Design Against Terrorism: soft targets and safe public places

Urban Planning, Design and Management against ram raiders
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Photo cover (top): Stockholm, April 2017
Photo cover (below): Town hall Zaltbommel (little village of 29,940 inhabitants in Bommelerwaard, Gelderland, The Netherlands), August 2017

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Murderous ram raiders

Suddenly unattractive concrete blocks appeared everywhere in most capital cities in Europe. Were they effective barriers that can stop deadly ram-raiders, or was it rather a soothing measure to show the public that local government was watching over local safety and security in public places?

The measures did not come out of the blue, because there were quite a few attacks in cities such as Apeldoorn (April 30th 2009), Nice (July 14th 2016), Berlin (December 19th 2016), Stockholm (April 7th 2017; photo cover) London (March 22nd and June 3th 2017) and Barcelona (August 18th 2017). But also in New York (Time Square and Lower Manhattan), Toronto (photo) and much more often in countless cities in the Middle East already a decade before the attacks in Europe. All attacks were examples that show how easily a (freight) car can turn into a murder instrument. No wonder the practical policy question arises ‘what to do about this?’

Of course, for measures we must first and foremost look at the perpetrators: can they be traced in advance and can they be prevented from carrying out their murderous plans, what are possible motivations for their act and what are they capable of? That often works, but not always, also because in many cases they are ‘lone wolves’, or ‘lone actors’⁴: often unstable disturbed men who commit an attack on their own. The Dutch ram raider who killed seven people in Apeldoorn (2009) was an early example of that.

Hence it might be worthwhile to look at what could be done in places where the risks of this kind of attacks are high: an environment-oriented situational approach. If you look at it from that angle, it is clear that a Christmas market in Berlin, the Ramblas in Barcelona, or a Quatorze Juillet Boulevard in Nice score higher in risk than the Nowhere road in Middletown. Fortunately, that means that we do not have to search for security options everywhere and always. Risks can be approached scientifically, with clear and logical probability calculations. Risks are time-place specific: hot spots and hot times.

Lots of knowledge available

Fortunately, both risk management and an environment-oriented approach to ram raiding have been under consideration already for decades. Therefore a lot of knowledge is available.

Risk management is nowadays a globally respected discipline which involves the effective and efficient management of risks⁵. Effective means that a safety approach has real effect. Efficient indicates that there must be a conscious cost-benefit assessment: total safety is an illusion and we

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⁴ Since many of this type of offenders like to see themselves as hero’s, the term ‘wolves’ is to much of an honor so we better use the neutral term ‘actor’.

⁵ See www.iso.org. ISO 31000:2018, Risk management – Guidelines, provides principles, framework and a process for managing risk. This worldwide standard can be used by any organization regardless of its size, activity or sector. Using ISO 31000 can help organizations increase the likelihood of achieving objectives, improve the identification of opportunities and threats and effectively allocate and use resources for risk treatment.
must therefore also explicitly consider the social and financial costs. Good risk management means that we must always first look carefully at the context in which a risk can arise. After that, the trio risk assessment, risk analysis and risk evaluation (together: the risk assessment) should be considered and only then there is an approach: the risk treatment⁶.

Ram-raiding was already a problem in the last decades of the last century, although it was then mostly ram raiding attacks aiming at expensive retail shops like jewelers. The emphasis was then already mainly on the protection of buildings and the building envelope with the help of Vehicle Security Barriers (VSBs) against criminal ram raiders. Things like bollards, sturdy posts, concrete blocks and heavy flower boxes. Great if there is no other option, but good safe design and management requires that we also dare to think more broadly: think about the urban planning, - design and landscape architectural solutions, the roads and approach routes, planting, the wider environment. Otherwise every city center will soon look like Whitehall in London: a defensive war zone; a hard boiled inner city security reinvention of the French Maginot Line.

### Possible measures: use crime prevention through urban design, planning and management

Crime Prevention through Urban Design, Planning and Management (CP-UDP⁷) is based on a worldwide approach called CPTED (Crime prevention through Environmental Design). Other similar approaches are known as Design Against Crime, Crime Prevention by Design, Designing Out Crime Security – or secured - by Design, etc.

