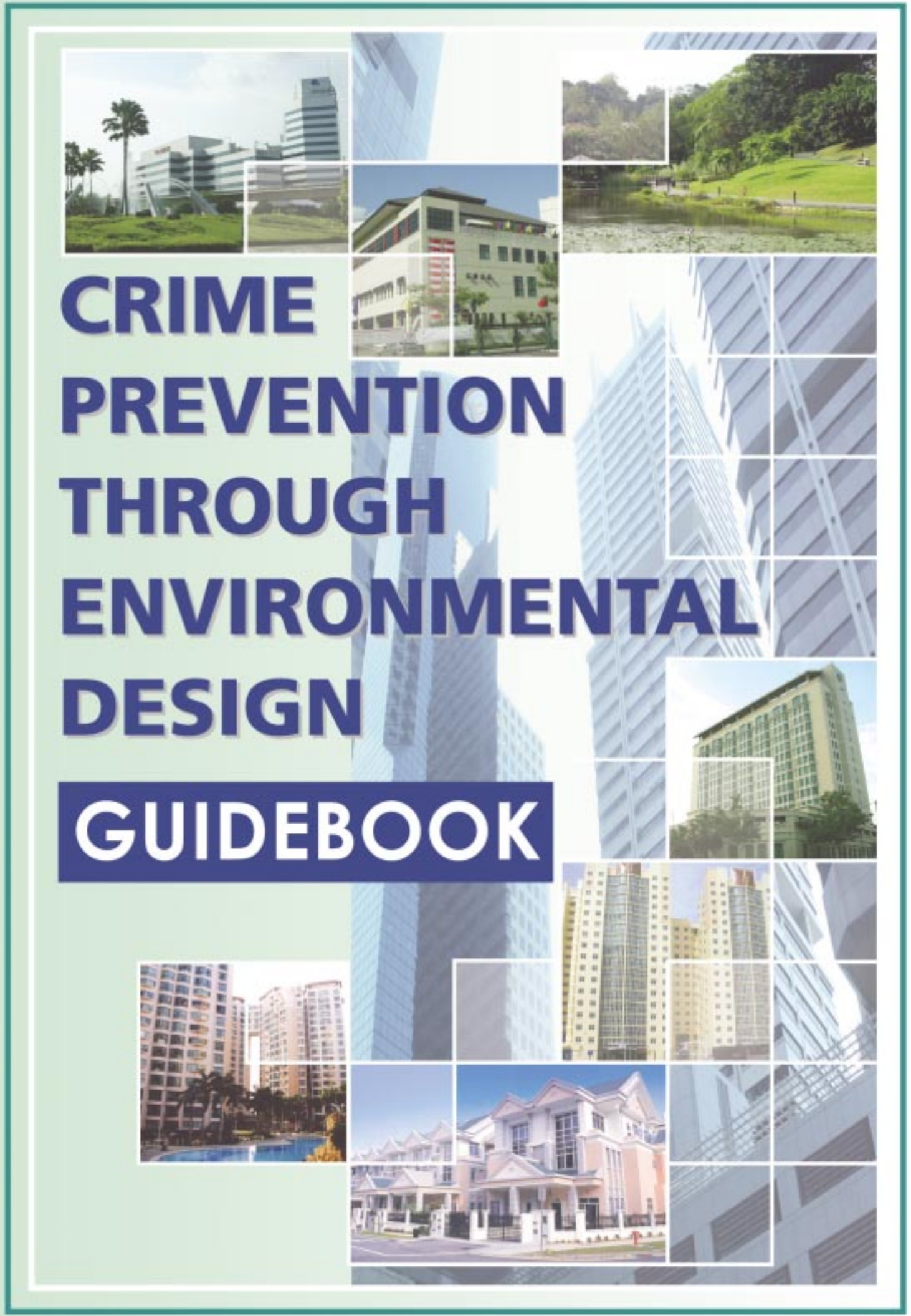




# **CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN GUIDEBOOK**

## VISION

Making Singapore  
***Safe & Secure*** for all.

## MISSION

We work in ***Partnership***  
with the ***Community*** and  
the ***Police*** to ***prevent crime.***



### National Crime Prevention Council

c/o Public Affairs Department, Police Headquarters, Level 4,  
New Phoenix Park Tower P, 28 Irrawaddy Road, Singapore 329560  
Tel: (65) 6252 4101 Fax: (65) 6251 2913  
Website: [www.ncpc.gov.sg](http://www.ncpc.gov.sg) Email: [spf\\_ncpc@spf.gov.sg](mailto:spf_ncpc@spf.gov.sg)

© October 2003

# CONTENTS

|                                                                                           | Page      |
|-------------------------------------------------------------------------------------------|-----------|
| <b>FOREWORD</b> .....                                                                     | <b>ii</b> |
| <b>INTRODUCTION</b> .....                                                                 | <b>1</b>  |
| <b>CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN PRINCIPLES</b> .....                     | <b>3</b>  |
| ❑ Four Principles of CPTED .....                                                          | 3         |
| Natural Surveillance .....                                                                | 4         |
| Natural Access Control .....                                                              | 4         |
| Territorial Reinforcement .....                                                           | 5         |
| Maintenance and Management .....                                                          | 5         |
| ❑ “Three D” Approach .....                                                                | 6         |
| Designation .....                                                                         | 6         |
| Definition .....                                                                          | 6         |
| Design .....                                                                              | 7         |
| <b>BASIC DESIGN AND MANAGEMENT STRATEGIES</b> .....                                       | <b>8</b>  |
| Sight Lines .....                                                                         | 9         |
| Lighting .....                                                                            | 11        |
| Concealed or Isolated Routes .....                                                        | 13        |
| Entrapment Areas .....                                                                    | 15        |
| Isolation .....                                                                           | 17        |
| Land Use Mix .....                                                                        | 19        |
| Activity Generators .....                                                                 | 21        |
| Ownership, Maintenance and Management .....                                               | 23        |
| Signs and Information .....                                                               | 25        |
| Overall Design .....                                                                      | 27        |
| <b>APPENDIX A : CHECKLIST</b> .....                                                       | <b>29</b> |
| <b>APPENDIX B : EXAMPLES OF CPTED STRATEGIES APPLICABLE TO VARIOUS DEVELOPMENTS</b> ..... | <b>34</b> |
| Condominiums and Public Housing .....                                                     | 34        |
| Landed Developments .....                                                                 | 36        |
| Central Business District/ Regional Centres/ Town Centres .....                           | 39        |
| Offices/ Retails/ Hotels .....                                                            | 40        |
| Educational Institutions and Schools .....                                                | 42        |
| Industrial Areas .....                                                                    | 44        |
| <b>APPENDIX C: EXAMPLES OF CPTED STRATEGIES APPLICABLE TO PUBLIC SPACES</b> .....         | <b>47</b> |
| Car Parks .....                                                                           | 47        |
| Parks/ Open Spaces/ Playgrounds .....                                                     | 50        |
| Back Lanes .....                                                                          | 54        |
| Public Washrooms .....                                                                    | 55        |
| Sidewalks/ Walkways .....                                                                 | 56        |
| Underpasses/ Pedestrian Overhead Bridges .....                                            | 57        |
| Bus Shelters/ Taxi Stands/ MRT/ LRT Stations .....                                        | 59        |
| <b>REFERENCES</b> .....                                                                   | <b>61</b> |
| <b>CREDITS</b> .....                                                                      | <b>62</b> |

---

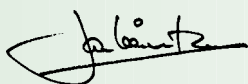
# FOREWORD

---

Since its inception in 1981, the National Crime Prevention Council (NCPC) of Singapore had been actively working towards the objectives, such as, to raise the level of public awareness about crime; to encourage self-help in crime prevention; to examine, develop and recommend crime prevention measures to the public and to coordinate efforts of various organisations in crime prevention.

The NCPC engages the public through the organisation of crime prevention activities such as crime prevention campaigns, exhibitions, seminars and workshops. The NCPC also forges close alliances with various professional, social and trade organisations to tackle the problem of crime. In addition, various sub-committees have been formed to address problems of security in specific areas. They are the Hotel Security Committee, Security in Construction Worksites Committee, Children and Youth Committee, Security in Housing Committee, Security in Commercial Premises Committee and Focus Group Committee.

Working in partnership with the stakeholders in the construction and real estate industry to design out crime is the latest effort by the NCPC in its strive towards making Singapore a safe place. This is achieved through the use of Crime Prevention Through Environmental Design (CPTED) principles when designing buildings, facilities and the surrounding. In view of the emerging trend of extreme crimes, such as terrorism, in the region as well as globally, the adoption of CPTED principles can also be adapted and applied to counter these threats. This CPTED Guidebook will serve as a useful reference for planners, building professionals, security agencies and homeowners to incorporate suitable crime prevention and security measures in their planning and design of their building and infrastructure projects.



