Henrico County Police Division
Mixed Use Development - Design Standards:

The Henrico County Police Division supports and implements Crime Prevention Through Environmental Design (CPTED), which is the theory that the proper design and effective use of the built environment can lead to a reduction in the incidence and fear of crime and an improvement in the quality of life.

The following characteristics are considered the framework from which *safe designs* can be created:

1. ***Natural Surveillance***. Provide natural surveillance throughout the site, especially to parking areas, buildings, building entrances, walkways, etc. Natural surveillance is the placement of physical features, activities and people in such a way as to maximize visibility.
2. ***Natural Access Control***. Provide natural access control throughout the site. Natural access control is the physical guidance of people coming and going from a space by the judicial placement of entrances, exits, fencing, landscaping and lighting. The goal is to guide people where you want them to go and how you want them to get there.
3. ***Territorial reinforcement***. Territorial reinforcement is the use of physical attributes that express ownership, such as fences, pavement treatments, art, signage and landscaping. The goal is to promote ownership and pride in where you live and work.
4. ***Maintenance***. Allows for the continued use of space for its intended purpose. It also serves as an additional expression of ownership.

For more information log on to www.henricopolice.org and click on CPTED

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Mixed Use Design Standards

I. *Streetscapes/Landscape/Lighting*

I.A. Relationships

The design of streets within a community or development has to be considered when we think of "healthy streets". The characteristics that so often define "healthy streets" also can mirror what the users, pedestrians, cyclists, as well as law enforcement, consider to be "safe". If streets are used by residents or visitors, they will be perceived as safe and more people will be drawn to using them.

Inter-connectivity is encouraged and is vital to healthy streets. The design, sight lines or visibility, access control, maintenance and ownership or territorial reinforcement of the various means for this inter-connectivity is critical in the success of its long term use.

Considerations:

I.A1. Create and maintain as much visibility to/from and within the streets, alleys, paths, trails, etc. that are used to connect the various uses and features within the development.

I.A2. Consider the location of amenities, how they relate to their surroundings and where the amenities are located. Sitting areas, walkways, gathering points, et cetera all need to be positioned where visibility is maximized to and from other areas of the property.

I.A3. The design of the buildings and their relationship to the street should be considered. Instead of "*breaking up the flatness of the building façade with a series of recessed sections",* consider alternatives that will not create areas to hide, loiter, sleep or have trash and debris gather. Recessed areas are a concern. Acts occurring within such areas deserve special design attention. Many localities' response to recessed doorways and alcoves has been to retrofit them with wrought iron fencing to discourage loitering, sleeping and the build up of trash and debris.

I.A4. Weather-protection features such as awnings, canopies, or arcades, are encouraged rather than tinting of windows and recessed portions of the buildings.

I.B. Amenities

In locating amenities such as parks-linear or passive, benches, walkways and paths, play grounds, sports fields, open space, etc., the following should be considered and addressed:

I.B1. Maximize visibility to the amenity by considering its location within the development.

I.B2. Consider if access to the amenity should be controlled. If the desire is for the amenity to be open to anyone at all times, other considerations may need to be given to create a safer area. If the desire is to limit when and who uses the amenity, access control measures should be put in place and could range from signage, fencing, gates, etc.

I.B3. If street furniture is placed within the development, the type and design of furniture should not allow someone to lie down.

I.B4. If street furniture includes newspaper boxes, mail boxes, public telephone stations, etc., these features should always be in wide, open spaces, away from the building edge in order to discourage loitering, but in view of the interior of any nearby business.

I.B5. Consider the location of trash cans and their proximity to buildings. The goal is to discourage potential locations for devices that may be detonated.

I.B6. If bicycle racks are provided - These should be located in central areas of a garage or plaza, with visibility to and from the area.

I.C. Trails, paths, etc.

Visibility to and along trails or walkways is critical. Providing opportunities for observation by the users and passersby will help to create a sense of safety and encourage the use of such features.

Maintain sight lines along either side of trails. Clearing underbrush and invasive species anywhere from 10 to 25 feet out on either side of the trail is recommended. Clearing for sightlines along the trail or path will depend on the trail's location in relation to other activities, the density of woods, visibility, etc.

