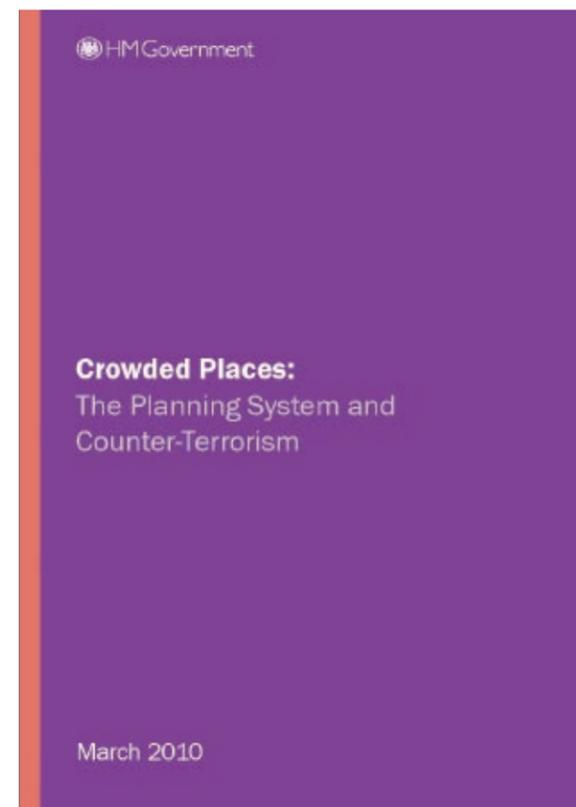**Permanent** places of assembly, including but not limited to
– Outdoor venues (stadia, racecourses, spectator sports complexes)
– Indoor venues (transport hubs, arenas, theatres, concert halls, exhibition and convention centres, shopping centres, nightclubs, places of worship)

Temporary places of assembly, generally short duration outdoor events overlaid to otherwise public domain or private land, including but not limited to
– Temporary ticketed event venues (festivals, annual shows, exhibition events)
– Temporary open access event venues (parades, road races, exhibition events).

As well as crowded places, other places to consider include iconic buildings, government and military installations, infrastructural sites, and sites neighbouring these.

1 *Protecting Crowded Places: Design and Technical Issues*, HM Government March 2010, paragraph 1.10

Crowded places focus on large new developments

The focus of government guidance is on large new developments, where the opportunity to design in security is most practicable and cost effective.

The process of identifying the risks of a site are complex and it is not the role of the architect to identify which sites are at an increased risk. But common sense based on an understanding of what a crowded place is should encourage establishing contact with your ALO or CTSA at the earliest stage of the brief to establish whether counter-terrorism is pertinent to your project.

Proportionality and risk

In considering counter-terror risk response, the concepts of proportionality, relevance and effectiveness are fundamental. There is no need to build fortresses to protect property and interests against the terror threat, nor necessarily even a requirement to install extensive (and expensive) physical barriers or bollards. There are many ways that existing security and site management concerns can be integrated with those of CT. And in instances where new measures are necessary these can often be designed with dual purpose in mind.

What is a proportionate response?

The government guidance on counter-terrorism advises that 'as the level of risk varies, counter-terrorism protective security measures should be proportionate to the risk of terrorist attack to which the building or place is exposed.'[2]

To formulate a proportionate response, one should first understand the overall risk profile of the activities or organisations that will be housed in a building or place. This requires clear, unbridled input from all key stakeholders of a project, from the client to the local authority, in order to clearly identify issues of concern.

Advice on identifying and understanding terrorism security risks can be sought from your local CTSA and other security organisations.

It is important to engage with relevant stakeholders as early in the design process as possible to establish to what extent, if any, CT measures are necessary based on the particular merits of the site, project, and organisation(s).

2 *Crowded Places: The Planning System and Counter-Terrorism*, HM Government, March 2010, paragraph 2.03

Responding to different risk levels

The risk of a particular site is measured against a matrix set up by government security agencies and the local counter-terrorism security adviser. There are four risk categories:

High
Medium-high
Medium
Low

See Appendix for more details.

Government guidance distinguishes between those measures needed to mitigate risk in the two highest risk categories (high and medium-high) and those in the lower two categories (medium and low).

The two highest risk categories will be prioritised by CTSAs for the inclusion of counter-terrorism measures. In such cases a set of measures and strategy should be agreed between the project team and the CTSA as early on in the project as possible.

For sites in the lower two categories, advice still should be sought from your local CTSA on practical mitigation measures but their inclusion will be preferred and not mandatory in a planning application.

Cabot Circus, Bristol © Chapman Taylor

Who to talk to?

With many organisations concerned with counter-terror security mentioned below, a variety of these agencies and individuals can contribute to the development of your counter-terrorism and security architecture programme.

Your first point of call should be your Counter-Terrorism Security Adviser. They will be able to advise whether further counter-terrorism scrutiny will be needed for a particular site or project. If necessary, a CTSA will visit your site and advise on the risks and potential mitigation measures.

The other agencies and bodies listed can provide more specialist advice and assessment of your counter-terrorism strategy and design throughout various stages of the project.

