A Handbook
for **Safe Built Environments**
and **Security through Design**

aE Research Report
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course//**AR5AE013**

The growing need for security in our contemporary society is attributable to recent terror events happening on the streets all around the globe and has resulted into the militarization and securitization of cities.

Contemporary urban settings and buildings are increasingly 'saturated by intelligent surveillance systems, checkpoints, defensive design and planning strategies, and intensifying security' (Graham, 2010).

These processes not only had affected the physical composition of cities but also had a considerable impact upon citizens' access to – and tolerated activities undertaken within – the physical built environment. In other words they resulted into a compromised freedom of people movement and their activities in our so-called 'democratic' public realm.

The coexistence of security and freedom are necessary to encompass a good framework for an inclusive public life for all. As Ruth Reed, former president of the Royal Institute of British Architects (RIBA), wrote: "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" (RIBA, 2010).

It is time to look for an alternative way of secure design where contemporary environments can become livable and controlled, not by the police and expensive retrofits, but by a community of people sharing a common terrain. We should now start to produce safe and inclusive environments, without looking like 'war zones'.

Crime prevention through environment design (CPTED) is a term that was firstly introduced by the American criminologist Professor C. Ray Jeffrey in his book of the same name. The concepts of CPTED are based on a simple idea – crime results partly from the opportunities presented by the physical environment (Jeffrey, 1971). This being the case then, it should be possible to alter the physical environment so that crime is less likely to occur.

The contribution of design towards more aesthetic and less visible approaches to physical security measures, and the integration of security thinking in the planning phase of buildings and public spaces instead of relying on expensive retrofits (Simpson, Jensen, & Rubing, 2017, p. 11) is vital for creating both safe and inclusive environments, without looking like 'war zones'.

The following study is based on this simple idea mentioned above and its aim is to organize and present variety of design strategies and concepts that contribute to the creation of architectural projects that are capable to deter crime through their physical composition.

The strategies presented in following handbook are collected from numerous studies relating to crime prevention; for instance Defensible Space (Newman, 1972) and Crime Prevention through Environmental Design (Crowe, 2013), and design guidelines, such as RIBA Guidance on Designing for Counter-terrorism.

In addition, insights taken from Life Between Buildings (Gehl, 2011) and Cities for People (Gehl, 2010) written by the Danish architect and urban designer Jan Gehl are also of importance in this study. His strategies that are presented are concerned with creating inviting and lively spaces – the starting point for holistic space planning that encompasses the vital qualities that make a safe city.

The design concepts and strategies that will follow have been organized in four overlapping principles and are classified according to their primary thrust as explained on the next page.

Note that design concepts and strategies falling under those four classifications are not mutually exclusive but rather strategies in one classification typically are mutually supportive of the other. For example a surveillance strategy may have the effect of an access control strategy by effectively keeping intruders out because of an increased perception of risk.

Organization of this Handbook

TERRITORIAL REINFORCEMENT

Primary thrust of concepts and strategies in yellow chapter:
Create or extend the sphere of the users' influence. Directed primarily at presenting potential intruders a perception of a site/building belonging to a certain group.

NATURAL SURVEILLANCE

Primary thrust of concepts and strategies in blue chapter:
Facilitate observation.
Directed primarily at keeping intruders under observation.

ACCESS CONTROL

Primary thrust of concepts and strategies in red chapter:
Deny access to a crime target and create a perception of risk in offenders. Directed primarily at decreasing crime opportunity.

FEELING SAFE

Primary thrust of concepts and strategies in green chapter:
Impart a sense of security.
Directed primarily at inviting or repelling users.

THINGS TO AVOID

SOME IMPORTANT TIPS

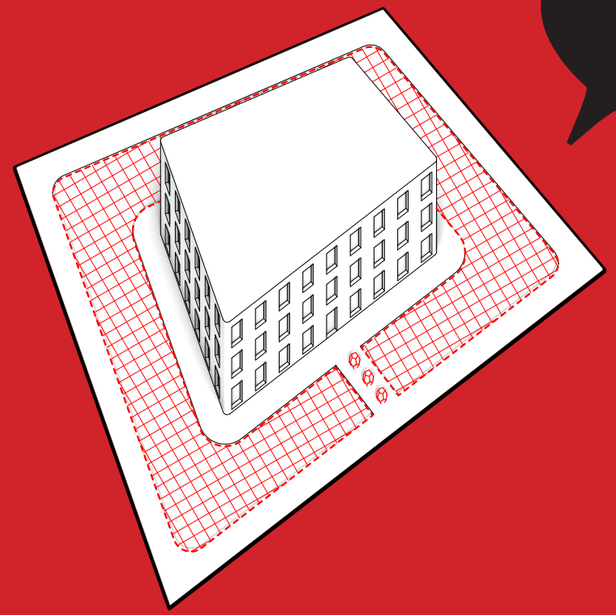
GOAL AND INFORMATION

EXPLANATION OF CONCEPT / STRATEGY

Design for landscape features that form physical barriers

01

Experian Data Centre by Sheppard Robson. The artificial lake prevents physical access to the building without visual impact.



less visible security measures

Reduce visual impact of barriers. Effectively delinate public and private areas and provide protection from potential intruders in an unobtrusive way.

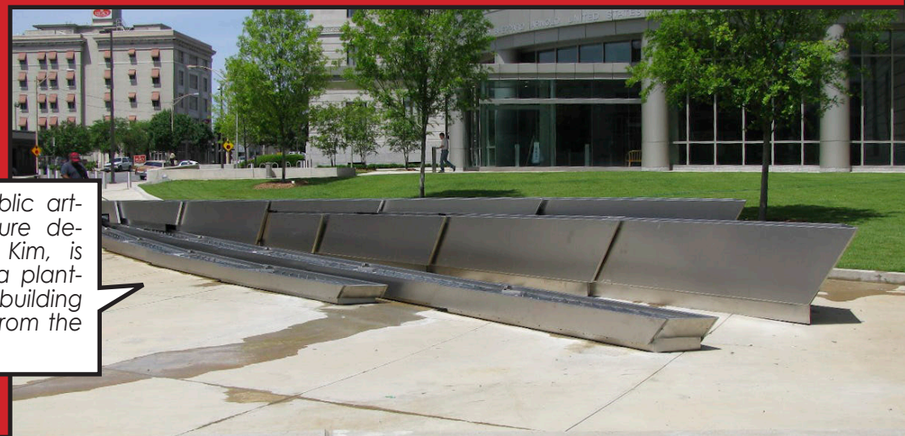
Use landscape features such as sculptures and water bodies to prevent unauthorised users from entering or getting close to the development.

US embassy in London balances impenetrable security standards with a visual language of openness. The ornamental lake and gardens act as physical barriers to intruders.

Federal Plaza in San Francisco replaces concrete barricades with faceted landscape of angular planes of hardscape and plantings, incorporating seating and lighting. The spatial configuration of the plaza is broken up into discontinuous surfaces to encourage movement and discourage public gathering.

The Drayton Park entrance features a sculpture with the club's name spelled out in big letters which intends to keep vehicles out of reach to Arsenal's Emirates stadium.