Berms and screening from roadways or other developed areas is not recommended. If some type of screening is required, it should not be continuous, but should have openings for surveillance opportunities.

I.D. Landscaping

The type of landscaping along streetscapes, paths, parking areas, amenities, etc., also needs to be considered. The goals should be:

a) Eliminating concealment areas
b) Locating amenities in high-traffic areas where these amenities may serve as focal points
c) Discouraging sleeping, skateboarding, in-line skating, etc. through proper design

Considerations:

I.D1. The location of light poles and their relationship to the trees throughout the site, to include streets, parking lots, buildings, etc., needs to be considered. The two should not be located in the same area, as illumination will be reduced as the trees mature.

I.D2. The landscaping within the development should provide 'windows of visibility'. Creating windows for visibility or surveillance does not limit the planting of trees and shrubs, but it does require a consideration of the following:

a) Natural growth habit of a shrub, evergreen or tree.
b) Location of the plants and features or activities that are immediately around them.
c) What the intent is for the landscaping. Answering such questions as – What is it there for? What is it doing? Why?

I.D3. Consideration of this window of visibility must be a part of the design if hedges, screening and the like are installed and/or required.

I.D4. Standard safety considerations for landscaping include:

a) Shrubs should have a ***natural*** growth habit of 2½ to 3 feet.
b) Trees should have a ***natural*** (canopy) growth habit of at least 4 feet from the ground.
c) When plant material will not naturally grow at these heights, maintenance is needed to maintain that visibility.
d) The goal is to maximize surveillance opportunities into and out of a site, as well as from within.
e) Consider the type of plant, its growth habit and where it will be located.

I.E. Lighting

Lighting is one of the most economical and effective forms of crime prevention available. Lighting must be even and uniform and not produce dark areas or sharp contrasts for concealment. In creating uniform lighting, consider:

a) type of fixture
b) the height of poles
c) the direction of the light
d) the spacing of fixtures

Routine maintenance of the lights throughout the property should be in place.

a) A program should be implemented to review the lights regularly to determine if any have burnt out or been broken and need replacing.
b) Globes should be cleaned to ensure full illumination from the light.
c) A program should be established to relamp the complex, also known as group relamping. This will better ensure the proper use of the lamp, as well as reducing cost when lights need to be replaced one at a time and each individual visit has to be paid for.
d) A program should be established in trimming and maintaining tree canopies and other plant materials at and around the light poles, wallpacks, etc.

Considerations:

I.E1. Light fixtures should direct the light down versus horizontally or up into the air, which is full cut off fixtures. All fixtures should be full cut off – to include post top, wall mounted and pole fixtures.

I.E2. Post top fixtures, even if decorative, should have the lamp in the top casing of the fixture so that the light will be directed towards the ground. This will remove glare because the lamp is hidden from view.

I.E3. Consideration of the height of the fixtures should be given. Shorter fixtures will require additional fixtures as the light spread is reduced.

I.E4. Install metal halide, compact fluorescent or incandescent lamps. All of these lamps produce a white color rendition. over high pressure sodium for parking lot lighting, parking decks, etc. The applicant should consider metal halide for street poles as well.

I.E5. The Illuminating Engineer Society of North America (IESNA) has created standards on security lighting. The below chart is from the *Guidelines for Security Lighting for People, Property, and Public Spaces,* IESNA G-1-03. *SEE APPENDIX C*

II. *Parking areas/decks*

II.1. The design of the deck should be open, which will allow:

a) Natural light into the deck area. Use less concrete on the edge of each level to allow for more light.

b) The ability to be heard throughout the deck and surrounding area.

c) The elimination of hiding places.

d) The ceiling crossbeams should be widely spaced which will allow for more light spread from the light fixtures. If they are not widely spaced, the light fixtures need to be level with the bottom of the crossbeam versus flush with the ceiling to be more effective.