The stages at which particular agency liaison is relevant are mapped to the RIBA plan of works. This provides a framework through which you can manage your counter-terrorism security programme through the various stages of the development process.

Counter-terrorism security organisations

Free advice

Architectural Liaison Officer (ALO)
There is an ALO in every borough, and they provide advice on crime prevention through the built environment to planners, developers, builders, landlords and estate/facility managers. They will refer you to a Counter-Terrorism Security Adviser if necessary.

They can be contacted via your local police force websites or through www.securedbydesign.com

In London and some other local authorities ALOs are also known as Crime Prevention Design Advisers (CPDAs).

Counter-Terrorism Security Adviser (CTSA)
CTSA's core role is to identify and assess local critical sites within their force area that might be vulnerable to terrorist attack; then devise and develop appropriate protective security plans to minimise impact on that site and the surrounding community. There are now 245 CTSAs across the UK, with most police forces having at least two CTSAs. Most CTSAs work within or alongside their Special Branches force.

They can be contacted via local police force websites or through emailing nactso@btconnect.com

The National Counter Terrorism Security Office (NaCTSO)
NaCTSO is a police unit co-located with CPNI. NaCTSO contributes to the UK government's counter-terrorism strategy.

It runs Project Argus and Argus Professional, as well as training and supporting CTSAs. It has a series of general sector related guidance on its website including

– bars, pubs and clubs
– shopping centres
– stadia and arenas
– visitor attractions
– cinemas and theatres
– hotels and restaurants
– higher and further education
– commercial centres
– health
– aviation
– major events
– places of worship

Argus Professional
NaCTSO launched the Argus Professional initiative in 2008 in order to raise awareness of designing in counter-terrorism protective security measures at the design concept stage. The aim of Argus Professional is to encourage debate, and demonstrate that counter-terrorism measures can be designed into spaces to create safer crowded places.

NaCTSO and CTSAs continue to run ARGUS seminars across the UK with seminars particular to built environment professionals, and CPD approved.

Secured by Design (SBD)
Established in 1989, Secured by Design is the title for a group of national police projects focusing on the design and security of new and refurbished homes, commercial premises and car parks as well as the acknowledgement of quality security products and crime prevention projects. SBD focuses on crime prevention at the design, layout and construction stages of homes and commercial premises.

Other security bodies and agencies

Register of Security Engineers and Specialists (RSES)
Sponsored by CPNI and maintained by the Institution of Civil Engineers, the Register of Security Engineers and Specialists lists experts who are able to provide a range of advice from initial risk assessment, potential design considerations and solutions, to design detailing and testing. RSES members comprise of engineers, applied scientists, health professionals and other security specialists. www.ice.org.uk

Home Office
Government department responsible for internal security matters, counter-terrorism and policing policies. www.homeoffice.gov.uk

Office of Security and Counter Terrorism (OSCT)
The OSCT was established in 2007 in the Home Office, in order to bring more cohesion and greater strategic capability to the fight against terrorism. www.security.homeoffice.gov.uk

MI5
The Security Service, more commonly known as MI5, is the UK's security intelligence agency. www.mi5.gov.uk

Joint Terrorism Analysis Centre (JTAC)
Created as the UK's centre for the analysis and assessment of international terrorism. It is based in MI5's headquarters in London. www.mi5.gov.uk/output/joint-terrorism-analysis-centre.html

Centre for the Protection of National Infrastructure (CPNI)
Government authority which provides protective security advice to businesses and organisations across the national infrastructure. Their advice aims to reduce the vulnerability of the national infrastructure to terrorism and other threats. CPNI is also responsible for testing the ever-expanding range of vehicle security barriers and other counter-intruder devices. www.cpni.gov.uk

Transec
Transec is the Department for Transport's Transport Security and Contingencies Directorate. As the transport industries' security regulator, Transec devises and enforces standards taking account both of the costs to the industry of security measures and the consequences of security failures. www.dft.gov.uk

RIBA plan of works

How does new guidance sit within the RIBA work stages?

Preparation

A Appraisal
Threat and risk assessment completed in consultation with appropriate agencies and stakeholders (CPNI, CTSA, ALO). Threat sizes for hostile vehicles and other security risks agreed.

B Design brief
Assessment coordinated with architects and structural engineers. Security masterplan completed and Document Control protocols agreed.

Design

C Concept
Security concept agreed (physical, technical, procedural). Assess architect's and engineer's design proposals to agreed threat risks.

D Design development
Physical and technical security performance specifications developed. Drawings and budgetary figures.

E Technical design
Fully coordinated design completed. Revised budgetary figures.

Pre-Construction

F Production information
Design revisions, statutory approvals, counter-terrorism Design and Access Statement. Construction information.

G Tender production
Produce tender fit documentation.

H Tender action
Trade contractor list produced. Evaluation and recommend contract award.

Construction

J Mobilisation

K Construction to completion
Design consultancy, snagging, witnessing and commissioning.

Use

L Post practical completion
Design liability periods enforced as built drawings to agreed Document Control protocols. Rolling performance standards for systems.