Mr Tan Kian Hoon

*Chairman*

*National Crime Prevention Council*



# INTRODUCTION

**C**rime is a social problem in our society that affects thousands of people's lives each year. Serious crimes against persons and properties generate considerable fear within the community. Crimes like theft, break-in, rape and murder are serious threats to the safety of the community. The resulting fear of crime in itself can restrict people's freedom of movement and prevent them from fully participating in the community. In particular, some groups of people are more vulnerable to crime and the fear of crime, for example, older people, women, parents, teenagers, etc.

Many different strategies are needed to combat the complex issues of crime and fear of crime. A whole range of responses involving strategies in design, community action and law enforcement would be required to achieve successfully the objective of crime prevention. In this connection, there is widespread acknowledgement that planners, architects and developers can play an important role in enhancing the safety of our communities as they have a major influence in the design of the built environment.

Traditionally, the community has turned to the police and the judicial system to protect them by deterring criminals and punishing offenders. The general public's indifference towards self-protection arises mainly from the lack of knowledge of the means of protection, and perhaps a perception that somebody else - the government or insurance companies - bears most of the cost of theft and vandalism.

On the other hand, Crime Prevention Through Environmental Design (CPTED) asserts that the community, homeowners, planners, developers and architects can play a greater role in protecting the community and themselves from crime by integrating CPTED principles and concepts into the design and management of the physical environment. In this connection, CPTED may be viewed as a subset of the total set of measures required for effective crime prevention and control.

The purpose of this guidebook is to raise awareness of homeowners, developers, architects, and town planners on the concepts and principles of CPTED. CPTED seeks to enhance the safety of developments and minimise the opportunities for crime to be committed. This guidebook presents information, illustrations and suggestions on how this can be done through the application of CPTED.

Notwithstanding the relevance and usefulness of CPTED, the recommendations in this guidebook may not be compatible with the requirements, standards and codes of various relevant authorities. In such situations, the demands of the authorities will take precedence over the recommendations in this guidebook.

# CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN PRINCIPLES

**T**he basis of Crime Prevention Through Environmental Design (CPTED) is that proper design and effective use of the built environment can reduce the incidence and fear of crime. This in turn leads to improvements in the quality of life.

In contrast to the approach of addressing crime concerns by implementing visually affronting security or target hardening measures such as locks, hard barriers, security gates, security patrols, etc., CPTED promotes high quality and visually pleasing solutions as first responses that aim to enhance the legitimate use of space.

CPTED can be applied without interfering with the normal use of the space. It is easy to apply and can be economical to implement, especially if it is done early at the planning and design stages of a project.

## THE FOUR PRINCIPLES OF CPTED ARE:

- ☐ Natural surveillance
- ☐ Natural access control
- ☐ Territorial reinforcement
- ☐ Maintenance and management

There are strong overlaps and synergies among the four CPTED principles. These have been identified separately for convenience and clarity of understanding. In practice, it may be useful to see all four principles as different facets of a single technique for dealing with the security of the physical environment. In respect to the first two principles, the term 'natural' refers to deriving surveillance and access control results as a by-product of normal and routine use of the environment.

### **NATURAL SURVEILLANCE**

The fundamental premise is that criminals do not wish to be observed. Surveillance or the placing of legitimate 'eyes on the street' increases the perceived risk to offenders. This may also increase the actual risk to offenders if those observing are willing to act when potentially threatening situations develop. So the primary aim of surveillance is not to keep intruders out (although it may have that effect) but rather, to keep intruders under observation.

Natural surveillance can be achieved by a number of techniques. The flow of activities can be channelled to put more people (observers) near a potential crime area. Windows, lighting and the removal of obstructions can be placed to improve sight lines from within buildings.

### **NATURAL ACCESS CONTROL**

Natural access control relies on doors, fences, shrubs, and other physical elements to keep unauthorised persons out of a particular place if they do not have a legitimate reason for being there. In its most elementary form, access control can be achieved in individual dwellings or commercial establishments by the use of adequate locks, doors and window barriers.

However, when one moves beyond private property to public or semi-public spaces, the application of access control needs more care. Properly located entrances, exits, fencing, landscaping and lighting can subtly direct both foot and vehicular traffic in ways that decreases criminal opportunities. Access control can be as simple as locating a front office to a warehouse.

While access control is more difficult on streets and areas that are entirely open to public use, there are other techniques for controlling access in these circumstances. For example, non-physical or 'psychological' barriers can be used to achieve the objective of access control. These barriers may appear in the form of signs, paving textures, nature strips or anything that announces the integrity and uniqueness of an area. The idea behind a psychological barrier is that if a target seems strange, or difficult, it may also be unattractive to potential criminals.

Because any strategy that fosters access control is also likely to impede movement, careful consideration should be given to access control strategies. Such strategies may limit the opportunity for crimes, but should not hinder the mobility of potential victims.



### **TERRITORIAL REINFORCEMENT**

People naturally protect a territory that they feel is their own, and have a certain respect for the territory of others. Clear boundaries between public and private areas achieved by using physical elements such as fences, pavement treatment, art, signs, good maintenance and landscaping are ways to express ownership. Identifying intruders is much easier in such well-defined spaces.

Territorial reinforcement can be seen to work when a space, by its clear legibility, transparency, and directness, discourages potential offenders because of users' familiarity with each other and the surroundings.

### **MAINTENANCE AND MANAGEMENT**

This is related to the neighbourhood's sense of 'pride of place' and territorial reinforcement. The more dilapidated an area, the more likely it is to attract unwanted activities. The maintenance and the 'image' of an area can have a major impact on whether it will become targeted.

Another extension of the concept is that territorial concern, social cohesion and a general sense of security can be reinforced through the development of the identity and image of a community. This approach can improve not only the image of the population has of itself, and its domain, but also the projection of that image to others.

With clear spatial definitions such as the subdivision of space into different degrees of public/ semi-public/ private areas and the raising of standards and expectations, the level of social estrangement would decline. This is known to be related to reduction in opportunities for aberrant or criminal behaviour, such as vandalism.

Maintenance and management need to be considered at the design stage, as the selection of materials and finishes will impact on the types of maintenance regimes that can be sustained over time. For example, plant material should be selected for its size at maturity to avoid blocking of sight lines.

## THE “THREE D” APPROACH

CPTED involves the design of the physical space in the context of the normal and expected use of that space by the users as well as the predictable behaviour of people around the space. CPTED emphasises the connection between the functional objectives of space utilisation and behaviour management. Conceptually, the four CPTED principles are applied through the 3-D approach, i.e. **Designation**, **Definition** and **Design**. The 3-D approach is a simple space assessment guide that helps the user in determining the appropriateness of how a space is designed and used. The 3-D concept is based on the three functions or dimensions of human space:

- ☐ All human space has some designated purpose.
- ☐ All human space has social, cultural, legal or physical definitions that prescribe desired and acceptable behaviours.
- ☐ All human space is designed to support and control the desired behaviours.

By using the “Three D's” as a guide, space may be evaluated by asking the following questions:

### 1. DESIGNATION

- What is the designated purpose of this space?
- For what purpose was it originally intended?
- How well does the space support its current use or its intended use?
- Is there a conflict?

### 2. DEFINITION

- How is space defined?
- Is it clear who owns it?
- Where are its borders?
- Are there social or cultural definitions that affect how space is used?
- Are legal or administrative rules clearly set out and reinforced in policy?
- Are there signs?
- Is there conflict or confusion between purpose and definition?

For example, in a given space, certain behaviour or activities may be socially or culturally discouraged while others may be clearly prohibited by display of written instructions or rules. On the other hand, what is not acceptable in a certain space may be acceptable in others.

### **3. DESIGN**

- How well does the physical design support the intended function?
- How well does the physical design support the desired or accepted behaviours?
- Does the physical design conflict with or impede the productive use of the space or the proper functioning of the intended human activity?
- Is there confusion or conflict in the manner in which physical design is intended to control behaviour?

Consideration of these questions may reveal areas that requires changes or improvements. For example, a space may need to have a designated purpose, it may need to be more clearly defined, or it has to be better designed to support the intended function. Once these questions have been considered, the information received may be used as a means of guiding decisions about the design or modification of the space so that the objectives of space utilization as well as natural surveillance, natural access control, territorial reinforcement and maintenance and management can be better achieved.

# BASIC DESIGN AND MANAGEMENT STRATEGIES

**T**he four CPTED principles can be translated into various planning and design strategies that would enhance security. These strategies can be categorised as follows:

1. allow for clear sight lines,
2. provide adequate lighting,
3. minimise concealed and isolated routes,
4. avoid entrapment,
5. reduce isolation,
6. promote land use mix,
7. use of activity generators,
8. create a sense of ownership through maintenance and management,
9. provide signs and information and
10. improve overall design of the built environment.

The decision of which strategy or combination of strategies to apply will depend on the site condition, the functional requirements and the desired programming of the space, as well as the design intent. These strategies are summarised in the checklist in Appendix A. Further examples of CPTED strategies that can be applied to various developments and public spaces are listed in Appendices B and C respectively.