II.2. The stairwells within the deck should be:

a) Access control (security) measures should be in place

b) Open stairwells where you can see into and out of the stairwell as well as have the ability to see from one landing to the next from within the stairwell.

c) Stairwells should have glass surrounding the exterior walls.

d) Stairwell doors are not desired. The preferred design is for the stairwells to be open for visibility and hearing ability, unless the stairs are to the residential corridors, then access does need to be controlled and doors would be necessary.

e) If stairwell doors are required, every door should have a vision panel that will allow visibility into and out of the stairwell.

f) If required by fire or building codes, tie the stairwell door into the alarm system and have it in a hold-open position. If the alarm is activated, the stairwell door will automatically close.

g) Access to stairs that lead to residential units should be controlled. The stairwell should not allow non-residents access into the stairwell.

II.3. Access control should be provided within the deck, stairwells and elevators for the residents or business owners. Consider:

a) Will the structure be for residents only? Will visitors, business owners, customers, etc. be able to utilize the deck?

b) If anyone can park in this structure, the residents should have a separate area similar to doctors parking at hospitals. This would include such items as - The stairwells and elevators should function the same way where ONLY residents can access these via a card reader.

c) This same access control needs to be in place for the elevators from the garage or lobby to the residential corridors. Non-residents should not be able to use the elevators. Install card readers in the elevators to restrict access to residential floors.

II.4. Consideration of the design and safety for stairwells within decks should be given:

a) For structures *with unrestricted parking* (open to anyone), the stairs should be open, where someone can see into and out of the space. The stairwells should not look like Photo A but more like the stairwell in Photo B.

b) Users should have the ability to see from one landing to the next from within the stairwell.

c) Stairwells should have glass surrounding the exterior walls (when possible)

Photo A– bad example

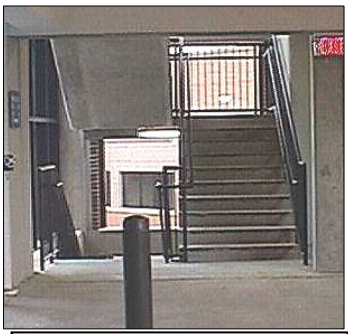


Photo B – good example

II.5. *If Building Code requires doors at the entry points to the stairwell* – Consider:

a) Install stairwell doors that have a reinforced vision panel to allow visibility into and out of this area.

b) Connect the doors to the alarm system so that they can be in a hold open stance unless the fire alarm is set.

II.6. Lighting within a deck should have the following characteristics:
a) Provide a minimum foot-candle level of 6.0 foot-candles throughout the parking garage. This foot-candle level must be maintained along drive/walk aisles, entrances, stairwells, etc.
b) For maximum effectiveness, locate light fixtures where drivers get in and out of their car versus just where they drive.
c) Interior lights should be on 24 hours a day.

II.7. Other characteristics that should be in place include:
a) Closed Circuit TV Cameras
b) Emergency phones on every level
c) Adequate (current) location and direction signage throughout the deck

III. Uses

IIIA. Ingress/Egress Points

The relationship and location of ingress and egress points into a building in a mixed use development are critical to the safety of the users. Locating the points along streets or in areas with the most visibility and with access control measures in place should be considered.

Providing visibility for ingress and egress points into the design within a mixed use development is critical for safety and security of the users. Visibility could include clear sight lines, clearly marked entrances, lighting, landscaping that doesn't block sight lines or create hiding spaces, not allowing large blank walls by entrances or lobby areas, among other measures should be considered. See Photo A as an example.

Photo A. Ingress/egress from street. Left set of doors is example of entry to public garage. Right set of doors is example of tenant (residential, office and commercial).

Access control measures can easily and cost effectively be planned at the preliminary stages to benefit both the residents, business owners and users of the site. Access control can include directional signage, access control instructional signage, card readers and other forms of locking mechanisms, etc.

Considerations:

III.A1. Residential entrances off of sidewalks or streets. Provide the following characteristics:
a) Do not construct solid walls along the walk to residential entrances located within a mixed use area. Install windows, glass within internal corridors, etc whenever possible to maximize visibility to and from ingress/egress points.
b) Any retail spaces located near the residential entrance area should have glass on the walls surrounding the residential entrances.
c) Minimum light levels of no less than 1.0 foot-candle
d) Closed circuit television

III.A2. All exterior ingress/egress doors should have the following installed:
a) Access control measures – card reader or similar to only allow residents into the space

b) Glass around and at the ingress/egress points.
c) Exterior doors should have reinforced glass or vision panels for visibility into and out of the space. If the doors are for egress only, no hardware should be installed on the outside of the doors.