Embedding material consideration in the design process

Common counter-terrorism considerations and evolving design responses

This section of the briefing runs through the most common factors involved when considering the inclusion of counter-terrorism measures in your scheme. They are illustrated, as much as possible, through actual projects that have addressed them in their design brief. These projects highlight the innovative ways in which designers and architects are engaging with the challenges of CT, with the result that CT measures often add to the quality and identity of a building or place.
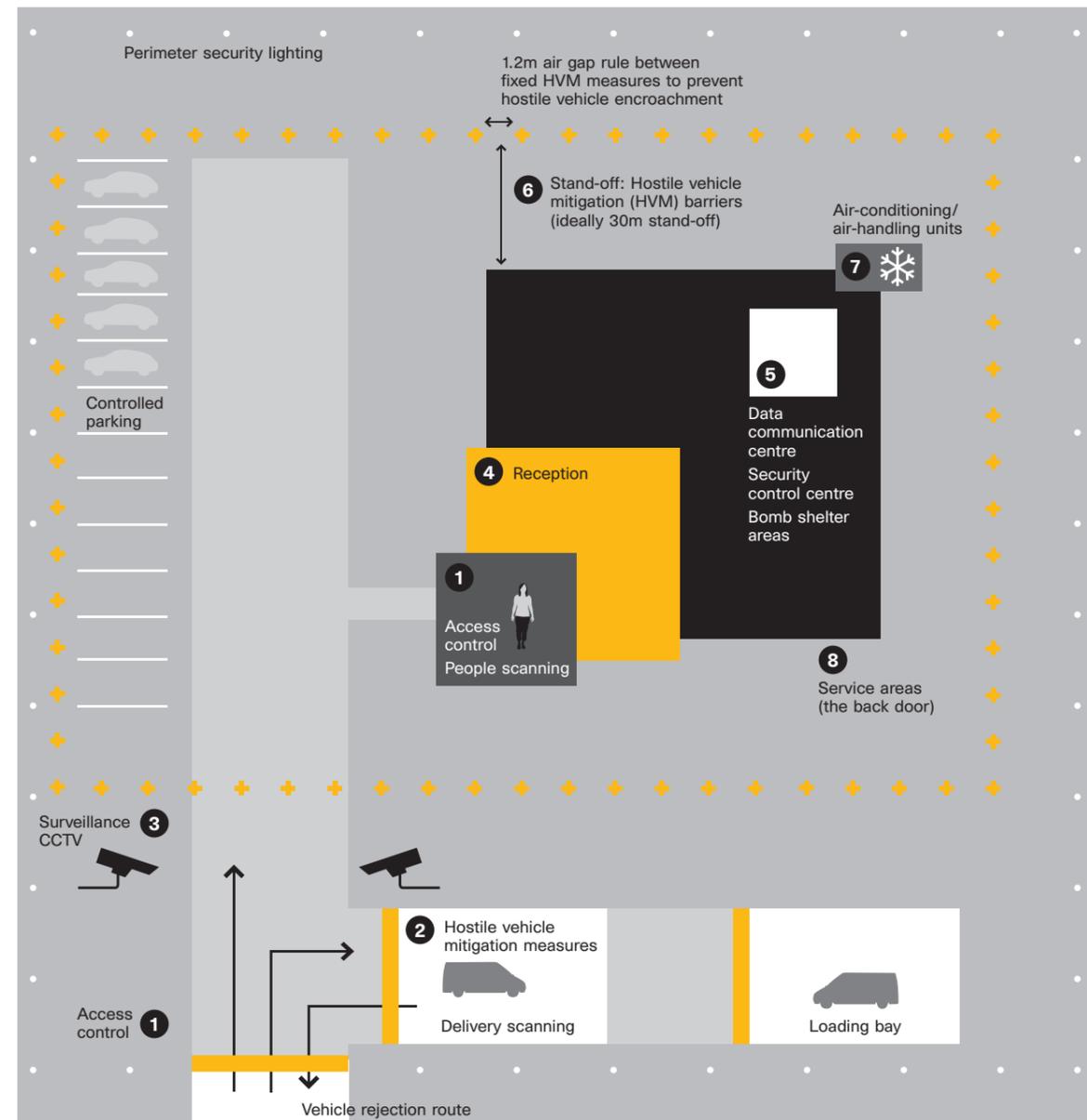
While the emphasis of this guidance is on specific counter-terror mitigation measures, the key areas of more routine security are also considered in relation to how they can augment and do not undermine CT design strategies.

Part 2

Reducing vulnerability to the threat

Terrorism risks can be mitigated in two basic fashions: by introducing physical, technical and procedural protective measures, such as barriers and bollards and landscaping, access control and surveillance devices, and by reducing the impact that the loss of a particular element may have on the asset as a whole. This latter effect can be achieved through: transferring the risk via insurance, redundancy of operations in the form of a back-up capability, or through ceasing that line of activity completely where the level of risk is determined to be unacceptably high.