## SIGHT LINES

Sight line is defined as the desired line of vision in terms of both breadth and depth. The inability to see what is ahead along a route due to sharp corners, walls, earth berms, fences, bushes or pillars can be serious impediments to the feeling of being safe. Large columns, tall fences, overgrown shrubbery and other barriers blocking sight lines adjacent to pedestrian paths could shield an attacker. Alternatively, low hedges or planters, small trees, wrought iron or chain-link fences, transparent reinforced glass, lawn or flower beds, benches allow users to see and be seen and usually discourage crime and vandalism.



*Residential apartments with windows overlooking carpark and park allow for clear sight lines*

### 1. DESIGN VISIBILITY

Design visibility in the built environment means allowing for clear sight lines and avoiding isolated or hidden spaces. Recessed doorways can result in corners that are hidden from casual surveillance. Sharp “blind” corners create the same problem, especially on stairs or corridors where there may be no alternative routes of escape. Sudden changes of grade on walkways can also create “blind spots”. Certain improvements can be made. For example, columns and walls can be tucked into the built design as protrusions can hinder visibility. Visibility can also be improved through modification such as creation of windows and other openings in otherwise blank walls

and removal of protrusions along walls. Improving visibility through such modifications will permit natural surveillance. Similarly, the location and design of fences, shrubbery and berms must also be carefully studied when design visibility is essential. In blind spots where no modification to the building is possible, the use of security mirrors or other security devices such as video cameras would be necessary even though these are not optimal solutions.

## **2. PROBLEMATIC SPACES**

Visibility should especially be taken into account when designing or planning spaces where risk to personal safety is perceived to be high, such as stairwells in multi-storey car parks, underpasses and lobby entrances to high-rise buildings.

## **3. FUTURE SIGHT LINE IMPEDIMENTS**

As the landscape matures over time, unintended screens, barriers or hiding places could be created. Therefore, planting in a landscape must take into consideration the growth, final height and habit of the plants. Plantings are best made with due consideration to the resources to be committed to their maintenance so as to ensure that the original sight lines designed do not get obscured over time.



## LIGHTING

Sufficient lighting is necessary for people to see and be seen. From a security point of view, lighting that is strategically placed can have a substantial impact on reducing the fear of crime. A basic level of lighting should allow the identification of a face from a distance of about 10 metres for a person with normal vision.



*Exterior lighting for night time use should provide adequate visibility*

### 1. MINIMUM STANDARDS

If the area is intended for night time use, lighting should provide adequate visibility. Pedestrian walkways, back lanes and access routes open to public spaces should be lit so that a person with normal vision is able to identify a face from a distance of about 10 metres. Inset spaces, signs, entrances and exits should be adequately lit. On the other hand, lighting of different wattage, colour temperature and rendition may also be used to make certain public areas “less hospitable” to gathering for long periods.

### 2. PATHS NOT INTENDED FOR NIGHT TIME USE

Lighting is not desirable in an isolated area or for a path leading to some obscure places. Lighting such areas may provide a false sense of confidence for people during night

time use. The paths or spaces not intended for night time use could be fenced off and remained unlit to avoid giving a false sense of security or impression of being used.

### **3. CONSISTENCY OF LIGHTING**

Lighting should be uniformly spread to reduce contrast between shadows and illuminated areas. More fixtures with lower wattage rather than fewer fixtures with higher wattage help reduce deep shadows and avoid excessive glare.

### **4. DESIGNING FOR NIGHT TIME USE**

Design proposals should take into account the night time use of the outdoor spaces and specify the type, placement and intensity of lighting.

### **5. PROTECTION OF LIGHTING**

Light fixtures should be protected against casual vandalism by means of vandal resistant materials and design.

### **6. PLACEMENT OF LIGHTING**

Lighting should also be directed on roadside pavement and possible entrapment spaces other than on roads. Lighting should take into account vegetation, such as mature trees, and other obstructions that would cause light to be blocked off.

### **7. BUILDING MATERIALS**

Light colour finishes on walls and ceilings should be used for places such as car parks and isolated routes leading to it. This may be preferred to using lights of higher intensity that consume more energy and are costlier to maintain.

### **8. MAINTENANCE**

Lighting requires maintenance to preserve visibility. Bushes and trees that block off light should be trimmed. Lighting fixtures should be located at suitable heights for easy maintenance and replacement. Light fixtures should be maintained in a clean condition and promptly replaced if burnt or broken. Posting information indicating who to call in case of burnout or vandalised lights is desirable.

## CONCEALED OR ISOLATED ROUTES

Concealed or isolated routes are often predictable routes that do not offer alternative for pedestrians. An attacker can predict where pedestrians will end up once they are on the path. Examples are underpasses, pedestrian overhead bridges, escalators and staircases. Predictable routes are of particular concern when they are isolated or when they terminate in entrapment areas.



*See through fencing covering a predictable route provides visibility*

### 1. VISIBILITY OF CONCEALED OR ISOLATED ROUTES

If there is a need for the concealed or isolated route, it should be designed to incorporate visibility. If there is an existing concealed or isolated route and security is in question, it should be modified or eliminated. Concealed or isolated routes can be made safer by bringing in more activities, ensuring clear sight lines, improving lighting, installing emergency telephones and electronic surveillance devices.

### 2. LOCATION OF CONCEALED OR ISOLATED ROUTES NEAR ENTRAPMENT AREAS

If there is an entrapment area or isolated area within 50 to 100 metres of the end of a concealed or isolated route, it should be modified or eliminated. An entrapment area located near a concealed or isolated route such as a tunnel or an isolated path provides the attacker with an opportunity to take a victim to a nearby entrapment area where a more serious crime could be committed.

**3. NATURAL SURVEILLANCE**

Natural surveillance of a concealed or isolated route should be encouraged. A stair or a ramp may be located such that it has external glazed/ open areas and has a view from the surrounding properties.

**4. SIGHT LINES**

If a pedestrian cannot see what is on or at the end of a concealed or predictable route, the visibility should be improved by lighting and/ or the use of a reflective surface such as mirror.

**5. LIGHTING**

Concealed or isolated routes should be adequately and uniformly lit. Lighting should be vandal proof and properly located. Light coloured walls and ceiling materials help to reflect light and can enhance the brightness of an area. Natural lighting is preferred and should be encouraged.

**6. SURVEILLANCE THROUGH HARDWARE**

If a concealed or isolated route is enclosed and prone to crime e.g. passageway or stairwell, surveillance through security hardware should be considered and these hardware should be properly monitored.

**7. ACCESS TO HELP**

Emergency telephones, intercoms, security alarms should be installed to concealed or isolated routes to allow users to summon help in emergency.

**8. ALTERNATIVE ROUTE SIGN**

Signs should be placed at the entrance to indicate alternative well-lit and/ or frequently travelled routes. Certain pedestrian walkways, in the city for example, may be preferable during day time hours only. As such, an alternate route should be indicated for evenings and weekends at the entrance.

## ENTRAPMENT AREAS

Entrapment areas are small, confined areas near or adjacent to well-travelled routes that are shielded on three sides by some barriers, such as walls or bushes. Examples are lifts, tunnels or bridges, enclosed and isolated stairwells, dark recessed entrances that may be locked at night, gaps in tall vegetation, a vacant site closed from three sides by barriers, narrow deep recessed area for fire escape, grade-separated driveways or loading/ unloading areas off a pedestrian route. Parking lots, petrol kiosks and school buildings isolated by school yards can also become entrapment areas, especially when there is less activity after operating hours.



*An entrapment area can be secured with some form of surveillance*

### 1. ELIMINATION OF ENTRAPMENT AREA

If there is an entrapment area, such as a hidden area below or above ground, a private dead alley, a walled area or a storage area adjacent to a main pedestrian route, it should be eliminated.

### **2. CLOSING OF ENTRAPMENT AREA AFTER OPERATING HOURS**

If elimination of an entrapment area is not possible, it should be locked or closed after operating hours. For instance, a passageway connection to a locked building should be locked as well.

### **3. VISIBILITY**

It is preferable to have natural surveillance. However, if an entrapment area is unavoidable, the area should be well lit with some form of formal surveillance. In the case of lifts, incorporation of glass windows in the design of lift doors would be helpful.

### **4. ESCAPE ROUTE AND HELP**

Design should provide for an opportunity to escape and find help. For example, fenced parking areas can have more than one pedestrian exit points. Deep recessed fire escape could act as an entrapment area despite being lit and thus it should be avoided.

## ISOLATION

Most people feel insecure in isolated areas especially if people judge that signs of distress or yelling will not be seen or heard. People may shy away from isolated areas and in turn such places could be perceived to be even more unsafe. Natural surveillance from adjoining commercial and residential buildings helps mitigate the sense of isolation, as does planning or programming activities for a greater intensity and variety of use. Surveillance by the police and other security personnel to see all places at all times is not practical, nor economical. Some dangerous or isolated areas may need formal surveillance in the form of security hardware, i.e. audio and monitoring systems. Aside from its cost, the hardware must be watched efficiently and attentively by staff trained for emergencies.