III.A3. Any ingress or egress points located off an alley, from a parking deck or similar should maximize the visibility and provide access control features as described above.

III.A4. Lobby areas to the residential units should be controlled so that no one else can enter or at minimum serve as a staging area for visitors with no ingress opportunities into the secured, private portion of the building unless granted by the owner or tenant.

III.A5. If the exterior door leading to the lobby area is open for visitors, etc., then the elevator and/or doors leading to stairwells should have card readers to control non-residents from gaining access. The elevator should not work unless activated by a card. The stairwell door should have vision panels within the door.

III.A6. Residents should have the ability to buzz someone from lobby.

III.A7. Make available the camera views from the lobby and other key areas to the residents via a TV channel they can monitor.

III.A8. Corridors - Doors to residential units should have:
a) wide angle peepholes
b) addresses
c) solid core doors

III.A9. Corridor design should not create blind corners. Design the corridors either as straight hallways, or if curved, similar to Photo C.

III.A10. Do not design 90 degree turns within corridors, but angle the turns so that the corners are cropped. This will also expand the turning radius for residents moving within the space, whether its furniture, bicycles, etc. (See photos B and C)

Photo B. Corridor not offering visibility in a hall.

Photo C. Corridor offering visibility down the hall.

III.B. Mixed – Residential/Office/Commercial

III.B1. See characteristics above.

III.B2. Office ingress/egress points and access to delivery corridors for retail spaces - off of sidewalks or streets. Provide the following characteristics:
a) Do not construct solid walls along the walk to residential/office and delivery corridor entrances located within a mixed use area. Install windows, glass within internal corridors, etc whenever possible to maximize visibility to and from ingress/egress points.
b) Maximize visibility around and at the ingress/egress points for these uses. Don't create solid blank walls, but locate glass on the walls surrounding the area.
c) Minimum light levels of no less than 1.0 foot-candle
d) Closed circuit television

III.B3. All exterior ingress/egress doors should have the following installed:
a) Access control measures – card reader or similar to only allow tenants into the space
b) Glass around and at the ingress/egress points.

c) Exterior doors should have reinforced glass or vision panels for visibility into and out of the space. If the doors are for egress only, no hardware should be installed on the outside of the doors.

III.B4. Any ingress or egress points located off an alley, from a parking deck or similar should maximize the visibility and provide access control features as described above.

III.B5. Lobby areas to office/residential and delivery corridors should be controlled so that no one else can enter or at minimum serve as a staging area for visitors with no ingress opportunities into the secured, private portion of the building unless granted by the owner or tenant.

III.B6. If the exterior door leading to the lobby area is open for visitors, etc., then the elevator and/or doors leading to stairwells should have card readers to control non-tenants from gaining access. The elevator should not work unless activated by a card. The stairwell door should have vision panels within the door.

III.B7. Corridors - Doors to office units should provide visibility to and from the corridors as much as possible so that ownership and surveillance are maximized. Locate small windows along office doors, vision panels or install full to partial glass doors.

III.B8. Corridors – retail delivery areas and the like should have the following characteristics:
a) wide angle peepholes or small one-way windows
b) addresses
c) solid core doors

III.B9. Corridor design should not create blind corners. Design the corridors either as straight hallways, or if curved, similar to Photo C.

III.B10. Do not design 90 degree turns within corridors, but angle the turns so that the corners are cropped. This will also expand the turning radius for the tenants and allow for more space for deliveries, etc. (See photos B and C)

Photo D. Good design of tenant entry point within a public parking deck. Security measures are in place

III.C. Mixed – Parking Deck/Residential/Office/Commercial

In a parking structure – whether surface or multi-level deck, maximizing surveillance opportunities within and to and from the space should be considered in the design phase.

Considerations:

III.C1. See II Parking areas/decks; III.A. Ingress/Egress Points and III.B. Mixed – Residential/Office/Commercial above.