Perimeter security lighting

1.2m air gap rule between fixed HVM measures to prevent hostile vehicle encroachment

6 Stand-off: Hostile vehicle mitigation (HVM) barriers (ideally 30m stand-off)

Air-conditioning/ air-handling units

7

5

Data communication centre

Security control centre

Bomb shelter areas

4 Reception

Controlled parking

1

Access control
People scanning

8

Service areas (the back door)

Surveillance CCTV **3**

2 Hostile vehicle mitigation measures

Delivery scanning

Loading bay

Access control **1**

Vehicle rejection route

❶ Access control

Access control can be as simple as a wooden gate, a simple lock and key-code on a door or a receptionist greeting and taking details of visitors. It can of course be non-existent, or may include speed-gates, electronic swipe-card readers, manned- (or even armed-) guarding. Site access control may incorporate vehicle security barriers (crash-rated or otherwise) and ANPR (automatic number plate recognition) operated measures. Whatever the case, and whilst access control should be commensurate with your security risk and financial imperative it should always provide the most effective solution within those parameters.

❷ Hostile vehicle mitigation (HVM) measures

One of the most effective ways that terrorists have for the delivery of large bombs onto a target is through the use of vehicles. Preventing unauthorised vehicles from getting too close to, or entering a site or building, and how the integrity of stand-off distances can be maintained remains one of the main considerations of counter-terrorism design.

Typically, there are five styles of vehicle-borne threat that need to be considered:

– **Parked** (stationary vehicle-borne improvised explosive device)

– **Encroachment** meaning a non-impactive attack which exploits any gaps in the site's perimeter defences or by 'tailgating' a legitimate vehicle through an active barrier system

– **Penetrative** based on a ram-raiding, impactive method of attack.

– **Entry by deception** either human deception or using a Trojan vehicle; or

– **Entry by duress** against the operator of an active barrier system or against a legitimate driver who is authorised to access the site.

Deception, duress and the 'tailgating' form of encroachment attacks can all be negated by considering alternative traffic management and parking options that eradicate the need for active barrier systems and only having static/passive barriers around the building to be protected.

Projects that have engaged creatively with re-routing traffic and providing stand-off have shown the positive consequences that can be produced. These include pedestrianisation of inner city zones and creation of more public gardens that would have previously been parking space.

❸ Surveillance CCTV

CCTV is an established part of a business' security profile yet often set up without establishing pertinent operational requirements beforehand. CCTV, correctly specified and installed can provide not just a deterrent, but can also support the detection of hostile activity, be it pre-attack reconnaissance or attack preparation, as well as support for police investigations and prosecutions.

Operational functions of a CCTV system vary depending on whether they are intended for identification, recognition, detection or crowd control purposes. The main functions and optimal operating conditions of a CCTV system are explained in the appendix.

❹ Reception

The design of the reception area for a building should be set out to ensure that unauthorised personnel cannot gain access to the building. Receptions should also be designed so that vehicles cannot be driven directly at, or indeed into, the building. This can be achieved through basic design or by integrating planters, bollards, blockers or barriers into the forecourt arrangement. Landscaping arrangements and other alternatives are also available and practicable in many circumstances.

Instances exist where people can slip into a building while the receptionist is engaged with someone else. Placement of the reception desk and other restrictions is therefore a key component.

❺ Communications

Maintaining appropriate communications conduits is vital for business continuity in most circumstances and it is therefore critical that you incorporate redundancy in communications provision to prevent loss of primary communications from crippling your business or operations.

❻ Stand-off

The risks from a large terrorist bomb, such as those delivered by vehicle, can be substantial. As such, the most significant protective measure one can implement is perhaps also the most basic: sufficient stand-off. Stand-off distance (the distance between the bomb and the building) is a fundamental parameter when determining the blast pressures experienced by a building. Blast loading reduces substantially with distance, with an ideal stand-off of 30m for small cars.

However such large stand-offs cannot always be achieved, especially in dense urban situations. In those cases, alternative design solutions should be considered such as zoning of the building to put low occupancy areas in the more vulnerable locations and treating these as sacrificial zones to protect and provide stand-off to the occupied zones. In one example in an urban centre, the atrium and reception of a commercial office tower was lifted from the ground level to a mezzanine floor, creating a large public atrium at street level while allowing a vertical set back from the main functions of the office block.

❼ Air-conditioning/air-handling units

Auxiliary infrastructure, such as air-conditioning, may or may not be fundamental to your assets' operations, but it can be a conduit for chemical or biological agent attack if not sufficiently protected and specialist advice should be considered.

❽ Service areas (the back door)

While the front door needs to be as welcoming and attractive as possible, the back door is usually quite different. Often neglected or poorly supervised, illicit access may be achieved when it is left open or service area workers do not quiz interlopers who claim to be staff. One can introduce as many CT measures as is feasible, but they are of no use if the back door is unlocked. Again, any CT measures must work as part of the overall security management strategy.

National Assembly
for Wales, Cardiff

The National Assembly for Wales (the Senedd) is a major public building for a devolved Wales. As well as hosting official sessions for Assembly Members, the building is open to the public to have coffee, go into the public galleries, to see exhibitions and performances. Therefore the project had to incorporate a set of raised security requirements associated with a government building with the need for open access to the public.

The scheme takes advantage of the public plaza around the building to achieve sufficient stand-off through landscaping. A series of staircases, strengthened street furniture and a controlled sequence of vehicle and security checks all contribute to the building's CT and general security programme.