*Banking facilities can be located near pedestrian activities to reduce sense of isolation*

### 1. NATURAL SURVEILLANCE OF ISOLATED ROUTES AND PUBLIC SPACES

Natural surveillance of public spaces such as plazas, open green spaces, isolated pedestrian routes and car parks should be encouraged through planning and design. Blank facades or buildings set far back at street level should be avoided as they can create a sense of isolation.



### **2. PROBLEMATIC ROUTES**

Isolated routes to and from car parks should preferably be overlooked by surrounding buildings. In a low rise development, it is desirable to provide parking so that there is natural surveillance from the occupants of the buildings or surrounding areas.

### **3. FORMAL SURVEILLANCE**

Telephones, emergency telephones or panic alarms should be adequately indicated by signs. Video cameras and patrols could help monitor isolated areas.

### **4. INCREASING ACTIVITIES**

Compatible land use and activity generators create activities, thereby allowing visibility by users.

## LAND USE MIX

A balanced land use mix is important for environmental, economic, aesthetic and safety reasons. Mixed uses must be compatible with one another and with what the community needs. For a residential development, a number of uses can be included by having a main street, a town square or park, prominent civic buildings and above all the ability of residents to walk to the place of work, to day care centres and to shops. The social value of frequenting local businesses provides a sense of security and safety as the local business people “watch” the street. Generally, any design concept that encourages a land use mix will provide more interaction and a safer place.



*Compatible mixed uses can encourage activity, natural surveillance and contact among people*

### 1. COMPATIBLE MIXED USES

Mixed uses should be compatible in order to encourage activity, natural surveillance and contact among people throughout the day. The first purpose in mixing uses should be to provide adequate and appropriate services to the primary users of an area. Examples include convenience retail shops, personal service shops and offices in primarily residential areas, especially if they provide local employment opportunities.

Childcare centres, health and fitness clubs and grocery stores in office areas including the possibility of adding residential uses at a later date, are other examples of compatible mixed uses.

### **2. BALANCING LAND USES**

Land uses such as pubs, clubs and bars are inevitable elements of urban life. However, they can be perceived as negative or undesirable depending on their locations in the neighbourhood. In order to minimise their impacts on the community, such uses should be balanced with positive measures by carefully selecting their locations in relation to surrounding uses.

## ACTIVITY GENERATORS

Activity generators are uses or facilities that attract people, create activities and add life to the street or space and thus help reduce the opportunities for crime. Activity generators include everything from increasing recreational facilities in a park, to placing housing in the central business district or adding a restaurant to an office building. They can be provided on a small scale or be added as supporting land use, or intensifying a particular use.



*Open space within the central business district can be used for various activities*

### 1. COMPLEMENTARY USES

Complementary uses should be introduced, to provide surveillance to potentially isolated areas, e.g. by locating administration office, lounge, TV room facing back lanes or side entrances.

### 2. REINFORCING ACTIVITY GENERATORS

Activity generators should be located along an “active edge” or along one or two pedestrian paths in large parks or on the boundary of large developments. An “active edge” creates a boundary of space that is inviting rather than threatening to passers-by. Appropriately licensed street vendors or food vendors should be encouraged in parks and the sensitive placement of seating areas informally generates activity along the edge of a path.

### **3. DESIGN FOR PROGRAMMING ACTIVITY MIX**

Park planning and design should provide opportunities for enhanced programming, such as cultural, recreational and community activities.

### **4. GROUND-LEVEL ACTIVITY**

Pedestrian oriented activities should be encouraged at ground level in high and medium density areas. Increased density generally attracts more people and may create more anonymity and a sense of fear. This sense of fear can be mitigated by creating more ground level activities such as retail which could add “eyes” on the street.

## OWNERSHIP, MAINTENANCE AND MANAGEMENT

Sense of ownership, or territoriality, is often considered a vital factor in making a place safer. Taking responsibility and caring for an environment helps make it safer. If residents in a residential estate for instance, feel that the areas outside their doors do not belong to them, they will feel less safe, and will be less likely to intervene in a dangerous situation. Not knowing who has formal ownership contributes to insecurity since it is not clear who to report the problems to. On the other hand, measures taken to increase the sense of territoriality may sometimes increase opportunities for crime. The visual or real barriers separating many new housing developments from surrounding neighbourhoods may isolate residents from the wider community.



*Artwork by residents of an apartment block at ground level promote sense of ownership*

### 1. TERRITORIAL REINFORCEMENT

The properties that are normally not protected and that can easily be intruded should be defined by the presence of design features and maintenance. For example, poorly defined front and rear yards could be defined by a small fence or by regular maintenance of the surrounding landscape.

**2. USE OF MATERIALS**

Materials used for common facilities should be vandal resistant so that maintenance is minimal. Street furniture should be made of durable and vandal resistant materials.

**3. MAINTENANCE ENFORCEMENT**

Properties should be well maintained to create a perception of ownership and safety. Building maintenance by law enforcement is a critical part of fostering a sense of ownership.

**4. REPORTING MAINTENANCE**

Well displayed telephone numbers or web sites to call for repairs and report vandalism to properties, especially in public areas are desirable. For example, a broken lock, door or window or light could be reported.

**5. MAINTENANCE PRIORITIES**

Offensive graffiti should be promptly removed either by the property manager or the public authority. Response to litter pickup and repairs should be prompt. A well maintained space gives an impression of 'ownership' and 'care'.

**6. MANAGEMENT**

Efficient programming and management of spaces, formal surveillance and good maintenance, for example by the management corporations of condominiums, and town councils taking care of public housing, can also enhance personal safety. If prompt attention is not given to maintaining a property, the result of lack of maintenance can contribute to a sense of fear.



## SIGNS AND INFORMATION

Well designed, strategically located signs and maps contribute to a feeling of security. Signs should be standardised to give clear, consistent, concise and readable messages from the street. Having addresses lit up at night will make them even more visible. Where it is difficult to find one's way around; signs with maps may help. Signs must be visible, easily understood and well maintained. Graffiti and other vandalism can make signs unreadable. If signs are in disrepair or vandalised, it gives an impression of lack of ownership and thus adds to a sense of fear.



*Maps and directories should be well designed and strategically located*

### 1. SIGN DESIGN

Signs should be large, legible and identifiable. The use of strong colours, standard symbols, simple shapes and graphics is recommended for signs of washrooms, telephones, information and help.

### 2 MESSAGE

Signs should convey the message with adequate information. For example, it should indicate where to go for assistance or help, or where the telephones and washrooms are, or the hours of operation of a underpass. The message should be conveyed in suitable language(s) or pictographs.

### **3. SIGN LOCATION**

Signs should be strategically located at entrances and near activity nodes (e.g., intersections of corridors or paths) and placed for visibility at an appropriate height.

### **4. MAINTENANCE**

Signs should be maintained on a regular basis to ensure that they are visible. This may involve trimming any landscaping growth or cleaning the sign. Clear signs in a car park help users to identify their location.

### **5. MAPS**

In large parks and buildings, maps or leaflets containing information appropriate to the different needs of various groups of users should be available.

### **6. HOURS OF OPERATION**

Where and when exits are closed should be indicated at the entrance of a route.

## OVERALL DESIGN

The design and management of the environment influences human behaviour. A barren, sterile place surrounded with security hardware will reinforce a climate of fear, while a vibrant and beautiful place conveys confidence and care. Both the functional and aesthetic values of public and semi-public spaces contribute to a sense of safety. In particular, the degree to which users can find their way around influences the sense of security. Good design reinforces natural use of space and lessens the need to depend on signs in order to find one's way around.



*Good functional and aesthetic design can contribute to a sense of safety*

### 1 IMPORTANCE OF QUALITY AND BEAUTY

The design of the space, besides fulfilling functional objectives, should create an aesthetically pleasing environment that a person can enjoy. The security aspects should be considered as part and parcel of designing the space and fulfilling aesthetic values.

### 2. DESIGN CLARITY

The design of the space should be easy to understand. The entrances and exits, the places to find people and the places to find services such as washrooms or telephones should be easy to find for a person visiting the place for the first time. The more complex

a space, the more signs and other measures to improve accessibility need to be provided and this may lead to more confusion. An inviting environment creates an image that attracts people.

### **3. AVOID UNUSABLE SPACES**

The purpose for designing a space should be clear. Unused and unusable “dead spaces” should be avoided.

### **4. NIGHT TIME USE**

The design of the space should address night time use.

### **5 CONSTRUCTION MATERIALS**

For better public safety and security, the design of the space should take into consideration appropriate materials, its placement, colour and texture to make the space inviting or uninviting. For example: bright and vibrant finishes create a sense of safety.

## Appendix A

# CHECKLIST

**T**he design guide is summarised in the form of a checklist. The questions help you to go through the security aspects of a project. The checklist will provide an initial crime prevention through environmental design review for the project.