A simple set of measures from this approach is the acronym VACA: Visibility, Accessibility Clarity and Attractiveness.

In addition to this "VACA-check", the choice of measures always involves a sound area-oriented risk management approach, because - as we wrote earlier- the Nowhere road in Middletown is not the Ramblas.

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⁶ We base ourselves here on the terminology used in the globally used risk management standard ISO 31000. The advantage of such a standard is that everyone who says 'I work in accordance with ISO 31000' also uses the same terminology. Because such a standard is translated into all languages this goes for every country. At least we talk about the same thing.

⁷ See the EU COST (Cooperation in Science and Technology) TU 1203: www.costtu1203.eu and see the set of European standards as issued by CEN - and available from every national standardization institute in the world – the set of standards in the CEN 14383 series.
Rules of thumb for social CP-UDP

Security and safety can be influenced relatively easily by urban design, planning and management – engineering in safety - by applying a limited number of guidelines in conjunction with each other. The guidelines are called ‘rules of thumb’ with the following key words (VACA):
- Visibility: clarity and visibility, sightlines, lighting, surveillance/surveillability
- Accessibility: accessibility or, on the contrary, inaccessibility (access control)
- Clarity: a clear zoning of territories, territoriality
- Attractiveness: an attractive environment

These rules of thumb can be used in various ways, such as:
- Performance requirements, program of requirements for new construction/renovation/restructuring etc.
- Design strategy, in planning
- Assessment criteria, when assessing plans or existing situations
- Management strategies, in use and management of an existing situation

If we go through all the letters of VACA...

Visibility
The question of whether the public and / or perpetrators should see the security measures (or not!) Is an important consideration. Showing all security measures for the public might result in more or in less feelings of insecurity. This also depends on timing. Roadblock and VSB’s set in place the day before royals, potus or other heads of state visit a place will probably be perceived as a necessary burden and the same goes for security measures right after a terrorist attack or attempt. But if the security measures stay there for month after month it will probably work as a constant reminder that terrorism is a very real option and it will thus augment fear and feelings of insecurity. In that way it would help terrorist to reach their goals: spreading fear and terror.

It is also important to look beyond the ultimate potential goal of terrorists. Security experts often only look at the "object to be protected", be it a building, a president/royal, a boulevard or a square.
But also a long queue for a festival (and especially the outflow afterwards), a gathering place after an evacuation, or the spectators at a Royal happening, can suddenly constitute an additional risk alongside the primary goal (namely the festival site, the building to be evacuated, or the royal family).
The main focus of security is to secure a site, building or royal. Often taking a broader view may show an array of far better places for security measures to be taken. An entertainment square, a market or a central shopping – or business – area may be \‘defended\’ better and esthetical more sound if for example the streets leading to these places are better secured. Taking a birds eye view and zooming out from the ‘place where it's all happening’ is thus essential.

Accessibility
It will be clear that "accessibility" is the most important concept in the case of ram raiding: we want to prevent a car from driving into a crowded street, boulevard or square; we want to control the access. At the same time - and then the considerations become more difficult - we also want busy shopping streets to remain easily accessible for wheelchair users, emergency services or operating traffic. And we cannot simply close roads, because there are always traffic rules, codes and decisions that also serve safety. Ram raiders may be a risk, but due to "normal road unsafety", several thousands pedestrians and cyclists are killed every year in Europe. Lone terrorist wolves do not yet score that number of deaths and certainly Al Qaida / IS, ethnic nationalist / separatist and right - or left - wing radical groups are responsible for fewer deaths.\(^8\)

