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CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

Crime Prevention Through Environmental Design, or CPTED (pronounced sep-ted) is a crime control philosophy that attempts to apply physical design, citizen participation and law enforcement strategies in a comprehensive way to protect entire neighborhoods or facilities. The goal of CPTED is the reduction of opportunities for crime to occur. This reduction is achieved by employing physical design features that discourage crime, while at the same time encouraging legitimate use of the environment.

There are three overlapping concepts in CPTED:

- Natural access control
- Natural surveillance
- Territorial reinforcement

The object of *access control* is to decrease or minimize criminal opportunities through organizational means (guards), mechanical means (fences, alarms, cameras) or natural means (spatial definition, placement of workstations, location of windows). *Access control* employs people, electrical and mechanical devices and natural measures to create a perception of risk to offenders and deny them access to targets. It also guides legitimate users safely through the environment.

Surveillance is a principal means of keeping intruders under observation. If potential intruders feel as though they can be observed, they perceive the risk of apprehension as being unacceptable. *Surveillance* can be organized (police patrols), mechanical (good lighting) or natural (windows). Criminals are least likely to act when there is a high risk of their actions being witnessed. *Surveillance* involves the location and use of physical features, electrical and mechanical devices, activities and people to maximize visibility. It creates a risk of detection for intruders and offenders, and a perception of safety for legitimate users.

- *Informal Surveillance.* Opportunities for informal or natural surveillance occur as a direct result of architectural design. Designs that minimize visual obstacles and eliminate places of concealment for potential assailants offer the most protection against crime. These open designs also encourage use of the environment, as people feel safer when they can easily see and be seen.

- *Formal Surveillance.* Formal surveillance methods such as closed-circuit television, electronic monitoring and directed patrols are normally used only when natural surveillance alone cannot sufficiently protect an area. Public and semi-private zones, such as interior corridors of a building, a parking structure, exterior pedestrian pathways, etc., may benefit from some type of formal surveillance.

Territoriality is the development of proprietorship or ownership by legitimate users of space or facilities. A strong sense of *territoriality* encourages an individual to take control of his or her environment and defend it against attack. A sense of *territoriality* is fostered by architecture that allows easy identification of certain areas as the exclusive domain of a particular individual or group. This feeling is enhanced when the area involved is one the individual can relate to with a sense of pride and ownership (work area, for example). *Territoriality* promotes neighborhood pride. It discourages the presence of outsiders by delineating private and semi-private spaces, controlling the movement of people and vehicles, and assigning responsibility for maintaining all spaces in a neighborhood.

The term *ownership* when used in this context, does not necessarily mean actual legal ownership. It can be, and very often is, a perceived ownership resulting from an individual's relationship with the environment. Office workers, for example, may feel a sense of ownership for the office in which they work.

The Definition of CPTED

The definition of Crime Prevention Through Environmental design (CPTED) as developed by the National Crime Prevention Institute (NCPI) at the University of Louisville is *"the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life."*

CPTED Strategies

Timothy D. Crowe, a previous director of the National Crime Prevention Institute, and perhaps the most notable authority on CPTED today, has defined the following nine CPTED strategies:

1. *Provide clear border definition of controlled space.* Examples of border definition may include fences, shrubbery or signs in exterior areas. Within a building, the arrangement of furniture and color definition can serve asa means of identifying controlled space.

2. *Provide clearly marked transitional zones.* Persons need to be able to identify when they are moving from public to semi-public to private space.

3. *Relocation of gathering areas.* Gathering areas or congregating areas need to be located or designated in locations where there is good surveillance and access control.

4. *Place safe activities in unsafe locations.* Safe activities attract normal users to a location and subsequently render the location less attractive to abnormal users due to observation and possible intervention.

5. *Place unsafe activities in safe locations.* Placing unsafe activities in areas of natural surveillance or controlled access will help overcome risk and make the users of the areas feel safer.

6. *Redesignate the use of space to provide natural barriers.* Separate activities that may conflict with each other (outdoor basketball court and children's play area, for example) by distance, natural terrain or other functions to avoid such conflict.