By considering the CT requirements of the project at an early stage, effective security measures can be seamlessly integrated and contribute to the civic nature of the building.

Assembly plaza modelled with hostile vehicle mitigation measures © National Assembly for Wales

Containing damage:
glazed facades and security

Glazed facades and security

Glass facades often fall under the scrutiny of CT analysis because of the extensive and severe injuries that fractured glass can cause in the event of an explosion. While we emphasise efforts to prevent or deter any successful terrorist attack, one should acknowledge that should a charge be detonated, glass often causes more injuries than the explosion itself.

Blast from a vehicle-borne device can break ordinary window glass and produce a hazard to occupants hundreds of metres away from the detonation, so occupants of buildings in the vicinity of specific targets such as embassies and government offices may be at increased risk, as may be occupants of buildings in an area which as a whole can be a terrorist target.

The three aspects of security that may need to be considered are resistance to intruders (manual attack), blast protection and ballistic protection. Intruder resistance of some degree will be a requirement of almost all buildings, but ballistic and blast protection are more specialised. Undertaking detailed design of such features should involve specialist advice from security advisers and engineers who can provide analysis to ensure a design or product is effective against the identified risk.

Design of glazed facades to resist intrusion

Suitable levels of resistance to intrusion, e.g. by burglars or protesters, should be an element of the facade design for general security, depending on the application, and need only be considered for counter-terrorism if special requirements arise from the CT risk assessment. Glazing can be specified for various levels of attack resistance.

Design of glazed facades to resist blast

There are two possible solutions to the risk of glass fragments caused by blast. The first is to design the glazing not to break. However, this leads to very thick glazing that causes very high reaction forces on the window frame, which requires very strong structural supports back to the building frame. This results in uneconomic facades that are not a realistic option for most buildings.

The alternative solution is to design glazing that retains the glass fragments after the glass cracks. For new construction, this can best be provided by using a PVB laminated glass inner leaf in the glazing system, adequately anchored to the frame.

A similar behaviour is possible with application of anti-shatter film on the inside of existing glazing, but the limited possibilities for anchorage of the film and the limited strength of frames not designed to resist the reactions tends to limit the performance to the lower levels of blast protection.

Blast resistance is not fully standardised, so designs tend to be site or client specific. Where standards do exist, such as for government buildings, they are listed in the appendix.

Design of glazed facades against ballistic threats

Ballistic threats from bullets are localised, affecting one window and one potential victim per bullet, and protection is expensive, so general protection of whole glazed facades against ballistic threats is rarely cost effective. Ballistic glazing is most commonly used for guard house windows, or to protect bank staff in the event of armed robbery. Fragments from improvised explosives devices may also offer a more general ballistic threat, but this is rarely considered in CT glazing design because the threat cannot be readily quantified.

Protection against random bullets from drive-by attacks where such risks are high is better provided by reducing the exposure of glazed facades.

Sources for experienced blast and ballistic designers include the Centre for the Protection of National Infrastructure and the Register of Security Engineers and Specialists maintained by the Institution of Civil Engineers.

Cabot Circus Shopping Centre, Bristol

Cabot Circus is an urban regeneration scheme in the heart of Bristol with residential, retail, leisure, offices, transportation and new landscaping. The aim was to compete with the current out-of-town shopping centre and attract people back into the city.

Counter-terrorism concerns were raised halfway through the project by the city council, and as such the first crucial step was to establish an understanding of the new requirements throughout the project teams. A working group was set up to manage the CT strand of work as the project progressed; the group consisted of the project manager, local CTSA, Bristol City Council's planning and highways departments, public transport bodies, external consultants, and contractors.

Although Cabot Circus was a privately funded scheme, it was intended to be an extension of the city centre. There was debate about how far privately funded CT measures should be introduced before the scheme became distinct from the rest of the city centre – aesthetically and in terms of security provision. The conclusion was to focus on key areas that were identified, by an assessment of the proposed scheme, to be at an increased risk of a terrorist attempt.

Those key areas included a central public space which stood under a large glass canopy at the centre of three converging streets. A series of strategically placed, anti hostile vehicle street furniture was then introduced on those streets. Neighbouring side streets were also realigned so that potential hostile vehicles could not achieve direct lines of entry into the public space.

Cabot Circus represents the complex dynamics often associated with introducing CT measures in large schemes, especially when CT may not have been a material consideration at the beginning of the project. Identifying a clear CT strategy that all working parties agreed on as soon as possible was crucial in delivering an open, public-orientated, and safer scheme.
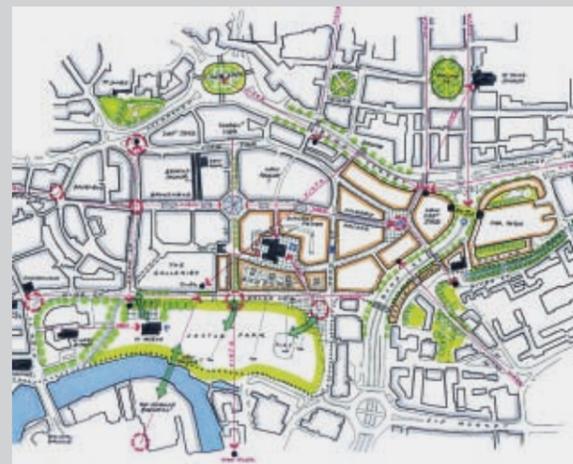
Street furniture provides vehicular access control while allowing open pedestrian access. The shopping centre is designed as part of a larger streetscape in Bristol's city centre. © Chapman Taylor

Counter-terrorist measures and general security provision

In many areas, counter-terrorist measures overlap with or extend beyond general security. These include control of delivery and vehicular access, adequate escape routes in emergencies and so on. However there are exceptions where CT provision will differ from normal patterns of behaviour. The main overlaps and differences are outlined below.