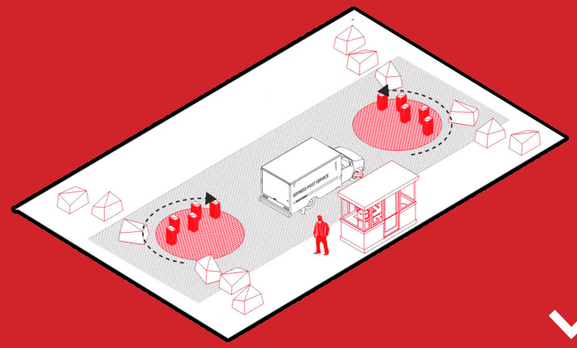
Echo Dynamics, a public artwork and water feature designed by Mikyoung Kim, is both a fountain and a planter which protects the building using passive security from the street face of the park.



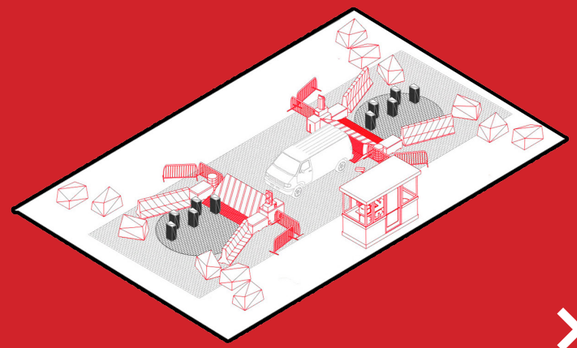
Design for Vehicle Hostile Mitigation

02

Wall Street Security Project. Sculptural bollards for Vehicle Hostile Mitigation.



Bollard Design



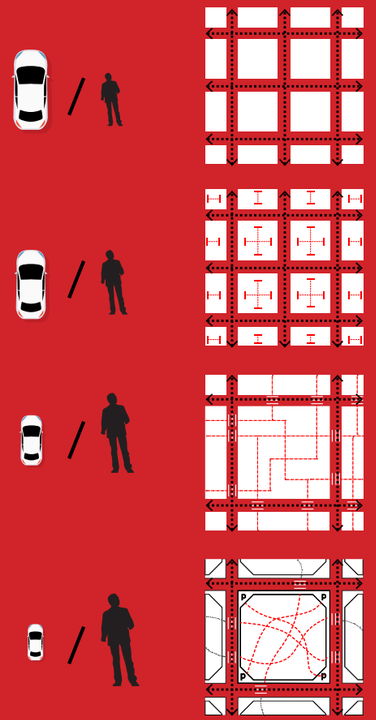
Prevent unauthorised vehicles from entering or getting too close to a site or building.

Use static or passive barriers around the development site or building project.

Choose for Pedestian and Vehicle Hierarchy

03

Venice, Italy
High Speed Vehicle Traffic is limited to the outer zone, while the inner city is only accessible by pedestrians and boats.

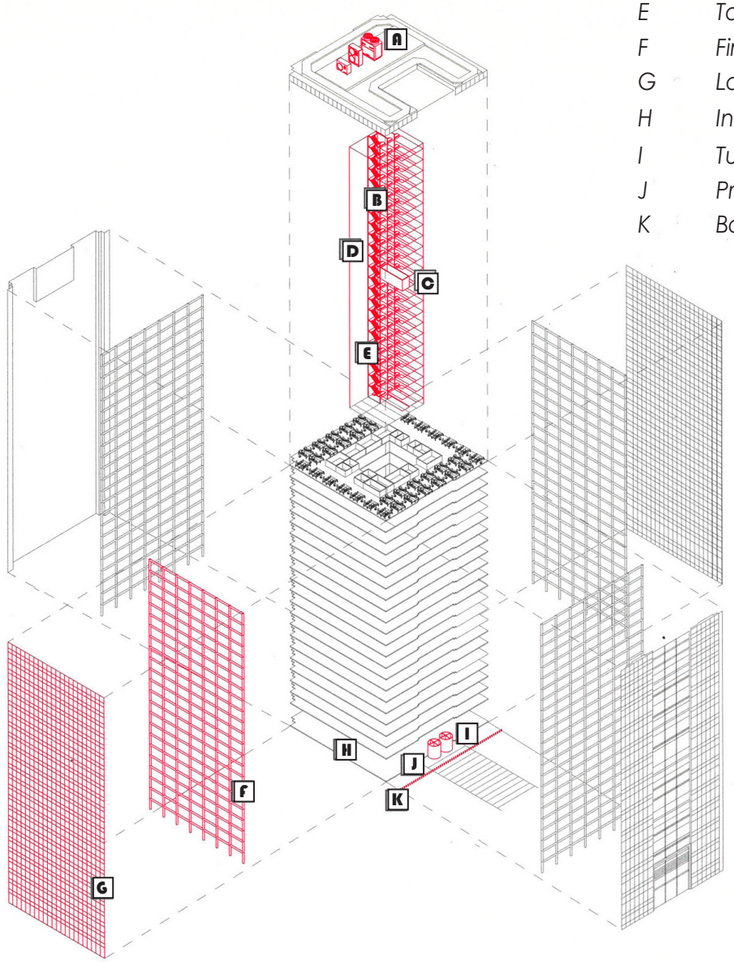


>Fast-moving traffic
> full separation
> Slow-moving traffic
> Transitioal

The growing dominance of vehicles poses a threat to pedestrians. It resulted into shrunken pedestrian sidewalks, unsafe streets and noisy neighbourhoods.

Develop for suitable traffic management and allow for different hierarchy between pedestrians and vehicle. Provide safe and naturally surveilled parking space.

Barclays Headquarters
Canary Warf, London

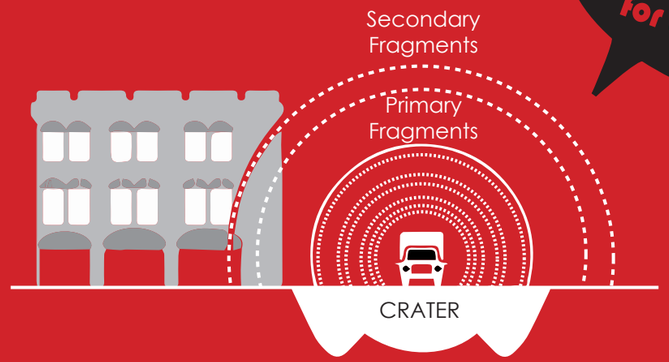


A *Ventilation on rooftop*
B *Evacuation stairs*
C *Panic Rooms*
D *40cm Reinforced Concrete Core*
E *Tannoy PA system*
F *Fireproofed Steel Framework*
G *Laminated Glass*
H *Interior Access Control with CCTV*
I *Turnstile Doors*
J *Private Security Desk*
K *Bollards*

Design for Counter - terrorism

04

Protect Building Form and Provide for Emergency



Ability of the building to: resist Intrusion, blast and chemical effects in case of explosion, ensure structural stability in case of impact and fire.