7. *Improve scheduling of space.* The timing in the use of space can reduce the risk for normal users and cause abnormal users to be at greater risk of surveillance and intervention.

8. *Redesign space to increase the perception of natural surveillance.* Abnormal users need to be aware of the risk of detection and possible intervention. Windows and clear lines-of-sight serve to provide such a perception of surveillance.

9. *Overcome distance and isolation.* This strategy may be accomplished through improved communications (portable two-way radios, for example) and design efficiencies, such as the location of restrooms in a public building.

Lighting

Good lighting is one of the most effective crime deterrents. When used properly, light discourages criminal activity, enhances natural surveillance, and reduces fear.

Lighting should be used to illuminate vulnerable areas that can be used as concealment by a potential attacker. By providing a level of good even light, the objective is to light up the criminal without spotlighting the victim.

As used in CPTED, lighting plays a part in creating a feeling of territoriality. Lighting can influence an environment both from an aesthetic and a safety standpoint. Good lighting creates a positive environment and furthers a sense of pride and ownership.

Landscaping

Landscaping design plays a significant role in CPTED. As a symbolic barrier, landscaping can mark the transition between zones or areas. Features such as decorative fencing, flower beds, ground cover, and varied patterns of cement work show separation between zones. If more substantial barriers are needed, shrubbery can be used to create more formidable obstacles.

From a surveillance standpoint, landscaping can be critical. Such factors as growth characteristics of plants and their placement in relation to potentially vulnerable areas are extremely important.

A further function of landscaping in crime prevention is aesthetics. An attractive environment creates a sense of pride and ownership.

Surveillance

Surveillance measures include (1) the design and location of physical features and electrical/mechanical devices to enhance visibility by people during normal/everyday activities, and (2) the location of people and activities to facilitate surveillance. These measures create a risk of detection for intruders and offenders, and a perception of safety for legitimate users.

- **Lighting**

  Provide exterior lighting for visibility at night on streets, parking areas, sidewalks, pedestrian paths, possible entrapment spots, etc., to enable people to see where they are going and identify others along their route. Light should be consistent to reduce contrast between shadows and illuminated areas.

  Avoid lighting isolated areas that people should not use at night.

  Provide interior lighting and stain or paint walls white to enable people to see well indoors, e.g., in parking garages.

  Make sure that trees or other landscaping do not block light.

- **Windows and Doors**

  Provide two-way visibility (from inside to outside) in areas not open to the public. Use mirrored glass or see-through curtains to maintain inside privacy. Use glare-proof glass to enable occupants of a lighted building to see out at night.

  Install peepholes for viewing people seeking entrance to secure areas.

- **Unobstructed Sight Lines**

  Maintain tree canopies at least 7 feet above the ground.

  Keep shrubs trimmed to less than 3 feet except where privacy or environmental noise mitigation is a primary concern.

Grade land where practical without substantially altering the natural terrain to provide unobstructed sight lines within the project and from adjacent streets and developed areas.

Use open landscaping and see-through fences instead of solid walls or hedges for boundaries where privacy or environmental noise mitigation is not needed.

Orient buildings in a complex for good visibility of the streets, parking lots and other buildings in the complex.

Orient parking spaces to provide good visibility between cars.

Maintain continuous front setbacks for buildings along a street.

Orient houses in a neighborhood for clear visibility of the streets and the sides of nearby houses.

Place garages even with or set back from front of homes.

Use open or see-through structures for exterior stairways, walkways, porches, sitting areas, patios, parking spaces, etc.

Use open structures for interior walls, e.g., in parking structures and garages.

Eliminate possible hiding or entrapment spots along pedestrian paths.

Install closed-circuit television (CCTV) cameras or mirrors where sight lines are obstructed.

Provide a clear view of room interiors from room entry points.

Install mirrors where sight lines are obstructed.

Use straight short cul-de-sacs instead of curved, angled, or long ones where practical without substantially altering the natural terrain to enable the end of the cul-de-sac to be seen from the cross street.

Use streets as buffers between housing and open areas, parks, and playgrounds.

♦ **Communications Systems**

Install emergency phones, alarms or intercoms in convenient places for people to use to report

intruders or suspicious activities, or to call for help.

