

Section 7

Crime Prevention Through Environmental Design

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1. Description

Crime Prevention Through Environmental Design (CPTED) is defined as a multi-disciplinary approach to deterring criminal behaviour and nuisance activity through environmental design. CPTED strategies rely upon the ability to influence decisions that precede criminal acts and nuisance activity through proper design, effective use and maintenance of the built, social and administrative environment. Realizing that there is a direct relationship between the physical environment, behaviour of people, productive use of space and crime/loss prevention, BC Housing has the following CPTED principles:

- .1 Territoriality
- .2 Natural Surveillance
- .3 Access Control
- .4 Activity Support
- .5 Maintenance

CPTED based strategies emphasize enhancing the perceived risk of detection and apprehension. Research into criminal behaviour indicates that the decision to offend or not to offend is more influenced by cues to the perceived risk of being caught than by cues to reward or ease of entry. Behaviour effects can be accomplished by reducing the propensity of the physical environment to support criminal behaviours.

2. CPTED Principles

Crime Prevention through Environmental Design (CPTED) is supported by the following five overlapping principles that are applied to specific sites and situations.

2.1 Territoriality

Territoriality is a design concept that clearly delineates private space from semi-public and public spaces and also creates a sense of ownership. Ownership thereby creates an environment where appearances of such strangers and intruders stand out and are more easily identified through:

- .1 The enhanced feeling of legitimate ownership by reinforcing existing natural surveillance and natural access control strategies with additional symbolic or social ones
- .2 The design of space to allow for its continued use and intended purpose
- .3 The use of pavement treatments, signage, landscaping, art, signage, screening and fences to define and outline ownership of space

2.2 **Natural Surveillance**

Natural surveillance is a design concept directed primarily at observing intruders. Provision of natural surveillance helps to create environments where there is sufficient opportunity for people engaged in their normal activities to observe the space around them. Areas can be designed so they are more easily observed through:

- .1 Design and placement of physical features to maximize visibility. This may include: building orientation, windows, entrances and exits, parking lots, refuse and recycling containers, walkways, guard gates, landscaping, trees and shrubs, use of wrought iron fences or walls, signage and other physical obstructions.
- .2 Placement of persons or activities to maximize surveillance possibilities.
- .3 Provision of minimum maintained lighting standards for nighttime illumination of parking lots, walkways, entrances, exits, and related areas to promote a safe environment.

2.3 **Access Control**

Access control is a design concept directed primarily at decreasing criminal accessibility. Provision of natural access control limits the number of entry points to the property and building. Intruders are discouraged or denied entry through:

- .1 The use of sidewalks, pavement, gates, lighting, way-finding signage, and landscaping to clearly guide the public to and from entrances and exits.
- .2 The use of gates, fences, walls, landscaping and lighting to prevent or discourage public access to or from dark or unmonitored areas.
- .3 The use of locks, non-removable pin hinges and other target hardening measures.

2.4 **Activity Support**

Activity support is the presence of activity planned for the space, and involves placing activity where the individuals engaged in an activity will become part of the natural surveillance system.

- .1 Place safe activities in areas that will discourage would be offenders, to increase the natural surveillance of these activities and the perception of safety for normal users, and the perception of risk for offenders. Examples include a seating area facing out the window from the inside of the lobby.
- .2 Place high-risk activities in safer locations to overcome the vulnerability of these activities by using natural surveillance and access control of the safe area. Examples include a playground located inside the fenced/enclosed courtyard of a building, or a recreation room with many windows along the main lobby of the building.

- .3 Locate gathering areas to provide for natural surveillance and access control or in locations away from the view of would-be offenders.

2.5 **Maintenance**

Provide a standard of maintenance document that describes proper maintenance of the property, fixtures, buildings, and other features required to support the principles of CPTED. Functions include:

- .1 Locating lighting in such a way that bulbs can be easily replaced and shrubs and vegetation do not obstruct light from intended target areas.
- .2 Landscaping which is maintained at prescribed standards so that the placement and growth of shrubs and vegetation does not interfere with sight lines or light sources.