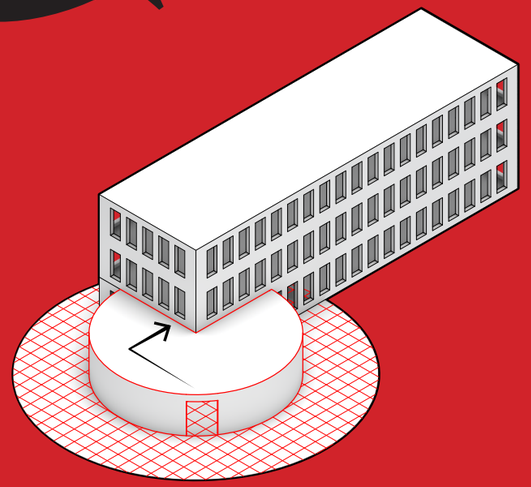
(a) 30m of stand-off distance if possible, otherwise:
(b) Design for a façade construction that retains glass fragments after blast - for example use PVB laminated glass inner leaf or anti-shatter film.
(c) Use of fireproof materials for both structure and envelope.
(d) Locate High Occupancy areas away from the risk of a blast and Low Occupancy Areas in more vulnerable locations

Provide Safe and Easily Controlled Access

05

London Business School, The Sammy Ofer Centre. Annexe building uses the excavated space between existing structures to create a new entrance and link structure.

Secondary Annexes



X

There should be no unnecessary paths, which could be used to gain unobtrusive access and escape.

!

Secure the back door and service areas equally.

?

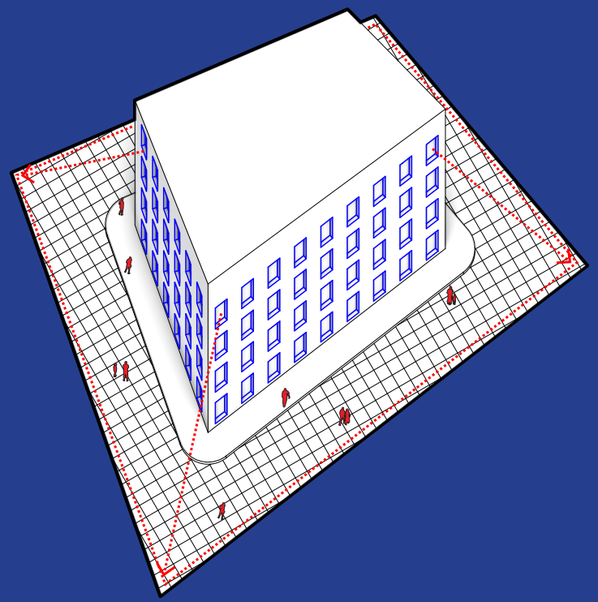
Provide only one way in which allows access only to authorized users. Use locks and electronic-swipe card. Provide a transitional space such as reception areas with active security screenings

i

Prevent unauthorized personnel from entering the primary building.

06 Improve Opportunities for Natural Surveillance

Design for openings and transparency.



X Avoid Blank Facade

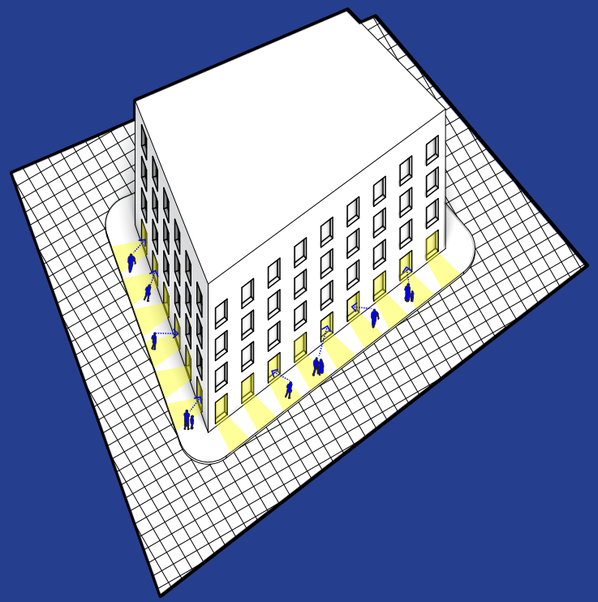
! Buildings limited to five storeys allow a clear visual connection to the ground level.

i Decrease the need of expensive retrofits and allow users to surveil their territory.

? Allow visual connection to the outside from indoor areas.

07 Create Visibly Active Indoor and Outdoor Spaces

Create an impression of 'eyes' on the street.



X Avoid Blank Facade

! Reduce light pollution on windows to influence users to leave curtains/ blinds partially open, creating the reality and perception of been watched.

? Allow partially visual connection to active indoor areas from outdoors. If necessary introduce false windows overlooking pedestrian routes to create the impression of been watched.

i Reinforce the impression of natural surveillance and openness from and to the structure.

08

Design for Visual Permeability

Clear Visibility threshold for Ground floor level

✕ *Sharp blind corners, large columns, opaque barriers and objects, overgrown plants.*

! *Use low hedges and planters, small trees, chain-link fences, transparent reinforced glass, lawns and flower bells, benches etc.*

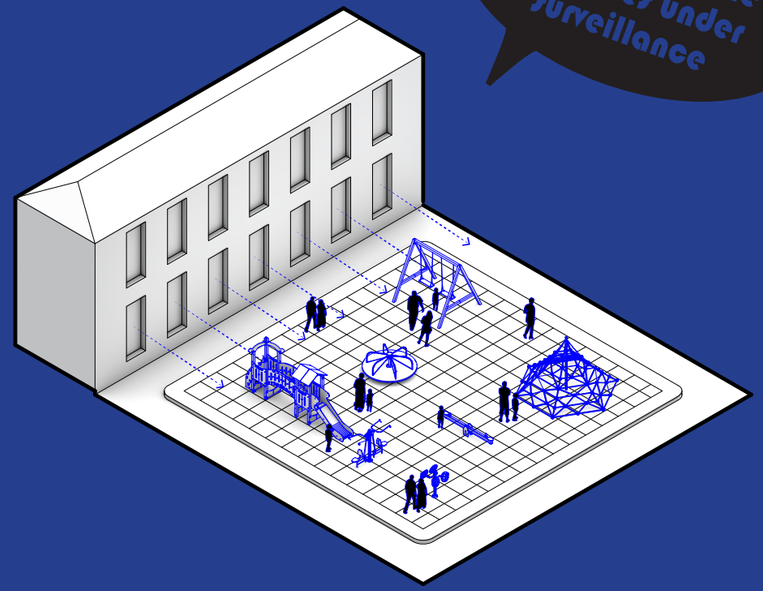
? *Use straight and unobstructed sight lines which eliminate potential hiding places and create spaces that can be easily surveilled.*

i *Allow for users to see and be seen.*

09

Designate gathering areas in location with good surveillance

Most vulnerable activities under surveillance



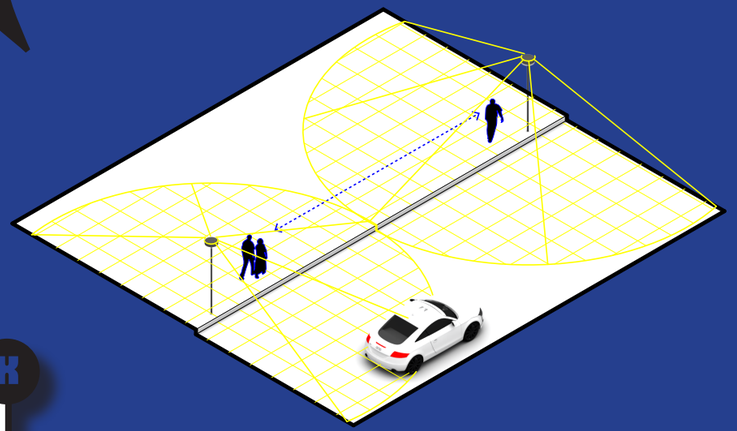
i *Decrease the magnetic attraction effect to undesirable areas.*