Post signs to show locations of emergency communications systems.

- **Indoor Facilities and Activities**

Locate high-activity rooms and areas so they face public and semi-public areas. These include kitchens and family rooms in homes, lobbies with guards or receptionists in buildings, offices of property managers in multi-family residences, offices of administrators and supervisors in businesses and other establishments, cashiers in stores and restaurants, etc. Provide large, unobstructed windows for good visibility of outside areas.

Locate facilities for activities that involve a few people at a time in areas of high usage and good visibility so they can benefit from the natural surveillance already in the area. These include restrooms, elevators, stairs, ATMs, pay phones, laundry rooms, trash containers, etc.

- **Outdoor Facilities and Activities**

Include front porches and benches to provide places where people can sit and observe activities on streets, sidewalks, open spaces, etc.

Locate facilities for activities that attract large numbers of people in areas of low usage and poor visibility so that users can provide surveillance of the area. These include basketball courts, ball fields, etc.

Locate facilities for activities that involve a few people at a time in areas of high usage and good visibility so they can benefit from the natural surveillance in the area. These include pay phones, ATMs, bus stops, bike racks, parking lots, hiking or jogging trails, etc.

Locate activities within a facility to reduce potential causes of conflict and confusion, and make individual activities easier to supervise.

Locate paths to and from entrances and exits of building through areas that need surveillance. Use most direct route where possible.

Mix compatible residential, commercial and other land usage permitted by zoning regulations to provide round-the-clock presence and surveillance opportunities.

Locate parking lots where non-conflicting users, e.g., churchgoers on weekends and office workers on weekdays can share the spaces to expand the times that people are in the area.

Access Control

Access control measures include design features and target hardening that create a perception of risk to offenders and deny them access to targets. They also guide legitimate users safely through the environment. Controls should also be established on exits to deny offenders escape opportunities.

- **Security Systems**

  Consider installation of alarms, cameras, intrusion detectors, metal detectors, activity decoys, intercoms, etc., to protect and control all entrances and exits, including garage, basement, service, loading and unloading, fire, roof, and attic. Make systems visible to potential intruders.

  Provide special protection for ground floor units.

  Install alarmed, self-locking emergency exits.

  Provide keys, entry cards, or access codes to residents or occupants.

  Provide safes or other secure facilities for storage of cash and other valuables.

- **Doors and Windows**

  Use strong locks and construction materials on all doors and windows.

  Limit numbers of entrances and exits to building, parking lots, etc.

  Locate entrances and exits in areas that are under surveillance or direct supervision.

  Locate windows next to doors on hinged side, not on locked side.

  Eliminate rear-yard gates to alleys, pedestrian paths, open areas, etc.

- **Walls and Fences**

  Make walls and fences attractive as well as durable.

  Use open fences, e.g., vertical wrought iron or decorative iron. They are preferred because they are easier to see through, harder to climb, and less susceptible to graffiti.

  Use vines, thorny plants, and other landscaping along walls to make access more difficult and prevent graffiti.

- **Signs**

Make signs visible and unambiguous. Use symbol signs where possible. Post bi-lingual signs.

Locate signs in strategic places.

Use signs to:

Discourage access to dangerous areas.
Indicate opening and closing times.
Direct people to safe paths, exits, emergency assistance, means of calling for help, etc.
Inform people how to report maintenance problems.
Inform intruders of access control measures.

- **Safe Paths and Common Areas**

Provide adequate light for nighttime use of paths to and from the entrances and exits of buildings, and throughout the project or neighborhood.

Close or discourage nighttime use of certain paths where adequate lighting, visibility, and surveillance cannot be provided.

Eliminate entrapment spots, e.g., dense shrubs, high walls or hedges, or alcoves along pedestrian paths.

Locate amenities and activities at or near entrances, exits and major circulation paths to increase risks of detection for intruders.

Place common areas within the building complex. Group common areas for increased surveillance.

Install barriers or other devices to prevent misuse of public facilities or areas, e.g., bathing in fountains or camping overnight under bridges.

Design public amenities to discourage misuse, e.g., shape benches go be comfortable for sitting but not for sleeping, and roughen or install breaks in low walls, curbs, steps, railings, and smooth surfaces to discourage skateboarding.