III.C2. Access control and surveillance opportunities must be in place within a parking deck or from a parking lot when removed from the normal flow within a site. In a deck consider the design and security features as shown in Photo D.

These types of features should be in place:
a) Tenant only ingress/egress points to the interior spaces
b) Access control measures at these ingress/egress points
c) Visibility to and from the ingress/egress points is offered
d) Signage is in place directing visitors and non-tenants.
e) CCTV is in place
f) Lighting is in place
g) The surfaces of the deck are light in color so that any light present will be reflected, making the space appear brighter.
h) The cross-beams in the ceiling are spaced at greater distances. This provides a more open feeling and doesn't create dark recessed areas, helping to make the space feel brighter.

Photo E. Alley of a rear loading garage example

III.D. Alley's and rear loading garages

The design and security features for alley ways must be considered. Not only is the design a concern in the beginning stages of these spaces, but maintenance is of great concern as a site or area ages. Consider the user of the space - the public and the homeowner, when designing alleys. Provide opportunities for informal observation to the alleys by the residents.

Considerations:

III.D.1. Design features:

a) Provide lighting in the alleys. Streetlights will be needed to illuminate the alley and the areas around the garages, etc. The minimum maintained light level should be no less than 0.5 foot-candles.

b) Limit the amount of landscaping installed in the alleys so that blind spots or areas for someone to hide will not be created.

c) Do not create recessed areas off of the alleys. Garages, sheds, fences, et cetera should be lined in a straight line to maximize visibility from within the alley and from the street.

d) Maintenance policies must be required to address the growth of the landscaping, light fixture maintenance, bulb replacement, surface treatment maintenance, etc.

e) Install a white concrete pavement in the alleys. This will reflect any light to help with the light levels, as well as avoid the problem of potholes, cutting of grass, grading, etc. for a gravel surface.

f) Locate addresses along the rear.

g) Construct trash corrals.

Photo F. Locate lights under deck space, beside garage and other spaces to be most effective.

III.D.2. Rear loading garages – the area leading to/around the garages will be challenging areas to properly illuminate if the space between the units is narrow and no features like rear decks are provided. Since this area will be the main point of entry/exit from the units, it needs to be illuminated. The minimum maintained light level is 1.0 foot-candles. This should be met when possible. Alternative lighting designs and fixtures may be necessary depending on the layout and design of the space.

III.D.2. Illuminating a space like in Photo E may prove challenging due to the bedroom locations on either side of the alley. Consider adding amenities like decks, landscaped areas, breaking up the continuous line of units, etc., that can also work towards better lighting and use of the spaces as shown in Photo F.

Appendix A: *Landscaping/Streetscapes/Main Street/Lighting Examples*

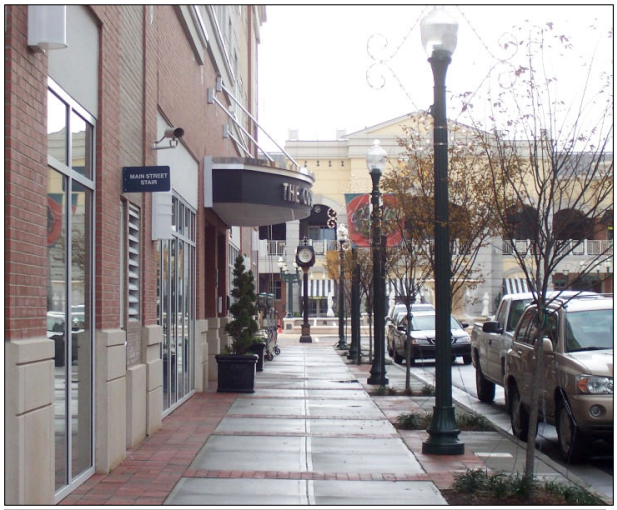
Example of Natural Surveillance and Access Control in outdoor dining along street

Notches placed to deter skate boarding, in-line skating, etc.

Private entrance for residents of the multi-story building to the right. Public entrance shown in on the left. CPTED strategies are in place.

Resident entrance requires card reader to enter. Visitor entrance is separate and controlled. Access only granted by resident land line phone.

Example of residents' entrance within a public parking garage. Surveillance and access control through a card reader are implemented.



