



PRESENTATION

Crime and Built Environment Research

DATE

Section 4

SPEAKER

DR. DEREK J. PAULSEN

Lecture Outline

- ✿ Important Factors for Designing sustainable Communities
 - ✿ 8 main factors associated with safe design
- ✿ Research Section
 - ✿ Major issues
 - ✿ Research findings and policy implications
 - ✿ Practical Exercise



Safe Design factors

Safe Design Factors

- ✱ Goal is to provide design issues that need to be considered when designing and planning individual homes as well as larger developments.
- ✱ Suggestions are “platform independent”
- ✱ These Safe Design factors need to be integrated into development process based on the local conditions present at the development location.
- ✱ Major Issues of each design factor
- ✱ Research Findings
- ✱ Design Guidelines

Safe Design Factors

- ✿ Local Neighborhood Understanding
- ✿ Access and Movement
- ✿ Site Design
- ✿ Surveillance
- ✿ Lighting
- ✿ Ownership
- ✿ Physical Protection
- ✿ Activity
- ✿ Management and Maintenance

Understanding Local Context

- ✱ It is essential that all parties involved in a development understand the social context and unique nature of the area they are building.
- ✱ Planners, Architects, Developers
- ✱ The design suggestions that will be made are contingent on the neighborhood conditions of the area of development.
- ✱ Undeveloped area
- ✱ Redeveloped area

Understanding Local Context

- * Social Demographics: Census and survey data.
- * Area Crime Data:
 - * Average overall crime
 - * Predominant crime types
 - * Crime Attractors/ Crime Generators
 - * Conditions of nearest neighborhoods
- * Neighborhood Lifecycle: Stage of decline of area.

Understanding Local Context

Neighborhood Lifecycle: Stage of decline of area.

Stage 1: Healthy Neighborhood: Homogeneous housing and moderate to upper income, insurance and conventional financing available.

Stage 2: Incipient Decline: Aging housing, decline in income and education level, influx of middle-income minorities, fear of racial transition.

Stage 3: Clearly Declining: Higher density, visible deterioration, decrease in white in-movers, more minority children in schools, mostly rental housing, problems in securing insurance and financing

Understanding Local Context

Neighborhood Lifecycle: Stage of decline of area.

Stage 4: Accelerating Decline: Increasing vacancies, predominantly low-income and minority tenants or elderly ethnics, high unemployment, fear of crime, no insurance or institutional financing available, declining public services, absentee-owned properties

Stage 5: Abandoned: Severe dilapidation, poverty and squatters, high crime and arson, negative cash flow.

Stage 6: Renewal: Process begins anew. Takes a great deal of money and a great deal of time to affect change.

Access and Movement

Focus: Involves the layout of roads and pedestrian paths/trails throughout a community.

Providing connectivity for cars and pedestrians while minimizing levels of criminal victimization.

Issues

- ✱ Within urban design and planning, connectivity is an important goal, as it has many benefits for society.
- ✱ Conflict arises in that research has shown that crime increases in highly connected/permeable areas.

Access and Movement

Increased Connectivity Argument:

Provides many benefits to communities, including:

- Decreases traffic on arterial roads;
- More direct routes;
- Increases walkability;
- Easier access for emergency vehicles.

Generally seen as more sustainable.

Much of the policy focus is on decreasing the use of cul-de-sacs, shrinking block sizes and increasing grid streets.

Access and Movement

Cul-de-sacs and block length:

Virginia: All new subdivisions must feature streets that connect to adjacent neighborhoods, schools, and shopping areas.

Cities such as Portland, OR have banned cul-de-sacs completely with only a few exceptions granted at a board of adjustment review.

Other locations have reduced block lengths (generally less than 1,000 feet) or implemented connectivity index scores.

Minimum link-ratio scores

Access and Movement

Planning Policy and Connectivity:

Several of the major planning policy initiatives are strong proponents of connectivity and the decreased use of cul-de-sacs.

Smart Growth: Transects

New Urbanism: Walkable streets and small blocks

LEED ND: Minimum requirements for intersections

In general, planning is moving towards more connected communities through various different methods and to varying degrees of success.

Figure 2. Project site with at least 90 eligible intersections per square mile within 1/4 mile of project boundary



90 Intersections per square mile within 1/4 mile of project boundary

Access and Movement

Connectivity and Crime: Empirical Research

Encounter: Permeable streets are safer because they encourage walking, social interaction and increased levels of “eyes on the street”.