3. **CPTED Definitions**

3.1 **Access Control**

- .1 The security of the property is enhanced by discouraging casual intrusion by non-residents, and public access should be restricted. Access control systems should be designed around a combination of systems which may include a concierge, digital access control (DAC) and door intercom system.
- .2 There should be no paths which could be used to gain unobserved access.
- .3 Easily found address and directional signage should be provided to deter unauthorized access and to assist emergency services, trades persons, etc.

3.2 **Balconies**

Enclosures to balconies at all levels should be designed to exclude handholds and to eliminate the opportunity for climbing up, down or across between balconies.

3.3 **Car Parking**

- .1 Individual car parking arrangements are preferred but where communal car parking areas are necessary, they should be in small groups, close and adjacent to the suites which they serve, and open to view of the residents from frequently occupied rooms.
- .2 Garages should be located to maximize opportunities for natural surveillance.
- .3 Underground parking should include well lit walls, posts, ceilings, and way-finding signage which can be achieved through lighting, paint, white concrete stain, window placement, or a combination thereof. Entrances to garages should be designed to be within the boundaries of the secured area. In certain conditions additional security features such as cameras may be required for parking.

- .4 Pavement treatment and maintenance in parking areas, such as painted curbs, parking symbols and lines, help to define the transition from public to semi-private space and create a sense of ownership and territoriality.

3.4 **Communal Facilities**

Communal facilities on the ground floor, such as residents' communal lounges and common laundry rooms are best located to give natural surveillance of entrances, entrance lobbies and external areas. Bin storage and chutes, service ducts and panels, pipes and door entrance canopies should be designed to eliminate the opportunity for unauthorized access and climbing. Secure bicycle storage for residents and visitors should be considered.

3.5 **Concierge / Building Manager Offices**

Where a concierge service is provided, entrances and fire exits should be audibly alarmed to the concierge control centre. Where provided, building managers offices should be located adjacent to main entrances, and directly accessible to the concierge control centre, if applicable. Building manager offices should include two room areas, one within view of the outside area adjacent to the office and one that is not within view.

3.6 **Crime Generators**

A crime generator is a location whose most likely frequented participants create a higher than average probability of illegal or inappropriate activity. Consideration should be given to locating potential crime generators within areas that have been secured from public access and where they are not likely to allow the escalation of problematic activities.

3.7 **Digital Access Control (DAC) and Closed Circuit Television (CCTV)**

Main entrances to multi-tenanted buildings should be fitted with a digital access control system. This may be DAC entry system, a door entry phone system and electrical lock release or a combination of these. Where a DAC entrance system, concierge and CCTV system is provided, consideration should be given to extending these systems to cover the internal circulation areas, for example DAC entry/door entry systems may be provided on landings and accessing elevator floors.

3.8 **Displacement Issues**

CPTED solutions should be designed to eliminate the problem versus relocating or displacing problems to other areas of the neighborhood or property.

3.9 **Edge Effects**

Buildings and structures should be constructed in a fashion that avoids the actual or perceived “un-used” areas that become partially or fully hidden from view. Windows or spandrel glass (appearing like real windows) should be installed in areas where an end wall may have little or no natural surveillance over a space

where socialization may occur. The property layout should provide each block with a clearly defined defensible space, and fencing where appropriate.

3.10 **Entrapment Spots and Movement Predictors**

Entrapment spots and movement predictors should be eliminated where possible. When options to eliminate entrapment areas or movement predictors do not exist, they should be located in areas of high visibility, including formal surveillance, and/or should include means of emergency communication.

3.11 **Exterior Entrances**

The entrances to a building should be preceded by elements such as fences, shrubs, and/or pathway treatments that identify a transition from public to semi-private space. Often they form the first physical barrier to access for outsiders. Where possible, a single point of entry should be provided, and all other access points required for fire egress safety should be restricted to exit only. Resident access should be limited to no more than two locations where possible. Doors should all be well lit, easily visible and not recessed behind site-line obstructions.

3.12 **Formal Surveillance**

A monitored close circuit television (CCTV) system covering the site area, with particular focus on key access points may be required. Consideration should be given to providing residents with the ability to view CCTV images from entrances and other areas that may be considered of risk. All systems must be designed to adhere to the standards of the Privacy Commissioner of BC.

3.13 **Garages**

All doors leading to parking garages should be secured, and minimizing the number of entry doors is recommended. Windows should be provided in garage doors. On carports and single car garages, roofs should be pitched (flat roofs should be avoided), and rainwater leaders etc, should be located so as to avoid providing climbing opportunities.