Vehicular access

Some counter-terrorism measures may simply entail an incremental application of additional measures on top of those that may be in place for normal crime-prevention purposes. Increased traffic control, for example, should sit comfortably with existing security checks.

A counter-terror situation should effectively build upon current security arrangements where only permitted vehicles are allowed onto a particular site, particularly those where there are high-value products or critical assets (including personnel) on-site. Access to service yards at shopping centres and similar establishments should be controlled so that only vehicles both registered and expected are permitted through.

Use of Automatic Number Plate Recognition (ANPR) and CCTV can augment the security provision in such instances.

Facilities to reject hostile vehicles outside of an HVM barrier should also be included so that vehicles do not need to be let in to a secure area to do a U turn in order to leave the site.

Landscaping: taking crime prevention into account

If general crime prevention advice has been sought, and the client demonstrates an awareness of Secured by Design principles, then landscaping decisions taking crime prevention into account are likely to already have been made. Examples could include the clearance and/or maintenance of vegetation to ensure clear sightlines (natural surveillance) around car parks; space alongside perimeter fencing to allow for unobstructed camera views, patrol space for security guards and to ensure no shelter for intruders to use as cover in approach to the site. Lighting should also be considered in the same vein to ensure that it aids, and does not undermine, the utility of CCTV cameras. Use of water features may also augment a site aesthetically, providing a haven for wildlife while also forming a physical barrier to potential intruders.

Fire evacuation versus bomb blast evacuation procedures

In any plan for emergency evacuation of a facility, provision must be made for personnel to escape the threat of fire, including emergency exits, escape routes and safe muster points. However, the threat of bomb blast – while also constituting an emergency situation – may entail a quite different contingency plan than that for fire evacuation. In a bomb threat situation leading personnel out of the building may actually be moving them into – rather than away from – harm's way and consideration should be given to the provision of temporary internal shelter area.

Adapting initial design to prevent augmentation of blast effect

In terms of exteriors, rather than stressing the need for further ancillary mitigation measures, an alternative emphasis of limiting augmentation of blast effects by designing out features which exacerbate explosion effects is equally valid when considering a new-build project – certain design features can actually exacerbate the destructive effects of bomb blast.

In essence, there is a considerable array of work involved to transfer the theory of counter-terror measures into practice. Early consultation with CTSAs is advised. One should also consider the engagement of an experienced multidisciplinary security engineering consultancy who would help to translate the theory into practice by testing the effectiveness and robustness of CT design solutions and strategies.

Corporation of London, an area based approach

A global company with its headquarters on a busy road intersection was judged to be a potential target of a terrorist attack. Following the installation of an array of temporary bollards and barriers, a decision was taken that more permanent CT measures should be considered in response to the continued risk.

The site coincided with an area which had a broader agenda of pedestrianisation; and a programme of works was agreed between the client and the local authority to provide a more satisfactory solution to the site's security needs.

The programme was paid for by the client and work included re-paving road surfaces for pedestrian use, provision of strengthened street furniture effective in hostile vehicle mitigation, and greening the subsequent streetscape. In the long run, these newly pedestrianised thoroughfares are encouraging cafes, restaurants and bars into the area.

Before

After

Pedestrianisation of a street to limit vehicular access provides new public space for the City of London

The public and private realm of counter-terrorism

Where do you draw the line?

In reality many of the CT measures and considerations outlined in this document will not be limited to a scheme's immediate footprint. Interventions such as traffic management or installation of bollards are likely to be installed on public authority land such as pavements, roads or public squares – and as such will have an impact on surrounding buildings and streets. The relationship between a project, its neighbours and neighbouring amenities will be unique to each site, but it is important to stress that CT security measures for a building can affect assets beyond its immediate perimeter, and vice versa.

In cases where public space is at a premium, such as in dense urban situations, a balance will have to be struck between elements of a security strategy that will be installed in the public realm and those that will be integrated within the building. We encourage that you work in partnership with public agencies such as the Highways Authority, the Local Council, and your CTSA, to establish an appropriate strategy specific to the site as early in the design process as possible.

Recent projects and case studies show that unexpected and positive side effects can result in the public realm from integrating CT measures, for example increased pedestrianisation and more extensive landscaping. While in the past many counter-terror measures have been overtly heavy in visual presence, projects are increasingly taking creative approaches to the challenge of incorporating CT design in new developments.