1. Sight lines
2. Lighting
3. Concealed or Isolated Routes
4. Entrapment Areas
5. Isolation
6. Land Use Mix
7. Activity Generators
8. Ownership, Maintenance, and Management
9. Signs and Information
10. Overall Design

## Design guide for reviewing project – CHECKLIST

| 1. SIGHT LINES                                                                                                                                 | Yes                      | No                       |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| • Can sharp corners or sudden changes in grades that reduce sight lines be avoided or modified?                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does design allow clear sight lines and visibility at those areas where they are desired?                                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| • Do areas of concerns such as stairwells, lobbies of high-rise building have clear sight lines?                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| • If sight lines are blocked, can it be made visible by using glass or can other enhancements such as mirrors or security cameras be provided? | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does design allow for future sight line impediments such as landscaping in maturity?                                                         | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does access to hidden areas such as underpasses or parking areas have clear sight lines?                                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. LIGHTING                                                                                                                                    |                          |                          |
| • Is there a need for lighting to be provided if the paths or spaces are not used at night?                                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is lighting adequately provided such that a person can recognise a face from about 10 metres?                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does lighting provide uniform spread and reduce contrast between shadow and illuminated areas?                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is lighting provided too glaring?                                                                                                            | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are light fixtures provided for areas that require good visibility such as pedestrian routes and entrapment areas?                           | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are light fixtures protected against vandalism or made of vandal resistant materials?                                                        | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                                                                                                                  | Yes                      | No                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| • Is lighting at areas used during night time e.g. car parks, space around buildings adequately provided?                                        | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is back lane lighting required?                                                                                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>3. CONCEALED OR ISOLATED ROUTES</b>                                                                                                           |                          |                          |
| • Can concealed and isolated routes such as staircases, passageways or tunnels be eliminated?                                                    | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are there entrapment areas within 50 - 100 metres at the end of a concealed or isolated route?                                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is there an alternate route?                                                                                                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| • If a pedestrian cannot see the end of a concealed or isolated route, can visibility be enhanced by lighting or improving natural surveillance? | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are concealed or isolated routes uniformly lit?                                                                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is there natural surveillance by people or activities through various land uses?                                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is there formal surveillance?                                                                                                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is access to help e.g. security alarm, emergency telephones, signage and information available?                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>4. ENTRAPMENT AREAS</b>                                                                                                                       |                          |                          |
| • Is there an entrapment area and can it be eliminated?                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Can it be closed during off hours?                                                                                                             | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is the entrapment area visible through natural or formal surveillance?                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does design provide for escape routes?                                                                                                         | <input type="checkbox"/> | <input type="checkbox"/> |



| 5. ISOLATION                                                                                                        |  | Yes                      | No                       |
|---------------------------------------------------------------------------------------------------------------------|--|--------------------------|--------------------------|
| • Does design incorporate natural surveillance?                                                                     |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Do areas of concerns such as isolated routes and parking areas provide natural surveillance?                      |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • If providing natural surveillance is not possible, are emergency telephones, panic alarm and attendants provided? |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Can compatible land uses be provided to increase activity?                                                        |  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. LAND USE MIX                                                                                                     |  |                          |                          |
| • Are different land uses compatible?                                                                               |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Can land uses that raise security concerns e.g. bars and pubs, be located where their impact is minimised?        |  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. ACTIVITY GENERATORS                                                                                              |  |                          |                          |
| • Can complementary uses that promote natural surveillance be provided?                                             |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does design provide for complementary users?                                                                      |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does design reinforce activity?                                                                                   |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is the area programmed for various events or activities?                                                          |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Can a clustering of uses be used to support the intended activity?                                                |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are ground level activities incorporated in design?                                                               |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Can areas be programmed to facilitate increased activity?                                                         |  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. OWNERSHIP, MAINTENANCE & MANAGEMENT                                                                              |  |                          |                          |
| • Does the design provide territorial reinforcement through design features?                                        |  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does the design allowed for easy maintenance?                                                                     |  | <input type="checkbox"/> | <input type="checkbox"/> |

|                                                                                                   | Yes                      | No                       |
|---------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| • Are there signs and information to guide people on how to report maintenance?                   | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does the management of space provide maintenance priorities e.g. removal of offensive graffiti? | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>9. SIGNS AND INFORMATION</b>                                                                   |                          |                          |
| • Are signs visible and legible?                                                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are signs conveying messages clearly?                                                           | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is information adequate?                                                                        | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are sign strategically located to allow for maximum visibility?                                 | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are signs well maintained?                                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are maps provided in large areas such as underpasses, parks, etc.?                              | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are signs displaying hours of operation?                                                        | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>10. OVERALL DESIGN</b>                                                                         |                          |                          |
| • Do quality and aesthetically pleasing built environments compromise security concerns?          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is the scale of development consistent with neighbours to avoid large gaps on streets?          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is design of the built environment simple and easy to understand?                               | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is there space that can become dead space?                                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| • How is the built environment used at night time?                                                | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are construction materials used to enhance safety and security?                                 | <input type="checkbox"/> | <input type="checkbox"/> |

## Appendix B

# EXAMPLES OF CPTED STRATEGIES APPLICABLE TO VARIOUS DEVELOPMENTS

## CONDOMINIUMS AND PUBLIC HOUSING



*Residential apartments overlooking outdoor play areas provide natural surveillance*

### 1. SIGHT LINES AND HIDDEN SPOTS

Essential walkways through the area leading to and from MRT/ LRT stations, bus stops, parking lots and retail areas should have clear sight lines. The lift lobby should be open and visible from the interior of the building or the street.

Avoid hidden areas in corridors and stairwells. If not possible, use transparent materials or lift doors with glass windows and security mirrors to improve sight lines.

The interior of a lift may need installation of surveillance cameras or an angled mirror if the entire interior area is not visible to a person about to enter.

**2. OPTIMISING USE AT GROUND LEVEL**

Empty space should be used for housing, commercial and community services that are complementary to the needs of the residents.

**3. ACCESS TO INDIVIDUAL BUILDINGS**

Entrance areas to individual buildings should be clearly visible from adjacent streets and apartments.

**4. SIGNS**

Street names and block numbers should be visible from the public road as well as within the development.

Site maps at central locations may be located for visitors, delivery people and emergency services.

**5. LIGHTING**

Pedestrian walkways leading to buildings and car parks should be lit to public street standards.

Lighting of common areas such as corridors, lift lobbies and stairwells should be adequate and areas of shadows should be avoided.

**6. FORMAL SURVEILLANCE**

Management and maintenance staff should be trained to respond to emergencies.

Residents should be encouraged to report suspicious activities.

Security or maintenance staff should patrol parking areas and other common areas.

**7. PARKING**

Parking areas and access should be visible and well lit.

Visitor parking should be designated.

Parking within a building should be access controlled, well lit, properly signed and preferably with formal surveillance.

**8. MANAGEMENT OF BUILT SPACE AND SECURITY**

Management should have explicit policies related to security that allow for improving the quality of the environment and fostering a sense of common purpose.

**9. LOCATION OF ACTIVITY GENERATORS**

Outdoor play areas should be placed at safe locations where natural surveillance is possible.

**10. NATURAL SURVEILLANCE**

Drain pipes, parapets and ledges should not be located near windows, corridors and balconies. If unavoidable, they should face car parks, children's playground or roads to allow for natural surveillance.

Mailing boxes should be visible by the residents at the interior of the building corridor or lifts or stairs.

## LANDED DEVELOPMENTS



*An active resident committee can promote proper management of the neighbourhood*

**1. STREET PATTERN**

The street pattern should be designed and/ or modified to reduce the opportunities for crime within the housing estates by maintaining simple and predictable grid patterns and by observing the following:

- reduce the number of intersections;
- access points to the neighbourhood should be highly visible;
- major traffic routes should not pass through the neighbourhood;
- conflict between pedestrian and vehicular traffic should be minimised to encourage pedestrian activity; and
- street pattern should be designed such that it is easy to find an address especially by emergency services.

## **2. LAND USE PATTERN**

Commercial uses such as retail shops and offices should be located on main roads.

On the other hand, incompatible uses such as having a bar next to a school or religious assembly building should be avoided.

## **3. SCALE**

The scale of new developments should be compatible with the surrounding developments.

## **4. MANAGEMENT AND MAINTENANCE**

Sidewalks should be cleared of undesirable litter.

Neighbourhoods should be well managed by an active resident committee.

Safety audits may be conducted to identify problems in the neighbourhood.

Maintenance problems such as litter, vandalism, graffiti, burnt out lights on private property should be reported to the property owners/ management and dealt with.

## **5. OPEN SPACES**

Open spaces and walkways should be designed to enhance security and safety.

**6. SIGN AND INFORMATION**

Signs may display maps at the entrances of individual developments indicating road names and block addresses.

This displayed information should be readable to motorists from a distance of at least 20 metres.

**7. NATURAL SURVEILLANCE AND ACTIVITY GENERATORS**

Opportunities for natural surveillance on the street should be introduced by encouraging front porches, balconies, more windows and convenience stores.

Open railings at balconies would be preferred to solid parapet walls.