? *Use attractive design features to promote activities. When activities need to be kept private, then position them out of the view of undesirable users.*

Provide Adequate lighting

10

Light-up pedestrian routes - vehivle have their own lights



X

Avoid flood-lit and under-lit paths that might result in lighting glares. Avoid lighting-up isolated or entrapment spots resulting into a false sense of security.

?

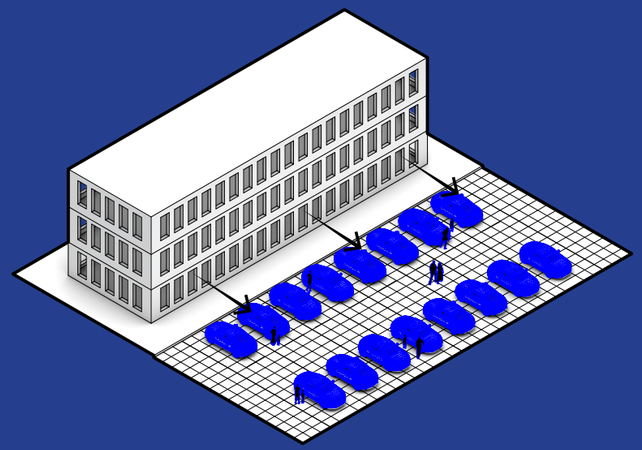
Achieve a certain level of illumination and ensure lighting is consistent. Increase lighting fixtures and decrease wattage. Protect lighting fixtures from casual vandalism and allow for easy maintenance.

i

Make it possible to identify a person standing 15 meters away.

11

Place parking in line-of-sight or infront of the building

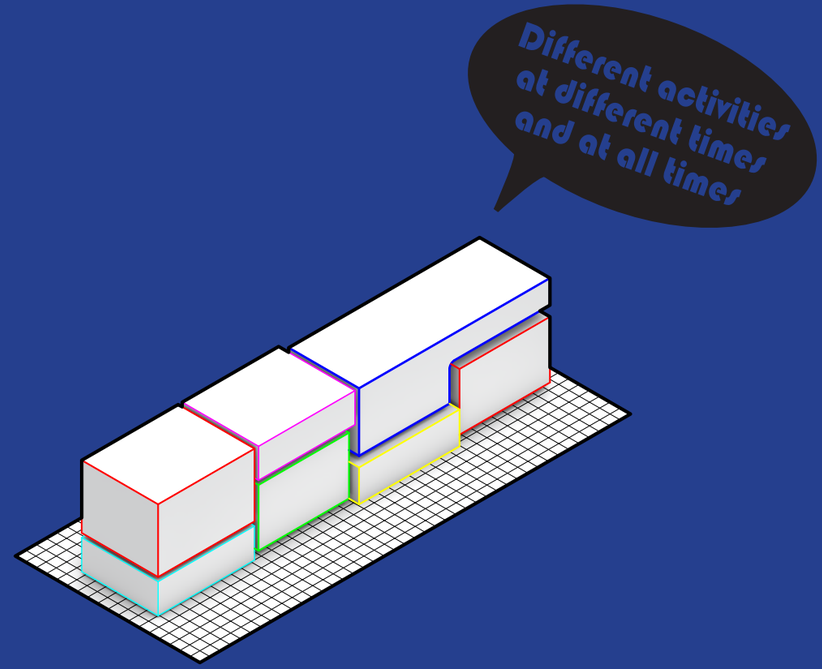


Increases perception of surveillance (of employees) from the building while decreasing the negative effect of isolate parking on morale.

Consider the best location for car parking having in mind natural surveillance, access control and pedestrians/vehicles hierarchy.

12

Improve Scheduling of space Design for land-use mix



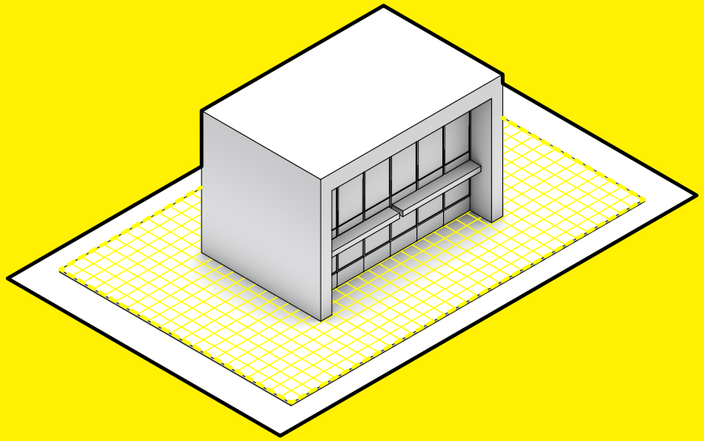
A building that is in use productively thoughout the day, allows for its users to maintain control and create the perception of lively and safe areas.

Ensure the building looks lively and occupied at all times. Allow for mix activities and productive use of space all day.

Funenpark, Amsterdam. The placement of apartment blocks in relevance to the open courtyard enhances a sense of territorial restriction and results to a recognizable semi-public outdoor space.

Clearly Define Territory

Grounds around the project are related to the building in question



Some real barriers are walls and fences, locked gates and doors, U-shaped buildings.
Some symbolic barriers are open symbolic gateways, light standards, run of steps, planting, change of paving material.

Serves to identify an entity and indicates to inhabitants and outsiders alike that the grounds are for the private use of the inhabitants.