3.14 **Internal Security**

Communal internal circulation areas, staircases, entrances and elevator lobbies should be brightly decorated and well lit, and a hierarchy of defensible space established. Access staircases should be linked to the minimum number of dwellings. External walkways should be eliminated wherever possible, or the number of dwellings accessed from them limited to the minimum compatible with the physical form of the building and the need for fire safety.

3.15 **Landscaping**

- .1 Landscaping is an important feature of this initiative. Landscaping should not impede natural surveillance and must not create blind spots or potential hiding places for intruders, especially adjacent to footpaths or close to buildings where it may obscure doors and windows.

- .2 Ornamental walls and hedges should not exceed one metre in height. Grass or low ground cover planting only should be used within 2 metres of either side of a footpath. The location and species of trees should not allow them to obscure lighting or CCTV, or become climbing aids. Take into account the maintenance needs to ensure continued compliance as plants grow. The correct use of certain species of plants can help prevent graffiti and loitering, and in addition to fencing may be used to define/reinforce boundaries. Landscaping such as berberis, low-height fencing, bio-swales, or similar products should be utilized to achieve this purpose. Private and semi-private yard spaces should have clearly defined boundaries.

3.16 **Lighting, Illumination and Colour/Image Rendering**

- .1 Appropriate lighting should be carefully designed to cover potential high risk areas.
- .2 Uniform and consistent levels of lighting should support all areas of natural and CCTV surveillance in order to deter intruders and reduce the fear of crime. Light sources should provide for accurate colour rendering, and light levels should place greater emphasis on the consistency of light versus the brightness level. The following areas must be lit: main site access, garages, car parking areas, all footpaths and associated doorways and accesses to the main building, refuse storage, secluded areas and similar locations around the site that are intended for use at night.
- .3 All exterior lighting for:
 - .a Primary areas (building exterior, primary entrances, primary walkways, etc) should be automatically controlled by photo-electric cell activator.
 - .b Secondary areas (alternate egress routes, landscaped walkways, areas of risk, etc) should be automatically controlled by motion sensor. Light fixtures, fittings and service wiring should be vandal resistant and located to minimize vulnerability to vandalism.

3.17 **Line of Sight**

All public and semi-private areas should maintain an unobstructed view from areas that are frequently and regularly occupied.

3.18 **Movement Predictors**

Any design feature that funnels or channels people along a route that contains few or no exits prior to the destination is a movement predictor. These should be avoided. (See entrapment spots)

3.19 **Natural Surveillance**

Optimum natural surveillance should be incorporated, whereby residents can see and be seen. Recesses, blind corners and hiding places should be eliminated wherever possible. The use of mirrors can assist in this measure. Additional measures should include:

- .1 An unobstructed view from dwellings of the site, its external spaces and neighbouring homes to include external paths, roadways, common areas, yards, landscaping, garages, entrance/exit doors and parking areas.
- .2 The avoidance /elimination of recesses, blind corners, and hiding places.
- .3 Windows placed in doors to stairways, laundry rooms, common hallways, recreation rooms, and other areas requiring visibility to improve safety.

3.20 **Pathway/Walkway Principles**

- .1 Superfluous and unduly secluded access points and routes should be avoided. Access points to the rear of buildings should be controlled, for example by means of lockable gates. Roads to groups of buildings should be designed to create a sense of identity, privacy and shared ownership amongst occupants. Foot and bicycle paths should be of generous width and have a suitable landscape setting to avoid creating narrow corridors which could be perceived as threatening. In terms of security, the design of the footpath is of equal importance to the design of the building. Where possible, the footpath route should be at least 3-4 metres wide, which includes a verge on either side of the 2 metre wide walkway.
- .2 Any shrub/planting should start at the back of the verges. The position of planting and choice of species should be such that hiding places are not created. Thorny species of shrub can help to deter intruders. Good visibility should be maintained from either end, and along the route of foot and bicycle paths. Sharp changes in direction should be avoided.
- .3 Foot and bicycle paths should not generally be routed to the rear of buildings, but if this is unavoidable a substantial buffer should be planted between a secure boundary fence and the footpath's margins, with planting designed so as to discourage intruders.
- .4 Where developments adjoin waterways, rivers with foot/bicycle path access, parks or similar public spaces, the buildings should 'face both ways', i.e. overlook the watercourse as well as the street. Foot/bicycle paths should be lit in built-up areas, except where the route is passing through woodland or an ecologically sensitive area, in which case an alternative lit route should be made available, such as a footway alongside a road.