**8. CONTINUITY AND CLEAR OWNERSHIP**

Entrances should be accentuated and well defined with landscaping, architectural design, lighting or symbolic gateways.

Fences that allow visibility from the street would be preferred.

Gaps such as empty lots should be given priorities for lighting and fencing.

**9. STREET AND BACK LANE LIGHTING**

Lighting should be of sufficient intensity to light the sidewalk as well as the street.

Trees and bushes should be trimmed adequately to allow unobstructed lighting.

Accesses from dwelling units to back lanes should be well lit and clearly visible from the street.

## CENTRAL BUSINESS DISTRICT/ REGIONAL CENTRES/ TOWN CENTRES



*Retail and entertainment uses at street frontages attract and enhance pedestrian activities*

### 1. NATURAL SURVEILLANCE THROUGH GENERATING STREET-RELATED EVENING ACTIVITIES

Building along street frontages should be enhanced and strengthened by incorporating pedestrian oriented activities.

Retail and entertainment uses that open late such as restaurants and theatres should be encouraged at street level.

### 2. LAND USE MIX - RESIDENTIAL

A variety of land use mix should be encouraged with emphasis on residential and appropriate supporting services. As such, sidewalk cafes, street entertainers and street vendors which generate pedestrian activities could be introduced into the central business district, regional and town centres.

### 3. ACTIVITY GENERATION

Cultural and entertainment activities should be encouraged. These uses bring vitality after business hours and increase appeal for hotels, restaurants, shops and more business to locate within the central business district, regional and town centres, thereby attracting more people and tourists.



#### 4. PEDESTRIAN ENVIRONMENT

Pedestrian environment should be visible.

Special treatment of sidewalks with adequate width, trees, lighting, banners, street furniture could contribute to an attractive and comfortable pedestrian environment.

### OFFICES/ RETAILS/ HOTELS



*Clear line of sight from reception desk allows easy surveillance of entrance*

#### 1. LOCATION OF WASHROOMS

Washroom entrances should be highly visible.

If the washroom entrance is through a corridor, it should be made visible from the shopping area. Alternatively, the security office could be located in close proximity to the washroom corridor.

#### 2. SIGHT LINES

Receptionists should have clear sight lines of entrance areas from their workstations.

Receptionists should have communication link with security staff or other workers in case of an emergency. Security numbers could also be posted in the office.

### **3. REDUCTION OF ENTRAPMENT AREAS**

Back lanes and loading/ unloading areas should be well lit.

Access to the service areas should be lockable.

Vacant properties should allow for natural surveillance so that there are no hidden spots that can act as entrapment areas.

Public telephones and ATMs should be located in areas of high use and away from entrapment areas.

### **4. CLUSTERING OF USES**

Shops that open late should be clustered in one area, preferably near the entrance of the building.

### **5. SITTING AREAS**

Ensure that public seating is located in areas which discourage loitering but enhance natural surveillance by placing seating in high traffic areas with clear sight lines in a number of directions.

### **6. SIGNAGE**

Signs should be posted for washrooms, telephones, and other amenity areas in the shopping areas.

### **7. LIGHTING AND SURVEILLANCE IN PARKING AREAS**

Surface parking area should be adequately lit.

For buildings with built-in car parks, the access to the car park and its interior should be well lit, free from entrapment areas with clear sight lines.

Avoid locating loading areas at entrapment areas.

Stairs or lift lobbies should be visible and allow for natural surveillance.

### **8. FORMAL SURVEILLANCE**

There should be formal mechanical surveillance for areas and accesses to shops that operate late hours and facilities such as ATMs.

Organised security patrol in areas very prone to crime and vandalism is desirable.

Formal surveillance is encouraged in areas prone to loitering problems.

Management should monitor the access to the building.

Offices should be connected directly to security staff.

## **9. ACCESS TO ROOF TOP**

There should not be unauthorised access to roof tops from within or from adjacent buildings.

# **EDUCATIONAL INSTITUTIONS AND SCHOOLS**



*Location and landscaping of school can be arranged to encourage natural surveillance from surrounding buildings and streets*

## **1. LOCATION OF SCHOOL YARDS**

Location and landscaping of school yards should be such that it encourages natural surveillance from surrounding buildings and streets.

## **2. OPTIMISING LAND USE**

If possible, activities such as the use of school facilities for community activities or sports activities to bring people into the school yard after school hours should be encouraged.

Supervised recreation activities before and after school hours should be encouraged.

### **3. WALKWAYS**

Frequently used walkways between buildings and other isolated walkways should be well lit to city street standards.

Walkways should avoid entrapment areas.

Emergency telephones should be well signed and lit along the walkways and bicycle tracks.

### **4. SIGHT LINES AND POTENTIAL ENTRAPMENT AREAS**

Major walkways, bicycle tracks and entrances to buildings should have clear sight lines.

### **5. SIGNAGE**

Besides other prominent signs, polytechnic and university campuses should include signs for emergency telephones along bicycle tracks, walkways and other isolated areas.

### **6. WASHROOMS**

Washrooms should be well lit, visible and should not be located at isolated or remote areas.

### **7. FORMAL SURVEILLANCE**

Walkways, bicycle tracks and parking areas should be regularly patrolled by the campus security.

Surveillance through hardware may be provided for any underpass connections between buildings.

## INDUSTRIAL AREAS



*Neat, visible and well-lit loading/ unloading areas minimise potential for hiding*

### 1. SIGHT LINES

Land parcels and buildings should be visible from public or secondary roads.

Driveways should meet in areas where there are activities and orientation of buildings could be such that driveways are visible from the buildings.

The path to parking lots, bus stops and taxi stands should be visible from the buildings that they serve.

Avoid dead end driveways and street should be designed to increase surveillance opportunities from passing traffic and patrol.

Avoid creating hiding places such as alleys, storage yards, loading/ unloading areas and so on.

Parking lots should be visible from the street and well lit for night shift.

### 2. LAND USE MIX - INTENSIFICATION OF ACTIVITY AND DEVELOPMENT

Activities and developments that should bring in a steady stream of people to make the area less isolated should be encouraged, e.g. housing on the fringe, eating places, recreational areas etc.

### **3. LIGHTING**

Lighting along entrance paths to buildings should be provided at the same level as street lighting.

Back lanes and loading docks should be well lit.

Internal footpaths should be well-lit and visible from buildings.

Lighting should illuminate entrapment areas such as the entrances to loading/ unloading areas.

Reporting of burnt out or vandalised lights should be encouraged.

### **4. LANDSCAPE**

Trees and hedges along public or secondary roads should not obstruct visibility from buildings.

Hedges if necessary should not become convenient hiding spaces and could be spaced out to avoid total visual obstruction. This also applies to internal landscaping.

### **5. PARKING**

Parking lots should be visible from the street and well lit.

Visitor parking should be designated.

### **6. LOCATION OF WASHROOMS**

Washrooms should be well lit.

Entrance should be highly visible and not tucked away in inconspicuous locations.

### **7. SURVEILLANCE AND HOUSE KEEPING**

Drain pipes, parapets and ledges should not be located near windows, corridors and balconies. If unavoidable, they should face car parks, children's playgrounds or roads to allow for natural surveillance.

Parking lots, bus stops and taxi stands should preferably be visible from the workstations of building security personnel.

Security or maintenance personnel should patrol parking and common areas and monitor access to buildings.

Common areas that do not have good visibility with the surroundings should be equipped with surveillance hardware.

Avoid locating loading areas at entrapment areas.

Good housekeeping should be encouraged to minimise hiding places.

## Appendix C

# EXAMPLES OF CPTED STRATEGIES APPLICABLE TO PUBLIC SPACES

### CAR PARKS



*Attendant booth should be located near entrances and predictable routes*

#### 1. SIGHT LINES AND POTENTIAL ENTRAPMENT AREAS

Stairwells and lift lobbies should be located where they can be viewed by the maximum number of people, for instance, near the outer edge of a building where there is a glass wall, or at the entrance to a shopping area.

Major route(s) in the car parks and to the exit(s) should be free of sharp turns. If there are sharp turns or pillars obstructing sight lines, this could be modified by using mirrors or other methods.

Potential entrapment areas such as storage rooms along the route should be kept locked.



Sight lines to the surface lots should be cleared of dense bush, solid fences, or advertisements that block the view.

Sight lines should be maximised especially from the entrance to a lot and from the parking attendant's booth, if there is one.

For road side parking in front of stores, low (not more than 1 metre in height) wrought iron fencing or low-growth, low maintenance bushes are preferable to other barriers. Gaps that could be used as hiding spots should be avoided.

## **2. LIGHTING**

Car parks should be lit to the minimum standard of being able to identify a face from a distance of about 10 metres for a person with normal vision.

Lighting should be consistent and located where it can provide maximum visibility.

Light fixtures should be protected against breakage by, for example, the use of wired glass or other vandal proof materials.

The colour of the walls should allow the lighting to be used efficiently, i.e. painted white or other light colours.