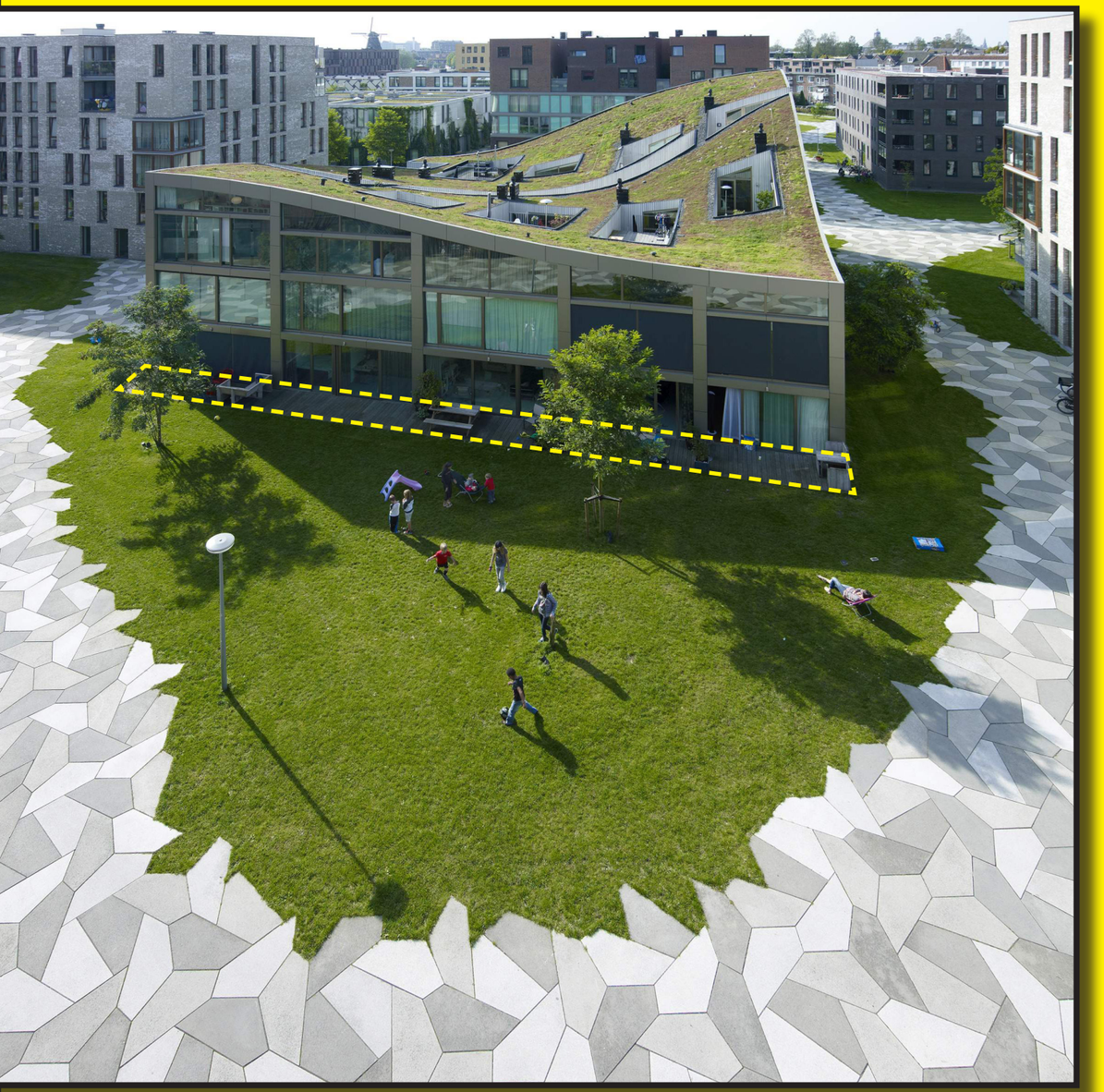
Barriers should be used as interrupters in the sequence of movement along access routes. Real or symbolic barriers serve to create perceptible zones of transition from public to private spaces.

Open symbolic gateways facing the main street mark the entrance to the outdoor semi-private zone that is created.

The area created by the right angle of the L-shape building on the outer boundary demarcates the space as a semi-private extension of the residential blocks. This enhances the territorial restriction of the space.

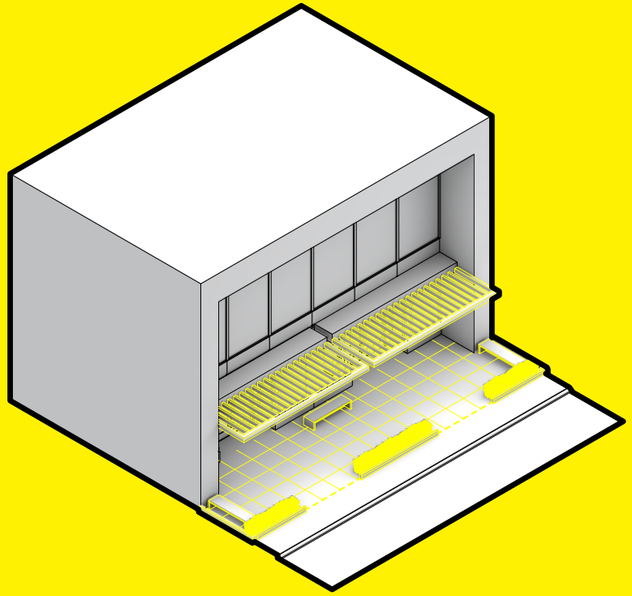
Change in walking surface material from grass to pentagonal concrete paving stones, timber decking and red stones marks the area of influence of the residents.

Short run of steps and protected narrower corridors mark the private entrances of the houses.



Create Transitional zones of Territorial Influence

4



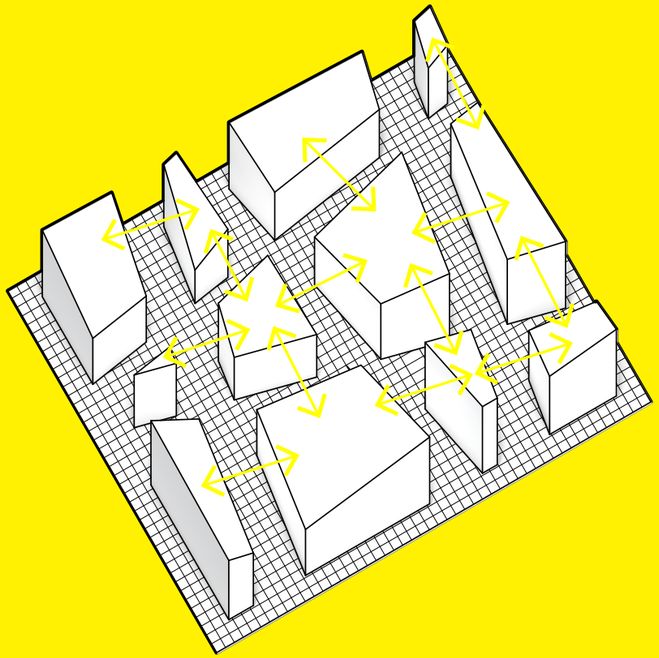
Create a semi-private transitional area

Design for a minimum distance of around 3m between public and private zones.

Add effective landscaping, change of paving material and use canopies to delineate this type of area. Equip this zone with sitting or play equipement for the private use of the users.

Define territory with soft transitions instead of hard boundaries.

Create an Interrelated Whole



Buildings entrances and orientation relate to each other

X

Avoid maximum path connections, over-dimensioned open areas and buildings whose entrances do not relate to each other.

i

The relationship of the buildings and the orientation of the entrances in relation to the pedestrian paths and outdoor public space are a determining factor.