But there is also the question of efficacy and the costs and benefits. One simple and common sinkable stainless steel pole costs € 4000 - € 5000 (+ € 3000 for installation). If such a post can also be used by e.g. local residents, an amount of € 10,000 can be added for a system with induction loops. The point is that with such a simple pole the maximum impact resistance is only around 6000 Joules. An average really strong pole - often used at nuclear power plants and embassies for example - yields 660,000 Joules, or a truck of 6800 kg with a speed of 50 km / h. But to stop this type of ram raider we are looking at costs of more than € 50,000 for one bollard. Compare that with a concrete block (Legioblock) of 2.4 tonnes that costs € 85 ex works (installation costs € 650\(^9\)). Hence a set of simple concrete blocks is often an easier option to implement. But those blocks are mostly placed in rather an at random way and without anchoring. Whether or not 'disguised' as a cozy bench or flower pot these blocks can suddenly turn into a deadly projectile in an attack, which, after being hit full speed by a truck, shoot in all directions and with that perhaps make more victims than the car itself. See also the outcome of a 'what-if scenario study' by Christian Schneider\(^10\) of the Berlin Breitscheidplatz attack (2016; 12 people killed) showing that a concrete block (160-120-80; 3.6 tons) hit by a truck of 40 tons driving 65 km/h would show a dispersion of (parts of) concrete up tot 194 meters.

Attractiveness

Also a concept such as attractiveness is a crucial precondition: the measures that are taken must not be shockingly ugly and / or stimulate people's feelings of insecurity. However, attractiveness not only embraces aesthetic qualities, but also a basic cost-benefit assessment. Hence a good risk assessment and a sound cost benefit analysis beforehand is important.

\(^8\) We tend to point only to religious (especially Muslim) oriented organizations in the event of terrorism. That image is certainly worldwide, but also in Europe much more nuanced. The EU Terrorism Situation and Trend Report (TE-SAT) published annually by Europol since 2007 "provides a concise overview of the nature of terrorism that the EU faced in 2016 and looks in detail at terrorist attacks that occurred: the largest number of attacks in which a terrorist affiliation could be identified were carried out by ethno-nationalist and separatist extremists (99). Attacks carried out by left-wing violent extremists have been on the rise since 2014; they reached a total of 27 in 2016, or which most (16) were reported by Italy. Although the total number of jihadist terrorist attacks decreased from 17 in 2015 to 13 attacks in 2016, or which 6 were linked to the so-called Islamic State (IS), 135 of the 142 victims of terrorist attacks in 2016 were killed in the 13 jihadist attacks. (Source: European Union Terrorism Situation and Trend report 2017). Note that TE-SAT looks broadly at terrorist attacks and not just at ram raiding.

\(^9\) Whether it is 1 or max. 14, that remains the same.

\(^10\) See also: https://inibsp.de/ In this scenario the calculations are made for a Scania truck R450, 40 ton, 65 km/h, Energy 6.500 Kj (Presentation Fachkongress Terrorabwehrsperren; Münster 19-09-2018).
In short: the measures that are taken must ultimately be attractive: not ugly and disastrous for people's sense of security, but also attractive for the municipal wallet where effectiveness is an important precondition.

Clarity

It must be clear where the risks are greatest and we must take measures there, and preferably in the run-up / route to them. Especially in those approach routes farther away from the real risk area, there are often good opportunities to stop cars (road safety!) and also ram raiders. Such places often catch the eye much less (visibility, see above) and can therefore be "more attractive". Incidentally, with zones around the risk area we often only think of the perimeter directly around a building or area. But the solution can also lie within a building. Take a long line of people waiting at an event, museum, or beer experience. In that case you can start protecting the queue (close by or further away), but you can also ask yourself whether this queue cannot be eliminated by optimizing internal logistics at, for example, the entrance / cloakroom or elsewhere in the building where the flow stops.

The task

If we focus on ram raiding in which the perpetrator (s) wants to kill and injure as many people as possible and we ask the question which environmental / situational measures can be taken in a city, we come to the next task and question:

Which measures can best be taken to prevent accessibility for a ram-raid? However, not only the physical security measures sec (bollard, VSB, concrete block, barrier, etc.) should be considered, but a broader approach must be taken with a careful weighting of concepts such like visibility (for perpetrators and the public), accessibility, clarity (time, place, route and only in high risk situations) and attractiveness (it must be attractive to look at and also remain attractive for the municipal wallet).

Approach

As stated, a great deal of knowledge is already available. An important question is of course: "What works?"