3.21 **Pavement Treatments**

Pavement treatments can provide a means of territoriality and help to define/demark transitions between public, semi-private and private space.

Changes in pavement treatments, such as moving from concrete to stone walkways, help to define boundaries.

3.22 Physical Security and Fire/Egress Regulations

In multi-tenant buildings, particular care needs to be taken to ensure that the security measures do not conflict with fire regulations with respect to means of escape in case of fire. In all cases, locks must be able to be opened from the inside without the aid of a key, to comply with fire regulations.

3.23 Signage and Way Finding

Address and way finding signage should be located at intersecting pathways, in parkades, and along driveways where the destination building signage cannot easily be seen. Address signage should be large enough to be clearly legible from the street and must have a source of light for viewing in darkness. Signage should be located where it can easily be seen for way finding, but should not be placed where it would interfere with the line of sight for vehicles or pedestrians, or where it would be easily vandalized. Exterior signage located at ground level or where it could be easily vandalized can be protected by planting berberis or similar products in a 1 metre or larger circumference around the base. Intercom displays should not include both the suite number and name of occupants, rather, the name and an entry code number, unrelated to the suite number, should be used.

3.24 Street Lighting

Consideration should be given to ensure that lighting meets with these same standards on the building walkways along the street.

3.25 Street Presence

This is the perception of the property that is created at the boundary of the property where it borders the municipal street in terms of the CPTED principles.

3.26 Target Hardening

Entrance and exit doors, including their frames, hinges and locks should be of robust, vandal-resistant material. Vandal resistant viewing panels should be fitted into doors. Entrances should be well lit internally and externally. External opening swing doors should be fitted with non-removal hinge pins, full length astragals and vandal-resistant locking devices. Doors, frames, equipment and finishes in circulation areas, including elevators, should be designed to be vandal resistant. Lock boxes should be securely flush mounted rather than a protruding surface mount.

3.27 Territoriality

This relates directly to the concept of ownership and the building design should lend itself to allowing the building owner and it's occupants to portray/express a sense of ownership by defining the transitions from public to semi-private and then private space.

3.28 Traffic Calming

These devices and measures are used to control the volume and/or speed of traffic at the posted/required area. Examples can include speed bumps, traffic circles/roundabouts, bollards, and narrow lanes.

3.29 Vulnerabilities

Identification of one or more weaknesses in the design and/or operation of the property as it relates to the prevention of crime or nuisance behaviours.

3.30 Windows

- .1 Ground floor windows and those easily accessible above the ground floor must have a multipoint locking system to lock the window from being opened from the outside. Windows should be located on all sides of the building to provide full visibility of the property.
- .2 Where necessary, opening restrictors or similar built-in mechanisms should be utilized. Where windows are required under the building code to act as an egress, the opening window must not have key operated lock. These egress windows must not be restricted in any way to prevent emergency exit from building. Instead of bars, consider all other alternatives such as laminated glass.

CPTED Performance Standard Checklist			
Principle / Definition	Design Intent	Evaluation Standard	Comments
Building Identification	<i>Ensure buildings are clearly identified by street number to prevent unintended access and to assist persons trying to find the building.</i>	Street numbers should be plainly visible and legible from the street or road fronting the property.	
		In residential uses, each individual unit should be clearly numbered. In multiple building complexes, each building entry should clearly state the unit numbers accessed from that entry. In addition, directional signage to unit numbers should be provided on each level or floor.	
		Street numbers should be made of durable materials, preferably reflective or luminous, and unobstructed (e.g. by foliage).	
		For larger projects, provide location maps (fixed plaque format) and directional signage at public entry points and along internal public routes of travel.	
Common/ Open Space Areas and Public On-Site Open Space	<i>Provide natural surveillance for common/open space areas</i>	Position active occupancies or occupied rooms with windows adjacent to main common/open space areas, e.g. playgrounds, swimming pools, etc., and public on-site open space.	
		Design and locate dumpster enclosures in a manner which screens refuse containers, minimizes opportunities to hide, and provides direct vehicle access for the removal and replacement of the bin.	
		Locate waiting areas and external entries to elevators/stairwells close to areas of active occupancies to make them visible from the building entry.	
		Foot and bicycle paths should be of generous width and have a suitable landscape setting to avoid creating narrow corridors which could be perceived as threatening.	
		Locate seating in areas of active uses.	
Exterior Entrances	<i>Provide entries that are clearly visible</i>	Design entrances to allow users to see into them before entering.	
		Entrances should be clearly identified	
	<i>Avoid confusion in locating building entrances</i>	Entrances should be easily recognizable through design features and directional signage.	
		Minimize the number of entry points.	