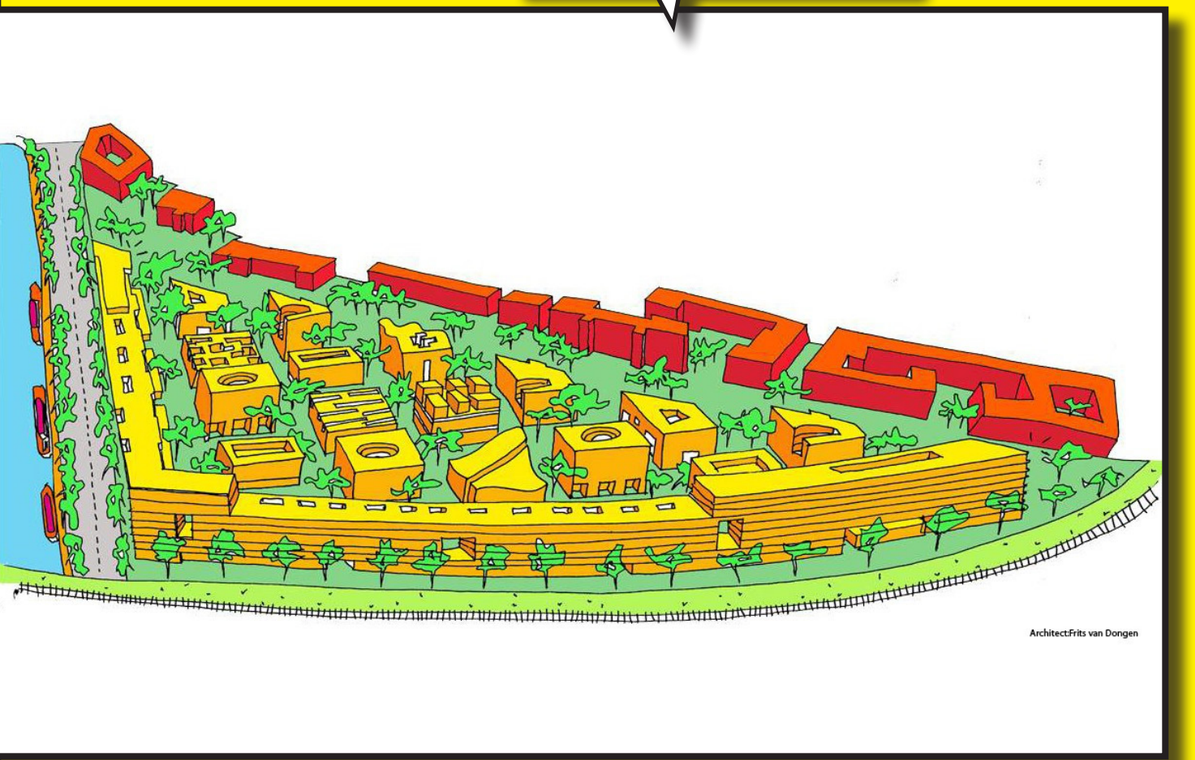
?

Design for compact and short distances and building entrances facing pedestrian routes.

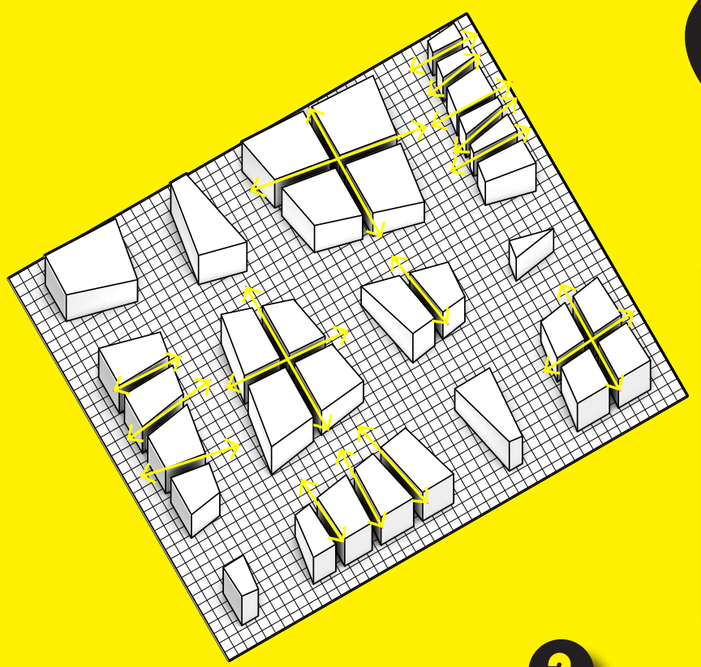
Subdivide Building per project or Units per building

16

The subdivision of buildings in Funenpark is made into 16 distinct apartment blocks.



ArchitectFrits van Dongen



One entrance for a smalle cluster of units

!

The exact number of dwellings in which people can relate with one another depends upon the location, but normally 12 to 15 dwellings in considered the maximum.

i

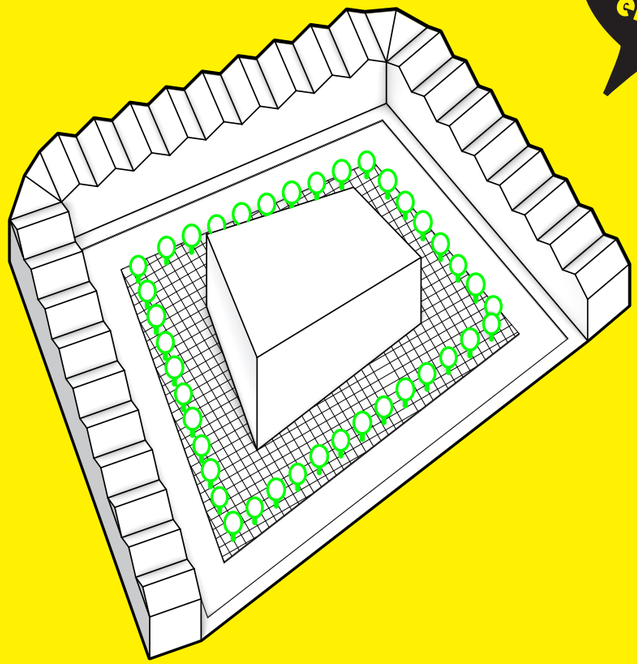
Lower the number of units per building or buildings per project, greater the capacity for people to distinguish members sharing a territory.

?

For the site, subdivide the project into smaller buildings instead of congragate all areas in one big building. For the building itself, subdivide the building into a smaller collection of units and provide different entrances for every group of units.

Eurojust by Mecanoo, The Hague. Vegetation on the perimeter of the building successfully draws the boundaries of the development while keeping outsiders away from the facade line.

Vegetation used to enclose spaces



X

Planting should not impede natural surveillance and should not provide hiding spaces.

!