Lighting at surface car parks should be adequate and uniformly distributed to avoid deep shadows. This could be achieved by providing more fixtures with lower wattage rather than fewer with higher wattage.

## **3. NATURAL SURVEILLANCE**

Street level pedestrian activities should be incorporated at the ground level of multi-storey car parks.

Car park design should incorporate permitted kiosks for car accessories and car cleaning kiosks etc.

Car park design should be open (railings instead of walls) to allow for natural surveillance from adjacent streets and nearby buildings.

For surface parking, windows and openings can be placed in adjacent buildings to overlook the lots.

Surface parking lots should be located where it can be viewed by shops and residents.

Landscaping foliage should be maintained.

#### **4. ATTENDANTS**

Attendant booths should be located near entrances and predictable routes where there are clear sight lines.

Information and signs should provide guidance on how maintenance problems can be reported to attendants.

There should be attendants at all times who is trained to respond to emergencies in multi-storey car parks that operate into the late hours.

If there is no attendant, there should be several well-lit, clearly marked entrances/ exits, in order to avoid the car park lot becoming an entrapment area.

#### **5. DESIGNATED PARKING LOTS**

Designated lots for people with disabilities should be provided near an attendant if there is one, or otherwise near a safe accessible exit or near areas of natural surveillance.

#### **6. FORMAL SURVEILLANCE**

In larger car parks there should be emergency telephones on each level with illuminated telephone signs.

Additional surveillance measures such as well signed audio links or video cameras should be provided in stairwells, lifts and other isolated areas.

Patrols by security/ maintenance staff should be encouraged.

The repair of broken bulbs and other common maintenance problems should be promptly undertaken by the maintenance staff, who should be trained to respond to or report emergencies.

#### **7. SIGNS AND INFORMATION**

Exits and main routes should be clearly signed using distinctive colours and symbols so that users can easily find their cars.

Relevant telephone numbers should be displayed prominently so that users can be guided to report security problems.

Location identification signs should be provided.

Emergency telephones, if provided, should be signed with raised illuminated telephone sign.

### **8. BICYCLE PARKING**

Bicycle parking facilities should be provided close to buildings.

In isolated areas such as parks, bicycle parking may be located adjacent to activity areas.

Secure bicycle racks should be provided.

### **9. TRAFFIC CALMING DEVICES**

Traffic calming devices such as speed humps should be installed. Landscaping, providing it does not obstruct lines of sight, is a useful psychological influence to slow drivers down.

## **PARKS/ OPEN SPACES/ PLAYGROUNDS**



*Parks and open spaces can be planned and programmed for a range of activities*

### **1. NATURAL SURVEILLANCE AND SIGHT LINES**

Small parks or play areas should be clearly visible from adjacent streets.

Small parks or the edges of larger parks should preferably be overlooked by housing or commercial developments.

Where practical, walkways should have clear sight lines, especially where they curve or change grade.

## **2. ENTRAPMENT AREAS**

Entrapment areas close to pathways through park design should be avoided.

Pathways may have a border of low-lying vegetation or high-branching vegetation, as opposed to other types of trees and bushes that can easily create entrapment areas and reduced sight lines.

Multiple entry and exit points should be provided in parks or playgrounds.

## **3. CLUSTERING AND PROGRAMMING FOR A RANGE OF ACTIVITIES**

To increase use and natural surveillance, activity areas may be clustered or programmed for a range of activities. Some examples of leisure activities include community services, cafes, snack bars, community gardens, gardening centres, childcare, adult and senior health programs and travelling libraries.

Parks and open spaces should be planned and programmed for a range of activities, even if they are intended for passive use.

Space for street activities and supervised washrooms are some of the amenities that the public might appreciate.

## **4. LOCATION OF ACTIVITY GENERATORS**

Park design should allow for the incorporation of activity generators such as food kiosks, information centres or special events.

Activity generators facing the park such as outdoor cafes and restaurants should be encouraged to attract users.

Activities should be located either along the edge of parks close to vehicular traffic or gathered together along pedestrian walkways.

To avoid isolation, some benches, fitness trails, tennis or basketball courts and bicycle paths in parks could be located adjacent to the perimeter of parks or along through-roads or combining them with the most used pedestrian paths.

For trails leading to dense vegetation, adequate warning signs should indicate that these trails lead users into isolated areas and suggest alternate routes.

Washrooms should be near children's playgrounds.

Food kiosks may be located near playgrounds where they are visible.

### **5. NIGHT TIME USE**

The planning and design of the parks should take into account the possibility of night time use such as night tennis or evening walks. Such areas of the parks must be highly visible, properly lit and away from entrapment areas.

### **6. SIGNS AND INFORMATION**

Signs should clearly indicate, using words, symbols and maps, the location of telephones, washrooms, isolated trails, less isolated alternative routes and any places where people are likely to be at most times while the park is open e.g., tennis courts.

Signs should be located at decision points, such as the intersection of two major paths or the entrance to the park.

Signs should indicate where and how help can be found and where maintenance problems and cases of vandalism can be reported.

The hours of operation should also be posted. Parks and open spaces should be signed for emergency telephone or panic alarm.

### **7. LIGHTING**

Lighting along paths and areas intended for night use should be provided at the same level as streets.

A clear demarcation in terms of lighting levels should be introduced to differentiate areas that are not likely to be used at night from areas where there is likely to have activities.

Landscaping elements should be chosen and maintained so that they do not block light.

If the parks and open spaces are intended for night use, the paths and potential entrapment areas should be lit at pedestrian scale to street lighting level.

## **8. FORMAL SURVEILLANCE**

In large parks, formal surveillance should be considered either by police, park attendants or community organised patrols.

Conducting safety audits should help identify safety and security concerns.

Park attendants or organised patrols should know how to respond to emergencies.

## **9. OPTIMISATION AND LINKAGES**

Parks and open spaces should be improved to provide access to and from populated areas in order to increase the use of the park system.

Parks and open spaces should complement and be integrated with the sidewalk system to develop an open space and pedestrian network that attract more people.

## **10. MAINTENANCE**

Parks and open spaces should be well maintained. Removing litter and graffiti, and replacing vandalised or burned out bulbs should be a priority.

## BACK LANES



*Back lanes should be well-maintained and free of inappropriate outdoor storage*

### 1. LIGHTING

Back lane lighting should be provided.

### 2. AVOIDING ENTRAPMENT

Back lanes with dead ends should be avoided.

Dead end spaces should be blocked off with fences or gates.

### 3. ACCESS TO BACK LANES

Back lanes should be closed to vehicular traffic as much as possible.

Removable gates or bollards should be placed at the entrances to prevent access of vehicles. If access to vehicles is required, one way traffic can be considered.

### 4. MAINTENANCE

Maintenance of back lanes should be carried out regularly.

Inappropriate outdoor storage should be discouraged.

## PUBLIC WASHROOMS



*Approach to washroom entrances should be highly visible*

### 1. SIGHT LINES/ LOCATION

Approaches to washroom entrances should be highly visible. Deep, contorted and recessed corridors leading to such facilities should be avoided.

### 2. ENTRANCES

For office and commercial buildings, maze entrances should be provided. Avoid placing public telephones near the entrance as potential offenders may monitor the movement in and out of the washroom from the public telephone.

Entrances to washrooms near playgrounds should be visible from the playgrounds as far as possible.

If there is more than one washroom, they should be located close to one another with clear sight lines.

### 3. MAINTENANCE

Vandalism and graffiti should be promptly cleaned.

The quality of finish and maintenance are important to a pleasant and safe washroom.



**4. SIGNS**

Washrooms should have signs alerting users to the location of emergency assistance and providing telephone numbers to report vandalism or maintenance problems.

**5. ATTENDANTS**

Attendants may be practical and required for washrooms which are located in remote areas.

**6. LOCKS**

Doors should not be lockable without a custodian's key in order to reduce the danger of entrapment.

## SIDEWALKS/ WALKWAYS



*Walkways should be clean and well maintained*

**1. SIGHT LINES AND POTENTIAL ENTRAPMENT AREAS**

Walkways should be designed to allow good visibility around sharp corners. Inset areas along buildings or walls, tall fences, earth berms or overgrown vegetation may restrict visibility and offer potential for entrapment and should be avoided as much as possible.

**2. MAINTENANCE AND CLEANLINESS**

Walkways should be regularly maintained and cleaned.

### 3. LIGHTING

Where regular street lighting is not illuminating the walkways, lighting at pedestrian scale should be provided for the well travelled walkways.

Lighting should be at consistent levels, vandal resistant and at appropriate height.

Lighting intensity should allow a pedestrian to be able to identify a person about 10 metres away.

### 4. FORMAL SURVEILLANCE THROUGH PATROLS

Natural surveillance should be encouraged by creating opportunities for pedestrian activities.

Walkways in large isolated park areas may have formal surveillance by police or park patrol.