Locate common mailboxes in secure, controlled-access areas.

Territoriality

Territoriality measures involve the use of physical features to express ownership and control of the environment, and promote neighborhood pride. They discourage the presence of outsiders by delineating private and semi-private spaces, and controlling the movement of people and vehicles.

- **Streets**

  Locate and design streets into and out of a neighborhood or development to reduce safety and security problems associated with through traffic. Employ measures to reduce the amount and speed of vehicular traffic. These include narrow road widths, two-way traffic, on-street parking, speed limits, bumps/humps, signs, traffic signals, curb indentations, bollards, cul-de-sacs, etc.

  Build sidewalks and seating to promote walking through the neighborhood or project.

- **Boundaries**

  Define clear boundaries between public, semi-public/private, and private spaces. Boundaries are needed at entrances to courtyards, yards, patios, terraces, storage areas, play areas, parking lots/garages, etc. They can be established by signs, walls and fences, gates, landscaping, sidewalks , curbs (vertical instead of rolled) and pavement treatment like tiles and cobblestones.

  Use boundaries to prevent conflicts between different groups, e.g., teens and seniors, so all user groups will be able to enjoy an area or facility and maintain an ownership interest in it.

- **Public Spaces**

  Create display and performance areas for local artists. A beautiful environment attracts people while a barren one repels legitimate users.

  Design neighborhood facilities to meet the needs of the people living in the neighborhood.

  Define uses for all areas in the neighborhood to prevent "no man's lands" from existing.

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LIGHTING AND LIGHTING SYSTEMS

Adequate exterior lighting is absolutely essential for business and homes. There is no substitute for it. Without adequate exterior lighting, the business owner accepts serious liability exposure. If serious crimes occur in poorly lighted areas, particularly crimes against persons, the business owner may well be held to be civilly and financially responsible.

The most important value of good exterior lighting is that it denies camouflage. It denies the would-be assailant the ability to hide from his potential victim. Additionally, good lighting provides a psychological deterrent to theft or assault. The individual or individuals who would commit such crimes prefer to operate in the shadows of darkness where the probability of detection or apprehension is less.

The effects of good exterior lighting can be generally summarized as *safety, security, identification, attraction, beautification, environmental integrity* and *utility.* It is essential to bear in mind that all of these effects are influenced by fixture and system design.

As previously stated, darkness is dangerous. The first step in designing exterior lighting is to determine "adequate lighting levels". The Illuminating Engineering Society of North America has established recommended guidelines for design and minimum lighting levels.

Areas	**Recommended Footcandles**
Pedestrian Walkways	5 footcandles
Building Entrances & Exits	5-8 footcandles
Parking Lots (Surface)	3-5 footcandles
Pedestrian Walkways Crossing Street	8-10 footcandles
Parking Structure Parking Areas	5 footcandles
Parking Structure Ramps	10 footcandles
Parking Structure Entrance Areas	20 footcandles
Parking Structure Stairwells	20 footcandles

These recommendations are not enforceable by law but are considered to be professionally credible. If a liability suit has exterior lighting as an element, the plaintiff's counsel would probably refer to these standards.

What is Good Lighting?

Good lighting is the single most cost effective deterrent to crime, but what is *good* lighting? Ideally, a good lighting system would be reproduced daylight. Realistically, however, the system must furnish a high level of visibility and at the same time a low level of glare. One of the most critical problems that needs to be considered is that the evenness of outdoor light is more important than an absolute level. Too much lighting can actually be a hazard in itself. Outdoor evening activity areas, such as a tennis court or playgrounds, can be hazardous because of the difficulty of seeing clearly into the surrounding area. When an individual leaves a brightly lighted area such as this and walks into a dark area, their vision is momentarily reduced and their vulnerability is increased. The opportunity for criminal attack is more of a likelihood when a situation like this exists.

Transitional lighting can be effectively used to minimize this hazard. Transitional lighting merely provides a gradual light level change from a brightly lighted area to a dark area. A lower light level can be employed adjacent to the bright area and this would help to provide a safe transition.