Area-based approach to counter-terrorist prevention

Increasingly local authorities are being encouraged by the Home Office and Office for Communities and Local Government to include a counter-terrorist strategy in their regional and local planning frameworks, where appropriate. This is aimed at providing a clearer framework for built environment professionals to identify areas requiring CT focus. It is also intended to help pool CT resources effectively, such that security measures for individual buildings are integrated within a coherent area-wide management strategy. For example, it can be easier to have your front door covered by CCTV camera from a building across the road than it is to achieve the same coverage from within your own perimeter, and vice versa for the other building.

In neighbourhood-wide schemes, such as large retail and commercial developments, it is often worth considering CT provisions at the masterplanning stage for the general area rather than for individual units within the scheme. Financial and design resources can be pooled together to achieve a collective site security strategy, and obviates the need for extensive retrofitting in the future should a new tenant require security measures not originally identified.

Designing for the future

In some more speculative developments, potential inhabitants and their security requirements may not be clear. In these cases one can still consider introducing baseline CT measures into the scheme, such as controlled vehicular access for the site or planning a site-wide security strategy, to help avoid costly retrofits and/or new planning consents in the future should a security conscious client move in.

Conclusions and going forward

The aim of this briefing is to provide an overview of key concerns when considering counter-terrorism design, so that you are better equipped to make your own response and judgement to how and where these concerns should sit in the context of a project brief. Design can play a key role in making crowded places secure and at the same time open and welcoming to the public.

Terrorism is an ongoing risk to the UK and many other countries around the world. Many of the counter-terror design considerations outlined here will equally have applications in projects overseas. A body of growing expertise in creating resilient buildings will be of value to many institutions and organisations globally, and the UK leads in having that body of applicable knowledge.

As counter-terror practice evolves, further supportive material may be produced by relevant agencies. Up-to-date information and guidance will be provided through the RIBA website: www.architecture.com

Appendix

Assessing threats and risk

Whilst a risk assessment is not a step undertaken by the architect, it is important to understand how risk is assessed so that counter-terrorism advice can be taken within a wider context of the client's business concerns. It will also inform what, if any, counter-terrorism implications may be involved in the building brief.

The first step in determining what counter-terrorist measures may be required for any existing or planned asset is to assess the threats and risks faced. While there are many methodologies of varying complexity that can be applied, there are a number of basic principles and definitions common to all.

Threat:
Threat is essentially the product of an adversary's capability and intent to harm your assets, facilities and organisation and expresses the likelihood of an attack in the near term.

Risk:
Risk can be defined as the product of the probability (likelihood) of a threat materialising into an actual event and the impact (consequences) of such an event, often expressed in terms of losses.

The process:
Risk should initially be assessed as though there are no mitigating measures in place, before a further assessment of residual risk following the application of counter-measures.

Government risk matrix categories

The following is the government's four risk categories for measuring terrorist vulnerability and their suggested response.

High This risk is the one which generates the highest concern. Comprehensive action is required as a high priority to reduce vulnerability, wherever possible and proportionate.

Medium-high The consequences of the risk materialising would be substantial. Action is required as a priority to mitigate the risk, wherever possible and proportionate.

Medium The risk is not substantial and can be managed via contingency plans. Status of risk should be monitored regularly.

Low The risk should be addressed if possible and contingency plans are required. This risk should be managed at local level.

Operational functions of a CCTV system

CCTV can operate in one of three essential ways:

– Surveillance/monitoring by permanent guard staff
– Alarm verification
– Provision of recorded images for evidential purposes

Whilst combination solutions are typical, they should be tightly defined in order to prevent function creep that may ultimately be at odds with the avowed purpose and optimal utility of the system, or that may run counter to the system's purpose as registered with the information commissioner.

The system hardware procured and the associated expenditure thereof will depend on the identified requirements for the system, but the cameras should be capable of fulfilling the appropriate function for which they are intended. The size of an object (target) on the monitor screen should have a relation to the operator task, e.g. identification, recognition, observation, detection, control/monitoring. If the target is a person and the CCTV system has an installation limiting resolution of 400TVL (or equivalent) the recommended minimum sizes are:

– **Identification**
  not less than 100% screen height
– **Recognition**
  not less than 50% screen height
– **Observation**
  not less than 25% screen height
– **Detection** not less than 10% screen height
– **Control/monitoring**
  not less than 5% screen height

Standard operational requirements for CCTV are as follows:

– Vehicle entrances to site (Identification standard)
– Staff/vehicle parking areas
– External facade of buildings (including all entrances and emergency exits)
– Main entrances (internal view to identification standard)

Home Office Scientific Development Branch document *CCTV operational Requirements Manual – 2009: Publication 28/09* is the most current manual available.

Meanwhile the importance of lighting needs to be considered to ensure that sufficient lighting (either visible spectrum or infra red) is provided to support CCTV fields of view.