## UNDERPASSES/ PEDESTRIAN OVERHEAD BRIDGES



*Pedestrian underpasses can be designed with good visibility and clear sight lines*

### 1. NECESSITY FOR GRADE SEPARATION

If the above or below ground pedestrian walkways has to be located in an isolated area with low pedestrian volume, signs should be provided at strategic locations to indicate where it leads to and if any alternate route is available.

**2. AVOIDANCE OF HIDDEN SPACES**

Pedestrian walkways should as much as possible, allow for high visibility by incorporating clear sight lines.

Any recessed surfaces or possible areas for hiding should be avoided.

If it is necessary for pedestrian walkways to take a sharp turn of more than 60 degrees, an angled full-length mirror should be placed so that pedestrians can see around the corner.

**3. SIGN AND INFORMATION**

Signs should display information such as the pedestrian walkways, hours of operation, alternate routes, location of telephones and panic hardware.

**4. ACTIVITY GENERATORS**

If underpasses are long and well used, supporting activity generators should be encouraged such as a small confectionery or coffee shop/ kiosk.

Activity generators should be encouraged at route intersections to create higher visibility.

**5. MAINTENANCE AND CLEANLINESS**

Underpasses should be maintained and cleaned as regularly as possible.

**6. VISIBILITY OF BELOW GRADE PEDESTRIAN WAY TRAFFIC**

Access to the underpasses should be highly visible from the streets, adjacent uses, frequent pedestrian traffic areas and activity generators.

**7. LIGHTING**

The underpasses should be lit by natural or artificial sources to be able to identify a face from a distance of about 10 metres. Lighting sources should be protected from vandalism or manipulation.

Lighting should be regularly maintained.

## 8. FORMAL SURVEILLANCE

If the underpasses are more than 35 metres long, mechanical surveillance of the underpass or alternatively an alarm device or emergency telephone should be made available.

## BUS SHELTERS/ TAXI STANDS/ MRT/ LRT STATIONS



*Materials and construction details for bus shelters should be vandal resistant*

### 1. SIGHT LINES

Commuters at bus shelters, taxi stands and entrances to MRT/ LRT stations should be clearly visible from streets and buildings as far as possible.

Any walls, berms, bushes, power boxes or solid fences that block the view should be eliminated or modified.

Advertisement on bus shelters should be located to ensure visibility of commuters.

### 2. AVOIDANCE OF ENTRAPMENT AREAS

Nearby entrapment areas created by landscaping or built form should be eliminated or modified.

### 3. SIGNS AND INFORMATION

Passenger information signs should indicate route schedules.

**4. REDUCE ISOLATION**

Bus shelters or taxi stands near to an isolated area such as a large parking lots, vacant land and, alleys or buildings set far back from the street should be avoided if possible.

**5. BUS SHELTER AND TAXI STAND DESIGN**

Bus shelters and taxi stands should be designed to ensure that there is no hiding space in or around the shelter.

Sitting rails instead of benches should be provided so as to prevent people from sleeping in bus shelters or taxi stands.

The materials and construction details for the shelter should be vandal resistant.

**6. LIGHTING**

The areas adjacent to bus shelters or taxi stands should be well lit.

**7. MAINTENANCE**

Bus shelters and taxi stands should be well maintained as far as possible.

The shelters should be identified by number and preferably a telephone number posted to report maintenance problems.

**8. FORMAL SURVEILLANCE**

Measures should be taken to improve drivers ability to respond to dangerous situations, e.g. through two way communications or a panic alert button.

Drivers should be trained to respond to emergencies.

All MRT/ LRT stations should have video and/ or other formal surveillance.

**9. PATROLS**

Police should be made aware of problematic MRT/ LRT stations, bus shelters or taxi stands.

## REFERENCES

- City of Edmonton Planning and Development (1995) Design Guide for a Safer City, Edmonton
- City of Tucson, Development Standard No. 2-14.0, Crime Prevention Through Environmental Design
- City of Virginia Beach CPTED Committee (2000) CPTED - General Guidelines for Designing Safer Communities. Virginia Beach, Virginia
- CPTED: Durham Guide to Creating a Safer Community. Durham County, North Carolina.
- Crowe, T. (2000) Crime Prevention Through Environmental Design. Butterworth-Heinemann, Stoneham, Massachusetts
- Crowe, T. (2003) Advanced Crime Prevention Through Environmental Design (Seminar notes). American Crime Prevention Institute, Louisville, Kentucky
- Geason, S. and Wilson, P.R. (1989) Designing Out Crime. Australian Institute of Criminology, Canberra
- Government of South Australia (2002) Crime Prevention Through Environmental Design and Urban Design. Adelaide, Australia
- Lismore City Council (2000) Development Control Plan No. 43 - CPTED. Lismore, Australia.
- National Crime Prevention Council (U.S.) (1997) Designing Safer Communities - a CPTED Handbook. NCPC (U.S.), Washington D.C.
- Office of Planning, Baltimore County (2000) Comprehensive Manual of Development Policies, Division VI, Section H (CPTED). Baltimore County, Maryland
- Plaster, S. and Carter, S. (1993) Planning for Prevention: Sarasota, Florida's Approach to CPTED. Florida Criminal justice Executive institute, Tallahassee, Florida.
- Smith, M. S. (1996) Crime Prevention Through Environmental Design in Parking Facilities. National Institute of Justice, Washington D.C.
- Tempe City Council (1997) CPTED Guidelines. Tempe, Arizona
- Wekerle, G. R. et al (1992) A Working Guide for Planning and Designing Safer Urban Environments. Planning and Development Department, Toronto.

---

The materials in this Crime Prevention Through Environment Design Guidebook may not be reproduced in whole or part without the written consent of the National Crime Prevention Council. Photographs taken by SSSgt Steven Cheong Kong Meng remain property of the Singapore Police Force and National Crime Prevention Council.

# CREDITS

## CPTED PROJECT COMMITTEE

Mr Chong Lit Cheong (Chairman)  
*Chief Executive Officer*  
*JTC Corporation*

Mr Benedict Tan (Deputy Chairman)  
*Deputy Chief Executive Officer*  
*Building and Construction Authority*

Dr John Keung  
*DCEO*  
*Housing and Development Board*

Mrs Lee Wai Chin  
*DCEO*  
*National Parks Board*

Mr Ong Geok Soo  
*ACEO*  
*JTC Corporation*

Mr Tan Bing Chui  
*Member*  
*National Crime Prevention Council*

Professor Cheong Hin Fatt  
*Dean of School of Design & Environment*  
*National University of Singapore*

Mr Lim Tow Fok  
*General Manager, Keppel Land*  
*Real Estate Developers' Association of Singapore*

Mr Eugene Yong Kon Yoon  
*President*  
*Singapore Contractors Association Limited*

Mr John Ting  
*President*  
*Singapore Institute of Architects*

Er Dr Lock Kai Sang  
*President*  
*Institution of Engineers Singapore*

Mr Ng Lip Joon  
*Hon. Secretary*  
*Singapore Institute of Landscape Architects*

Mr Francisco John Celio  
*Director, Security Consultancy Department*  
*Commercial & Industrial Security Corporation*

## ADVISOR

Mr Timothy D Crowe  
*Criminologist*

## CPTED GUIDEBOOK WORKGROUP

Mr Lim Tow Fok  
*General Manager, Keppel Land*  
*Real Estate Developers' Association*  
*of Singapore*

Mr John Ting  
*President*  
*Singapore Institute of Architects*

Associate Professor Teh Kem Jin  
*Department of Architecture,*  
*School of Design & Environment*  
*National University of Singapore*

Mr Cheong Kin Man  
*Housing and Development Board*

Mr Cheang Tick Kei  
*JTC Corporation*

Mr Chin Jen Chyi  
*Building and Construction Authority*

## SECRETARIAT

Mr Chin Jen Chyi  
*Building and Construction Authority*

Mr Lim Cheng Yong  
*Building and Construction Authority*

Mr Ng Man Hon  
*Building and Construction Authority*

*preventive medicine,*  
**stop before it starts**



***Planning to protect your physical health is second nature.***

But what about your accumulated wealth? At home and at work, buildings, cash and information resources are all at risk. The question is, how to guard yourself against loss without trying yourself in knots? Enter CISCO. For over 29 years we've had the ins and outs of loss prevention covered. From protecting buildings/premises, cash and valuables, information assets to IT networks and resources.

Whatever you value, we keep it safe.



**Your Best Partner in Total Security**



For an integrated security solution, call (65) 1800 747 28888 or email [security@cisco.com.sg](mailto:security@cisco.com.sg). Or visit our web site at [www.cisco.com.sg](http://www.cisco.com.sg) for more information.



*Supported by*



*A Community Project by*



CISCO, a statutory board under the Ministry of Home Affairs, is dedicated to supporting the crime prevention efforts of the Singapore Police Force. It also strives to enhance the security environment by providing a comprehensive range of security services. Straddling both the physical and cyber worlds, CISCO's solutions are tailored to protect buildings and premises, cash and valuables and information assets. CISCO - the best partner in total security.

Do visit us at [www.cisco.com.sg](http://www.cisco.com.sg) for more information.