Understanding Lighting Technology: A Definition of Terms

Lighting technology involves a number of technical terms. Generally, the terms, definitions and discussions that appear in most texts are designed for the lighting engineer who has a strong foundation in the jargon and specifics of this subject. The terms presented below, although only scratching the surface, provide a point of department that you may draw from in developing a better understanding of the subject. In summary, therefore, some of the basic lighting terms that you, as a crime prevention officer, should be familiar with include:

- **Watt:** A term used to measure the amount of electrical energy consumed.
- **Lumen:** The lamps (light bulbs) used in various lighting equipment are rated in lumens. The lumen is frequently used as a term to express the output of a light source.
- **Foot Candle:** *This is another unit of illumination.* It is defined as the illumination on a surface one square foot in area on which is uniformly distributed one lumen of light.
- **Reflector:** A glass band, globe or bowl designed to control the direction of light by the use of prisms.
- **Quality of Lighting:** The distribution of brightness and color rendition in a particular area.

- **Luminaire:** A complete lighting device consisting of a light source, together with its globe, reflector, refractor, and housing. The pole, post or bracket is not considered a part of the luminaire.

- **Visual Factors:** Factors that aid in seeing an object.

  - Size of an object.
  - Brightness of an object.
  - Contrast of object to its background.
  - Time needed to see.

General Types of Lighting Sources

Listed below are eight lighting sources that are used in providing indoor or outdoor lighting. Their characteristics are described and their lumen output is summarized. The eight lighting sources are: Incandescent, Mercury Vapor, Fluorescent, Metal-Halide, Low Pressure Sodium, High Pressure Sodium, Quartz, and Halogen.

Incandescent

Incandescent lighting has low initial cost and provides good color rendition. However, incandescent bulbs have only 17-23 lumens (a measure of light at its source) per watt and a short life span of 500-5000 hours. Incandescent lighting is good for home use where changing bulbs is not a hazard, and can be more effective if used in conjunction with a motion detector or timer.

Quartz Lighting

This is basically incandescent lighting that has been improved to produce approximately 35 lumens per watt.

Halogen

Popular for both interior and exterior use, halogen bulbs create a very bright light with good color rendition. They produce approximately 50% more lumens per watt than incandescent lighting.

Halogen bulbs are available as screw-in replacements for existing incandescent lamps. Caution should be used when using halogen lighting as intense heat created by the bulbs can be a fire hazard.

Fluorescent

Fluorescent lighting has long life (12,00 - 20,000 hours), but are temperature sensitivity and usually not recommended for security lighting in colder climates. The cost of fluorescent lighting is low for indoor fixtures ("shop light") and can range from low to moderate for exterior fixtures. Fluorescent lighting produces good color rendition and has between 67 - 83 lumens per watt. Fluorescent lamps and fixtures are useful for covered parking, porch lights, and walking paths.

Mercury Vapor

Mercury vapor produces fair to good color rendition with a bluish white color, caused by an electric current passing through a tube of conducting and luminous gas. Mercury vapor produces 45-63 lumens per watt and has a life of 16,000 - 24,000 hours. Approximately 75% of all street lighting is mercury vapor. Mercury vapor lamps are useful for yard lights and in parking lots. It is considered more efficient than the incandescent lamp and is used widespread in exterior lighting.

Metal-Halide

Metal-halide produces excellent color rendition with a distinctive white illumination. The life of metal halide lamp is 15,000 - 20,000 hours and it produces 80 - 100 lumens per watt. It is often used for stadiums and auto dealers where lighting and color rendition are important.

Low Pressure Sodium

With a golden-yellow or amber color, low pressure sodium lighting produces poor color rendition. Low pressure sodium has high lamp efficiency. It produces 130 - 183 lumens per watt and the life of the lamps is 20,000 - 24000 hours. It has a relatively high fixture cost.

High Pressure Sodium

High pressure sodium lighting offers fair to good color rendition with a golden-white to light pink illumination. Producing 100- 150 lumens per watt, operating cost is low. It tends to be more expensive to install but it consumes less energy and fewer luminaries are required. Bulb life is 20,00 - 28,000 hours. This lighting is recommended for parking lots and other common areas.