Open-branched and columnar trees are best for offering surveillance opportunities. Thorny plants keep people away in vulnerable areas.

i

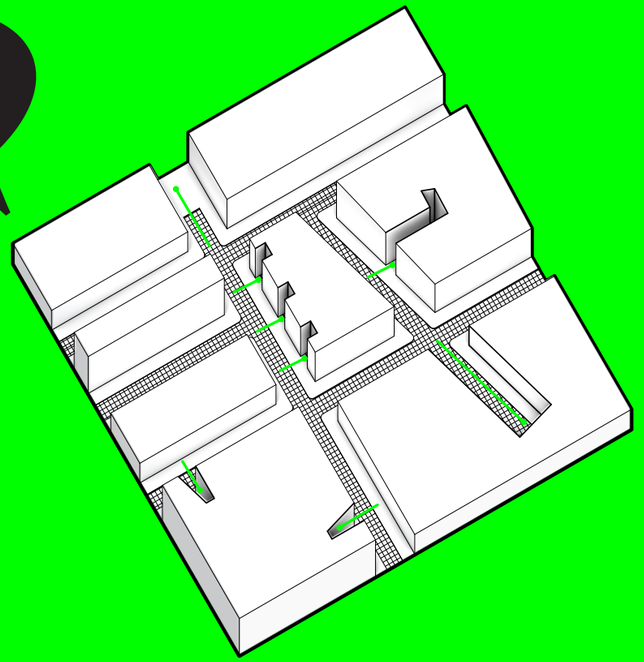
Screen the development from the surrounding area and define the patterns of main roads and footpaths to enhance the image of territorial grounds.

?

In open layouts, use planting to form contained spaces. Within the development, use planting to assist in creating enclosure and spaces of individual character.

limit Entrapment Spots

Minimize the chances of getting trapped



X

Avoid small and confined areas adjacent or near well-travelled routes. Tunnels, bridges, stairways and other similar cnveniences where the end of the path is not visible and might lead to entrapment spots.

?

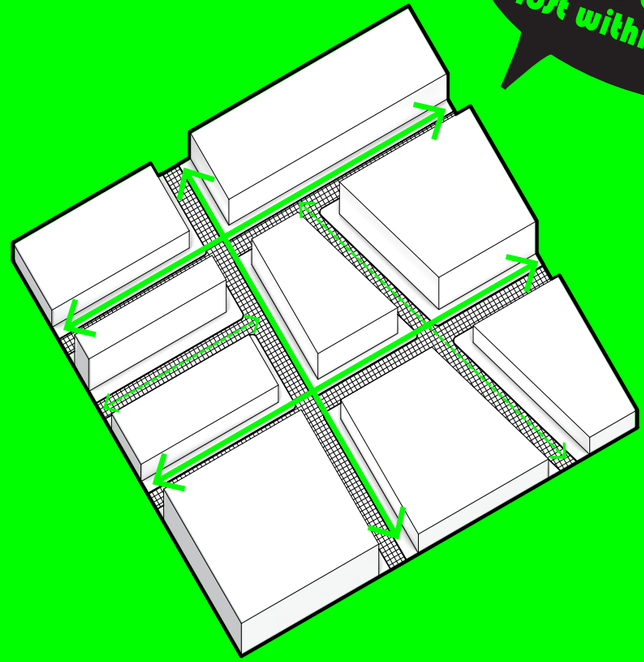
Design a disciplined building line with a limited use of projections and set-backs. For dangerous areas, lock in off hours, well lit and add aids to sightlines such as convex mirrors.

i

Prevent intruders to use spaces as hiding areas.

Create an Organized layout of Footpaths and Cycleways

Minimize the chances of getting lost within a site



X

Avoid long length of footpath in narrow open space. Avoid predictable and unchangable routes that offer no choice to pedestrians and cyclists.

!

Allow clear view along the route (100m max) and provide interest with a series of contrasting spaces.

i

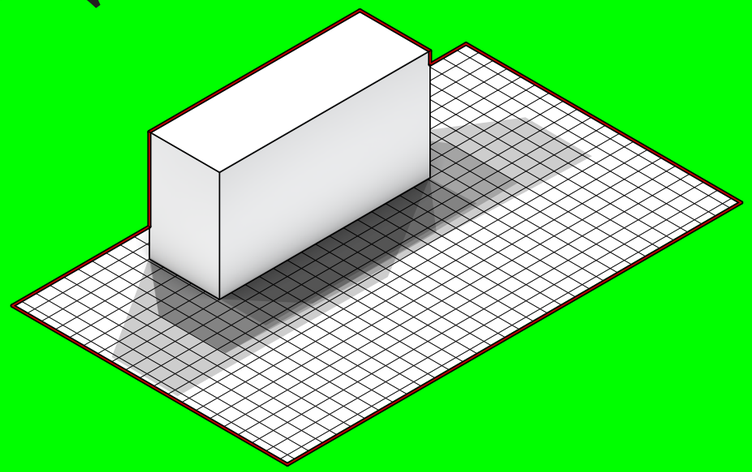
A good logical organizational layout of footpaths and cycleways allows users to easily find the way around and consequently feel safe.

?

Draw a clear hierarchy where decisions have been made about which spaces are the most important. Routes should be accessible and direct and lead to safe areas,

Design for Orientation

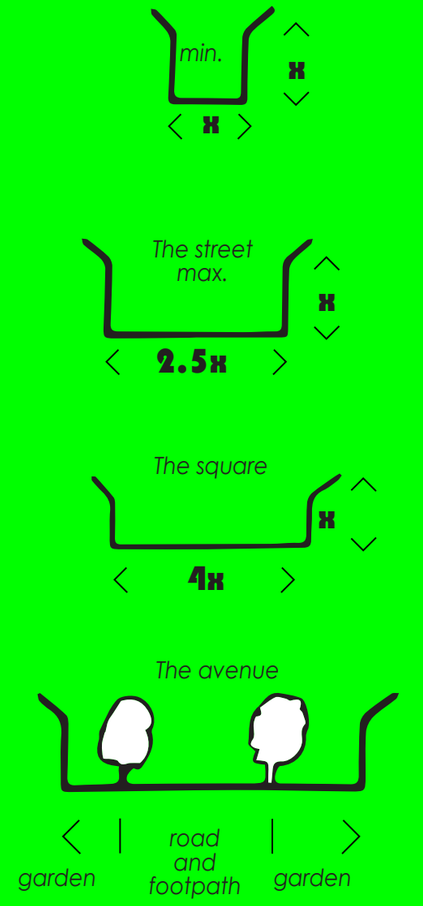
Areas adjecent to the north facade are darker



Placing gardens and gathering areas on the north side can undermine the relationship between the front and the back of the building and reduce natural surveillance.

Consider the height of surrounding buildings and avoid over-shadowing vulnerable spaces.

Create Spaces of Realistic Dimensioning



Ratio between building height and outdoor space

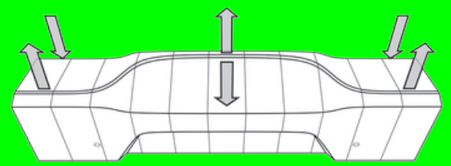
Avoid large spaces that cause a sense of anonymity and provoke vandalism.