At this point our paper becomes more technical: we all know that the Ramblas is not the Nowhere road - although it will always be difficult to make an exact risk assessment. However, answering the question how to limit the accessibility for ram raiders of a street or square is simply a lot of dynamics: how heavy and strong is the approaching car, how fast does it drives at impact, how does the car hit a blockade (for example in which angle), how strong is the blockade, has a blockade been anchored to the ground (and if so how)?

Fortunately, these kinds of questions have been thought about for much longer and things have also been extensively tested and, based on that, issues have been laid down in national, European and worldwide standards. However, testing is tricky and expensive, because several cars will actually
crash on bollards, blocks and walls. Only in this way can we learn what is really happening in practice. The results are then recorded in standards available from every national standardisation institute.

For example, since 2009 there exists a European standard “Protection of buildings and sites against criminal attacks with vehicles” under number CEN / TR 14383-8: 2009. This standard is a detailed standard in a much more extensive series of European standards on Crime prevention through Urban Design, Planning and Management (the CEN\textsuperscript{11} 14383 series).

Part 8 of this series of standards entitled CEN/TR 14383-8:2009 Prevention of crime - Urban planning and building design – Part 8: Protection of buildings and sites against criminal attacks with vehicles\textsuperscript{12}

The text provides an overview of all possible Vehicle Security Barriers. As I have said, the great thing about this European standard is that it forms part of a broader series of standards (the CEN 14383 series) which also contains terminology, principles and approach / process of the much broader topic of Crime Prevention through Urban Design, Planning and management\textsuperscript{13}.

In addition, the standard also delves deeply into the impact energy (mass and speed of vehicles) and angle at which vehicle obstacles or a building base can be hit. The required strength can be calculated with this data. This is not unimportant, because in the current panic, Vehicle Security Barriers (read: concrete blocks) are put everywhere without knowing whether those things could actually work at all. This is often not the case tests show. A well-intended concrete block then quickly becomes a dangerous projectile that can also injure and kill people.

Building on the CEN / TR 14383-8: 2009, CEN produced the Workshop Agreement (CWA) 16221: 2010 “Vehicle security barriers - Performance requirements, test methods and guidance on

\textsuperscript{11}This set of Standards (the CEN 14383 series) dates from the beginning of this century and has been neglected for some time. The Czech Standardization Institute (UNMZ) is working on revitalization and renovation. However, consensus must also arise on this and consensus in Europe sometimes takes a little time. See also EU COST (Cooperation in Science and Technology): Review of CEN 14383; The death and life of great European standards and manuals - Development and implementation of the CEN 14383 standards. October 2014 (downloadable from http://costtu1203.eu/).

\textsuperscript{12}Français : Prévention de la malveillance - Urbanisme et conception des bâtiments - Partie 8 : Protection de bâtiments et de sites contre l'utilisation malveillante de véhicules. Deutsch: Vorbeugende Kriminalitätsbekämpfung - Stadt- und Gebäudeplanung - Teil 8: Schutz von Gebäuden und Anlagen vor Angriffen unter Verwendung von Fahrzeugen. Technical Report was approved by CEN on 19 April 2009. It has been drawn up by the Technical Committee CEN/TC 325.

\textsuperscript{13}CEN (https://www.cen.eu) is the European Committee for Standardization / Standardization in which 34 national standardization bodies - think of NEN in the Netherlands, AFNOR in France and DIN in Germany - work together to arrive at European standards. The global standardization club is called ISO (International Organization for Standardization) in which 162 national standardization institutes work together. A standard often looks complicated and technical, but is in essence no more than a text in which, through a lengthy consultation and learning process, consensus has been reached on what 'something' is how we come to that' something 'and how that' something 'works. A standard is solidified consensus.
application" less than a year later. Based on these European standards from 2009/2010, further thought has been given worldwide to Vehicle Security Barriers in recent years. In addition, the worldwide ISO practice guideline ISO / IWA 14-1: 2013 (s)\textsuperscript{14} is well suited to current terrorism and terrorist attacks. This guideline provides a good overview of the "state of the art" and the knowledge of all parties involved in this subject worldwide in a practical sense.\textsuperscript{15}

The fact that today this subject is really looked at globally and knowledge from daily practice and testing is brought together in such an ISO practice guideline not only shows that the terrorist ram raiding issue has become a global phenomenon, but shows also that tests are very expensive: a lot of (freight) cars are crushed into scrap metal against bollards and blocks with a destructive speed of 30, 50 or 80 km per hour.