CPTED Performance Standard Checklist			
Principle / Definition	Design Intent	Evaluation Standard	Comments
Fencing	<i>Fence design should maximize natural surveillance from the street to the building and from the building to the street, and minimize opportunities for intruders to hide</i>	Front fences should be predominantly open in design, e.g. pickets or wrought iron, or solid fencing no higher than 1.2 meters.	
		Design other high solid fences in a manner that incorporates open elements such as lattice to allow visibility above the height of 1.5 meters.	
		If noise insulation is required, install other devices at the front of the building rather than solid fences higher than 1.5 meters.	
		Other landscape features such as elevation changes or berberis landscaping should be used in conjunction with fences in locations where climbing the fence is likely.	
Landscaping	<i>Avoid landscaping which obstructs natural surveillance and allows intruders to hide</i>	Trees with dense low growth foliage should be spaced or their crown should be raised to avoid a continuous barrier.	
		Use low groundcover, shrubs a maximum of .6 meters in height, or high-canopied trees (clean trimmed to a height of 2.4 meters) around children’s play areas, parking areas, and along pedestrian pathways.	
		Avoid vegetation that conceals the building entrance from the street.	
	<i>Use vegetation as barriers to deter unauthorized access</i>	Consider using berberis plants as an effective barrier in place of or in addition to fencing, and to obstruct access to walls, fences and other structures prone to graffiti.	
	<i>Avoid placement of vegetation or structures that would enable access to a building or to adjacent buildings</i>	Avoid placement of large trees, garages, utility structures, fences, and gutters next to second story windows or balconies that could provide a means of access.	
Lighting - Exterior	<i>Provide exterior lighting that enhances natural surveillance</i>	Prepare a lighting plan in accordance with BC Housing Standards, which addresses project lighting in a comprehensive manner. Select a lighting approach that is consistent with local conditions and eliminates crime.	
		Locate elevated light fixtures (poles, light standards, etc.) in a coordinated manner that provides the desired coverage. The useful ground coverage of an elevated light fixture is roughly twice its height.	
		For areas intended to be used at night, ensure that lighting provides visibility. Where lighting is placed at a lower height, ensure that it is vandal resistant.	
		Ensure inset or modulated spaces on a building facade, access/egress routes, and signage is well lit.	
		In areas used by pedestrians, ensure that light shines on pedestrian pathways and possible entrapment spaces.	