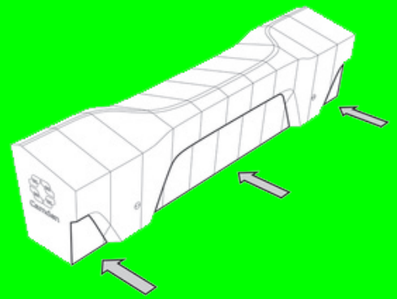
Smaller spaces create a feeling of intimacy, protection and security.

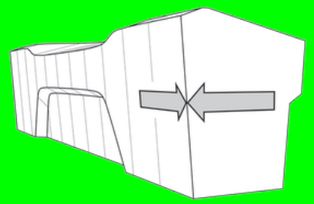
Design smaller, limited spaces, unequivocally belonging to a certain group of buildings. Design for appropriate ratio for a successfull containement of street.

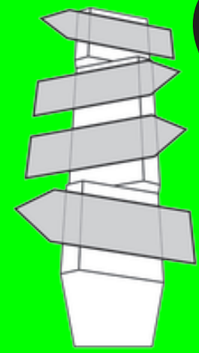
Introduce Hostile Design features if necessary

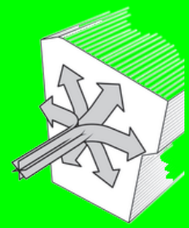
The Camden Bench. It was designed to restrict undesirable behaviour such as sleeping, skating, graffiti and drug-dealing











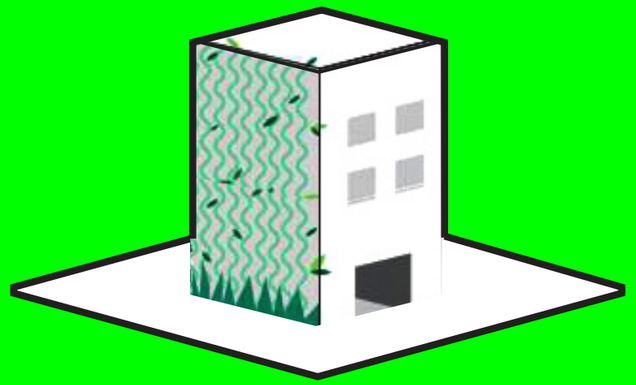
Detail design of street furniture to discourage misuse

Discourage unintended and inappropriate use.

Floor spikes and arm-rest on benches to discourage homeless from sleeping. High-pitched sounds, classical music in shopping malls and pink-lights to repel teenagers. Blue-lights in restrooms to prevent drug use etc.

Design out Vandalism and Graffiti

Protect Vulnerable surfaces with vegeation



i *The presence of vandalism and graffiti results into users fear.*

? *Use appropriate materials and applied surfaces. Conceale components and services. Allow for easy maintenance strategies.*

Provide Sufficient Signage and Information

Use restrictive or actively helpful signs

i *Knowing where you are and which way to turn contributes to a feeling of security.*

? *Locate signs and maps strategically at entrances, near activity notes and crossings. Provide information for all different groups of users. Indicate accordingly when routes are closed after hours.*

Active Ground Level

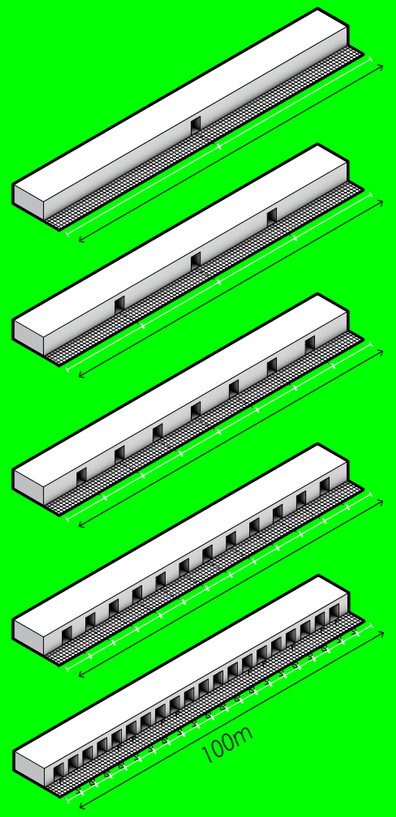
Friendly Ground Level

Mixture Ground Level

Boring Ground Level

Inactive Ground Level

Design for a lively Ground Floor Facade



Create interesting and contrasting eye-level

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Avoid left-over space, entrapment spots and shutters.

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An inviting and lively ground floor frontage is the starting point for holistic city planning that encompasses the vital qualities that make a city safe.

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The ground floor is an exchange zone between building and city. and where inside and outside meet and pedestrians pass by and interact at eye level.

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Our senses need stimulation at fairly short intervals of four to five seconds. Also allow for vertical facade rhythms.

BIBLIOGRAPHY

Armborst, T., D'Oca, D., Theodore, G., & Gold, R. (2017). The arsenal of exclusion & inclusion. New York: Actar.

Conquhoun, I. (2004). Design out crime: Creating safe and sustainable communities. Oxford: Architectural Press.

Crowe, T. D. (2013). Crime Prevention through Envrionmental Design (Third ed.). Oxford: Elsevier.

Crowe, T. D., & Fennelly, L. J. (2014). Crime prevention through environmental design. Amsterdam: Elsevier.

FEMA453. (2006). Safe Rooms and Shelters: Protecting People Against Terrorist Attacks. US Department of Homeland Security.

Fennelly, L. J. (2012). Handbook of loss prevention and crime prevention (Fifth ed.). Waltham: MA: Butterworth-Heinemann.

Fennelly, L. J. (2013). Effective physical security (Fourth ed.). Waltham: MA: Butterworth-Heinemann.

Gehl, J. (2010). Cities for People. Washington: Island Press.

Gehl, J. (2011). Life Between Buildings: Using Public Space. Washington: Island Press.

Gehl, J., & Svarre, B. (2013). How to study public life. Washinghton: Island Press.

Gehl, J., Gemzoe, L., Kirknaes, S., & Sondergaard, B. S. (2006). New City Life. Copenhagen: The Danish Architectural Press.

Graham, S. (2010). Cities Under Siege: The New Military Urbanism. London: Verso.

Jeffrey, R. C. (1971). Crime Prevention through Environmental Design. Beverly Hills, CA: Sage Publications.

Lynch, K. (1960). The image of the city. Massachusetts: The MIT Press.

Newman, O. (1972). Defensible Space: Crime prevention through urban design. New York: MacMillan.

RIBA. (2010). Guidance on designign for counter-terrorism. London: RIBA.

Simpson, D., Jensen, V., & Rubing, A. (. (2017). The city between freedom and security: Contested public spaces in the 21st century. Basel: Birkhäuser.

Wekerle, G. R., & Whitzman, C. (1995). Safe Cities:: Guidelins for planning, design and management. New York: Van Nostrand Reinhold.

Whyte, W. H. (1980). The social life of small urban spaces. Washington: The Conservation Foundation.