100% identification

50% recognition

25% observation

10% detection
5% control/monitoring
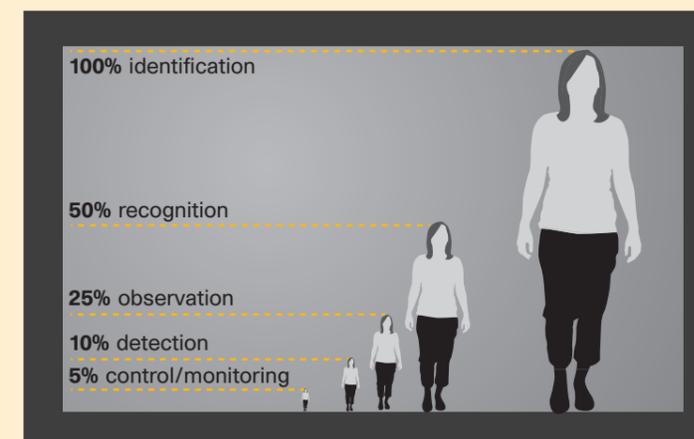
Recommended screen size of target objects for CCTV

Product specifications and modelling products

Many products will be specific to a project, depending on the level of risk that the product is intended to be effective against, and may require testing. However there is a growing body of standard products being tested by CPNI.

Hostile vehicle mitigation standards:
Once approach speeds and vehicle sizes have been assessed, the performance standards for hostile vehicle mitigation measures such as bollards, blockers and barriers can be specified and appropriate products chosen.

There are publicly available specifications from CPNI to aid specification. These are BSI PAS 68 and BSI PAS 69.

BSI PAS 68 rates vehicle security barriers by measuring the velocity and mass of an impacting vehicle against the level of penetration of the load carrying part of the vehicle past the original rear face of the vehicle security barrier being tested. Complementing BSI PAS68 is BSI PAS 69 which aids site surveys, gives installation guidance and shows how advance traffic calming can be used to reduce potential impact speeds such that less heavily engineered barriers can then be used.

The important thing is that hostile vehicles are kept at bay and barriers are designed to stop the vehicle at a suitable distance from the protected building. Some vehicle security barriers are made from materials or designed such that they are blast resistant in the event that they are affected by any explosives that detonate following the impact of a hostile vehicle.

Suitably qualified consultants can assist in qualifying the effects of blast at different distances.

Glazing standards
Minimum standard threat levels for UK government buildings are covered by recipe designs, with 6mm toughened outer glazing and 6.8mm thick laminated glass in conventionally designed metal frames.

For more severe blast levels, blast testing or dynamic analysis informed by blast testing is the norm, using laminated glass with at least a 1.5mm thick PVB interlayer and solid gaskets at least 25mm deep or structural silicone to anchor the glass in the frame. Fragility curves for a range of glass construction have been developed by the Home Office. Based on extensive testing these cover only two sizes of window pane, extrapolated up to 3m^2, but provide an initial idea of performance.

For larger glass panes, normal in retail developments or curtain walling, blast analysis, bespoke blast trials or a combination of these may be required to justify the glazing under blast. As the pane sizes increase, the anchorage of the glazing to the frame and the blast performance of the frame may become more critical, requiring larger test units or more elaborate blast analysis.

Further references

Working Together to Protect Crowded Places published by the Home Office can be found at www.security.homeoffice.gov.uk

Protecting Crowded Places: Design and Technical Issues jointly published by the Home Office, the Centre for the Protection of National Infrastructure (CPNI) and the National Counter-Terrorism Security Office (NaCTSO) can be found at: www.security.homeoffice.gov.uk

Crowded Places: The Planning system and Counter-Terrorism can be found at: www.communities.gov.uk/publications/plan ning_and_building/saferplaces

NaCTSO counter-terrorism protective security advice booklets for business sectors:
– bars, pubs and clubs;
– shopping centres;
– stadia and arenas;
– visitor attractions;
– cinemas and theatres;
– hotels and restaurants;
– higher and further education;
  commercial centres;
– health;
– aviation;
– major events; and
– places of worship.

Additional NaCTSO guidance booklets:
– Secure in the Knowledge: Building a secure business;
– Expecting the unexpected.

NaCTSO publications are available at: www.nactso.gov.uk

Secured by Design
www.securedbydesign.com

Design Against Crime
www.designagainstcrime.com

Further Reading:
Coaffe, J. (2003) *Terrorism, Risk and the City: the making of a contemporary urban landscape* (Aldershot: Ashgate).

Coaffee, J., Murakami-Wood, D. and Rogers, P. (2008) *The Everyday Resilience of the City: How Cities Respond to Terrorism and Disaster* (New Security Challenges) (Basingstoke: Palgrave Macmillan).

Bosher, L. (ed.) (2008)) *Hazards and the Built Environment: Attaining Built-in Resilience* (Taylor and Francis).

This briefing document is a most valuable guide to all those who have some awareness of the threats posed by terrorism, but who do not yet know what can be practically done about it by the designer.

Professor Geraint John RIBA, Populous

This RIBA document is an initial response to Home Office counter-terrorism initiatives that include new guidance, identifying recommended design and management approaches aimed at minimising terrorist risks. As a public realm improvement specialist, I feel that this guidance document will provide valuable design data and sources of further information. It sets out in a clear way, the context and principles of what is a sensitive and complex issue of our times, which needs to be considered at all stages of the built environment planning and design processes.

Peter Heath RIBA MRTPI, Atkins Ltd

RIBA

Royal Institute of British Architects
66 Portland Place
London W1B 1AD
T 020 7580 5533
www.architecture.com

TPS

a Carillion company