Streetscape where territoriality is readily apparent. Distinction of space on the sidewalk with pavement types and features.

Appendix B: *Design Examples for Alley's/Rear Loading Garages/Rear Entry's*

Example of townhome with rear loading garage. Full cut off light is mounted under balcony, as well as porch light by garage door. Address is provided for emergency response.

This design for rear loading garages creates a challenge in illuminating the alley properly. Pole lights aren't able to be placed within this space and wall packs could create light trespass issues for the owners.

Alleys can be designed so that they are welcoming versus areas to avoid. This example of the alley entrance between single family homes is very open allowing for visibility into the area. Additional features that would enhance the safety include – limiting recessed areas; maintenance; using white concrete to reflect light in the area; locating the numeric address on the garage or door; lighting; limit on size, growth habit and location of landscaping.

Appendix C: *Lighting*

The Illuminating Engineer Society of North America (IESNA) has created standards on security lighting. The below chart is from the *Guidelines for Security Lighting for People, Property, and Public Spaces,* IESNA G-1-03.

Security Locations and Tasks	Illuminance, Lux/FC (Horizontal) - Average	Illuminance, Lux/FC (Vertical)	Footnotes on special considerations	Ratios (avg to minimum)
Parking Facilities, Garages & Covered Parking Spaces			(h)	
On pavement	60/ **6.0**	(a)	--	4:1
Gathering points (stairs, elevators, ramps)	50/ **5.0**	(a)	--	4:1
Park trails and walkways	6/ **0.6**	(a)	(j)	4:1
Likely loitering areas	10/ **1.0**	(a)	--	4:1
Supermarket, Major Retail Parking				
Parking lot	30/ **3.0**	(a)	--	4:1
Low activity – close-in parking	50/ **5.0**	(a)	(k)	4:1
Fast Food Restaurants				
General parking	30/ **3.0**	(a)	--	3:1
Drive up window out to 30 ft	60/ **6.0**	(a)	--	3:1
Refuse area	30/ **3.0**	(a)	--	3:1
Convenience Stores & Gas Stations				
Pump island	60/ **6.0**	(a)	--	4:1
Sidewalks, refuse areas & grounds	30/ **3.0**	(a)	--	4:1
Interior of store	300/ **30.0**	(a)	--	4:1
Automated Teller Machines & Night Depositories (Exterior)				
Face of ATM	--	150/ **15.0**	--	3:1
Within 10 ft of face of ATM	100/ **10.0**	(a)	--	--
Beyond 10 to 50 ft	20/ **2.0**	(a)	--	3:1
Supported parking (60 ft)	20/ **2.0**	(a)	--	3:1
Side of bldg out to 40ft when ATM is w/i 10ft of corner	20/ **2.0**	--	(e)	3:1
Building Facade	--	5-20/ **0.5-2.0**	--	8:1
Hotels and Motels				
General parking	30/ **3.0**	(a)	--	4:1
Sidewalks and grounds	10/ **1.0**	(a)	--	4:1
Multi-family Residences				
Common areas	30/ **3.0**	(a)	--	4:1
Common mailbox area	100/ **10.0**	(a)	--	4:1

Footnotes:

(a) Vertical illuminance of 5-8 lux or values that produce a uniformity raito of no more than 4:1 (25% of horizontal illuminance
(b) Horizontal illuminance should be as shown or twice that of immediate surrounding area, whichever is greater
(c) Interior illuminance should be minimum recommendation for specific task requirement
(d) Redundant lamps so loss of any one lamp will not reduce lighting levels below minimum
(e) Good to excellent facial recognition required at a distance of 30ft
(f) Unobstructed view out to 50 ft. in all directions from face of machine
(g) Unobstructed view from inside enclosure outside to 20 ft.
(h) Interior lighting should allow for safe movement and easy detection of hazards to a distance of at least 30ft
(i) See IESNA RP-28, *Lighting and the Visual Environment for Senior Living*
(j) Lighting should extend out on both sides of trail to a distance of 30 ft
(k) Size of parking area determined by estimated customer count
(l) For special events, parking lots and grounds should be lighted 2 hours prior to 2 hours after the event