**Think before you begin**

It is important to think carefully about the use of measures such as concrete blocks, bollards or any type of barrier. For example, the direction of travel of a (freight) car is still somewhat predictable, but a concrete block that flies away due to the blow is no longer predictable at all. Also important is the question of whether a barrier should be fixed / permanent, on a temporary basis, or something in between (think of a weekly market or the weekends at an entertainment area).

**There is a lot of knowledge worldwide, but perhaps even more ignorance and hasty action.**

**What do we do?**

In the Netherlands a group of experts has been formed to bring knowledge together. This group – Design Against Terrorism – is and expert section of the Dutch ICA chapter (ICA = International CEPTED – Crime Prevention through Environmental Design – Association; [www.cpted.net](http://www.cpted.net)). The Dutch ICA Chapter stands for a rational approach in which knowledge development and distribution are central.\textsuperscript{16}

\textsuperscript{14} Vehicle security barriers - Part 1: Performance requirement, vehicle impact test method and performance rating. There is also ISO / IWA 14-2 "Vehicle security barriers - Part 2: Application.

\textsuperscript{15} Or in German (quote taken from [https://inibsp.de/](https://inibsp.de/) INITIATIVE BREITSCHEIDPLATZ): Er beginnt mit der individuellen Untersuchung und Diagnose vor Ort (Gefährdungs- und schwachstellenanalyse nach ISO IWA 14-2) durch den erfahren Experten und führt anschließend zu einem diagnosebasiertem und individuellem Behandlungsplan (Zufahrtsschutzkonzept nach ISO IWA 14-2) unter Einsatz wirksamer Medikamente (zertifizierte und geprüfte Barrieren nach ISO IWA 14-1). So erreichen wir gemeinsam unser Ziel eines anlassbezogenen, lokalspezifischen und normgerechten, nachhaltig wirksamen Zufahrtschutzes. „Angreifer aussperren, ohne die Besucher einzusperren!“

\textsuperscript{16} The Dutch ICA chapter is in itself an association (Association for Safe and Secure Urban Design, Planning and Management; Stichting Veilig Ontwerp en Beheer SVOB. SVOB: aims to promote safe design and management of the built environment and to form a national platform in the field of safe design and management. The SVOB wants to achieve this goal by:

* establishing and maintaining a network of experts in the field of safe design and management of the built environment;
* organizing courses, congresses, workshops and other events that aim to transfer knowledge in the field of safe design and management of the built environment;
* maintaining contacts with organizations in other countries that deal with the safe design and management of the built environment.
In addition to the SVOB, the CROW plays a leading role in this. CROW knows all about smart and practical solutions for issues in infrastructure, public space, traffic and transport. SVOB knows everything about planning, design, design and management of the public space to keep it safe and attractive.

In addition to CROW and SVOB, various parties joined the expert group: the national police, municipalities (Amsterdam, Rotterdam, The hague and Utrecht), NCTV, consultancy agencies for crowd and event management, TNO, market parties in (access) security and others. The expert group is open to all expert professionals who can contribute knowledge and distribute knowledge on behalf of important supporters. This expert group has organized a broader orientation meeting in the short term to see what questions there are in this field in the Netherlands and which knowledge (where and how) can become available (25 June 2 pm De Bazela Amsterdam King's Hall). The SVOB uses its own experts who are RCE certified (http://www.veilig-ontwerp-beheer.nl/netwerk/lid-worden/register-cpted-experts). See also the LinkedIn group Design Against Terrorism https://www.linkedin.com/showcase/design-against-terrorism/. The universities of applied sciences as well as other universities (and the Registrated CPTED Experts – RCE – from those universities) will play a role, certainly at a later stage when knowledge transfer becomes important. It is certainly work in progress up to and including autumn 2019.