CPTED Performance Standard Checklist			
Principle / Definition	Design Intent	Evaluation Standard	Comments
		Place lighting to take into account vegetation, in its current and mature form, as well as any other element that may have the potential for blocking light.	
		Avoid lighting of areas not intended for nighttime use to avoid giving a false impression of use or safety, or alternatively, use motion activated spot lights in these areas.	
		Provide uniform areas of light versus over-lighting areas which creates significant contrast to areas of darkness.	
		Select and light “safe routes” so that these become the focus of legitimate pedestrian activity after dark.	
		Avoid climbing opportunities by locating light standards and electrical equipment away from walls or low buildings.	
		Use photoelectric rather than time switches for exterior lighting.	
Mix of Uses	<i>In mixed use buildings, increase opportunities for natural surveillance while protecting privacy</i>	Where allowed by code, locate shops and businesses on lower floors and residences on upper floors. In this way, residents can observe the businesses after hours while the residences can be observed by the businesses during business hours.	
		Include food kiosks, restaurants, etc. within parks and parking structures.	
		Access to dwellings or other uses above commercial/retail developments should not be located in secluded areas.	
Natural Surveillance	<i>Avoid blind corners in pathways and parking lots.</i>	All public and semi-private areas should maintain an unobstructed view from areas that are frequently and regularly occupied. Pathways should be direct.	
		Consider the installation of mirrors to allow users to see ahead of them and around corners.	
		Any barriers along pathways should be transparent (see through) including landscaping, fencing etc.	
	<i>Ensure occupants can see and be seen</i>	Windows should be placed in doors or adjacent walls to stairways, laundry rooms, common hallways, recreation rooms, and other areas requiring visibility to improve safety.	
Ownership and Maintenance	<i>Create a “cared for” image</i>	Ensure that landscaping is well maintained to give an impression of ownership, care, and security.	
		The building design should allow the building owner and its occupants to portray/express a sense of ownership by defining the transitions from public to semi-private and then to private space.	
		Use materials which reduce the opportunity for vandalism.	
		Consider using strong, wear resistant laminate, impervious glazed ceramics, treated masonry products, stainless steel materials, anti-graffiti paints, and clear over sprays to reduce opportunities for vandalism. Avoid flat or porous finishes in areas where graffiti is likely.	

CPTED Performance Standard Checklist			
Principle / Definition	Design Intent	Evaluation Standard	Comments
		Where large walls are unavoidable, utilize vegetative screens to prevent vandalism and graffiti.	
		Where exits are closed after hours, ensure this information is indicated at the parking area entrance.	
Security	<i>Reduce opportunities for unauthorized access</i>	Utilize security hardware and/or human measures at each entry point to reduce opportunities for unauthorized access.	
Security Bars, Shutters, and Doors	<i>When used and permitted by building and fire codes, security bars, shutters, and doors should allow observation of the street and be consistent with the architectural style of the building</i>	Security doors should include laminated glass panels to enhance visibility.	
		Security bars should be avoided in favour of alternatives such as security film, laminates, wired glass, alarmed spaces, and barriers to the glassed area such as landscaping, fences, bollards and planters.	
Signage	<i>Ensure that signage is clearly visible, easy to read and simple to understand</i>	Use strong colours, standard symbols, and simple graphics for informational signs.	
		Address and way finding signage should be located at intersecting pathways, in parkades, and along driveways where the destination building signage cannot easily be seen.	
		Upon entering the parking area, provide both pedestrians and drivers with a clear understanding of the direction to stairs, elevators, and exits.	
		In multi-level parking areas, use creative signage/colours to distinguish between floors to enable users to easily locate their cars.	
		Signage should advise users that security measures that are in place, and identify locations such as security phone, panic alarm or intercom system.	
		Where exits are closed after hours, ensure this information is indicated at the parking area entrance.	

CPTED Performance Standard Checklist			
Principle / Definition	Design Intent	Evaluation Standard	Comments
Site and Building Layout	<i>Allow natural observation from the street to the occupancy, from the occupancy to the street, and between occupancies</i>	Orient the main entrance towards the street, or on corners, to both streets.	
		Position occupied rooms with windows at the front of the dwelling.	
		Offset windows, doorways and balconies to allow for natural observation while protecting privacy.	
		Minimize the number of entry points, and locate the main entrances/exits at the front of the property and in view of the street.	
		If employee entrances must be separated from the main entrance, they should maximize opportunities for natural surveillance from the street.	
		Avoid large expanses of parking. Where large expanses of parking are proposed, provide surveillance such as security cameras.	
		In parkades, access to elevators, stairwells and pedestrian pathways should be clearly visible.	
		Avoid hidden recesses.	
		Locate parking areas in locations that can be observed by adjoining occupancies.	
		Open spaces such as parks, plazas, common areas, and playgrounds must be clearly designated and situated at locations that are easily observable by people.	
	<i>Develop a sense of ownership for occupants</i>	Where possible, design multi-unit residential occupancies such that no more than six to eight units share a common building entrance.	
		Common area and/or street furniture shall be made of durable, vandal resistant materials and secured by sturdy anchor points.	
		Communal facilities on the ground floor, such as residents' communal lounges and common laundry rooms, should be located to provide natural surveillance of entrances, entrance lobbies and external areas.	

End of Section