Jane Jacobs

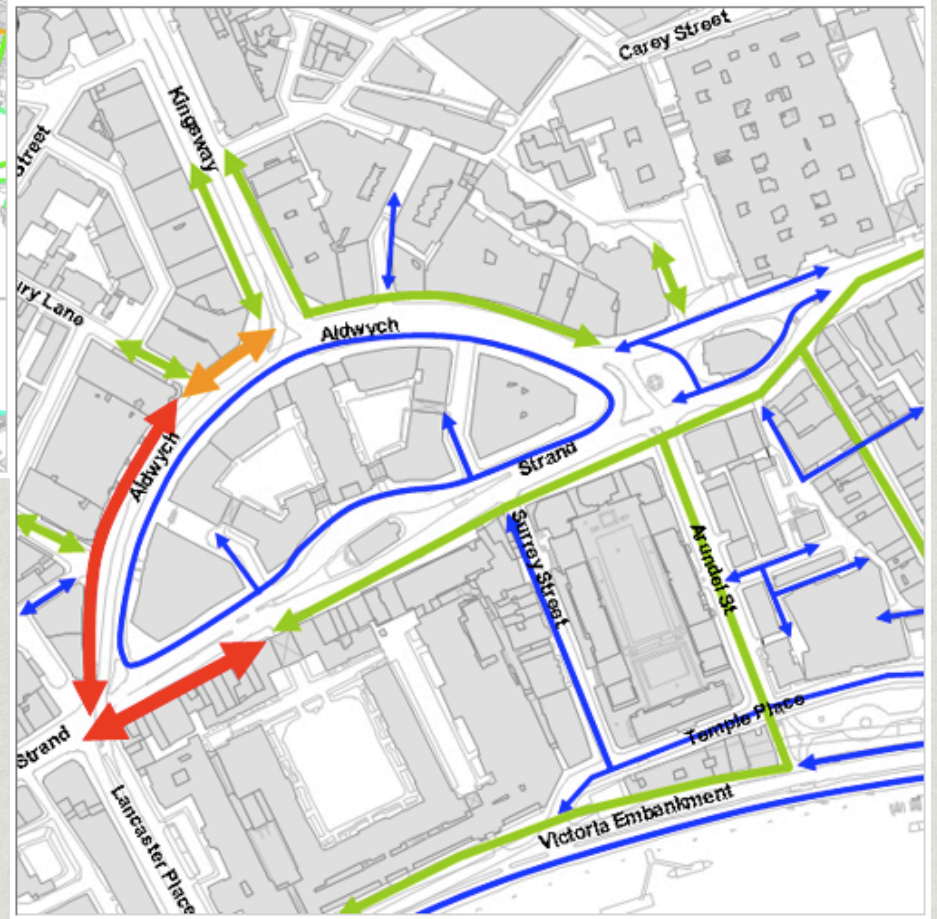
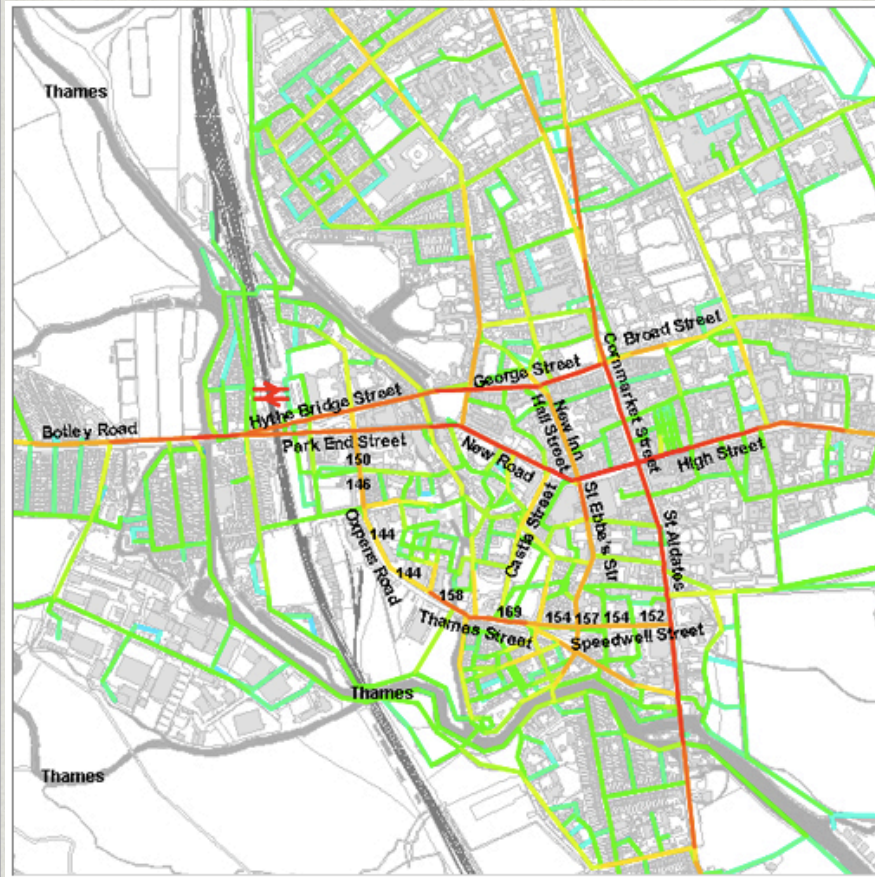
Enclosure: Limiting permeability by controlling access to strangers means residents can more readily distinguish strangers and potential criminal behavior and thereby reduce opportunities for crime.

CPTED, Defensible Space

Encounter Model

Nutshell: Vitality of a street provides informal social control that prevents crime. Vitality is dependent on highly connected urban street networks with short blocks and multiple connectors.

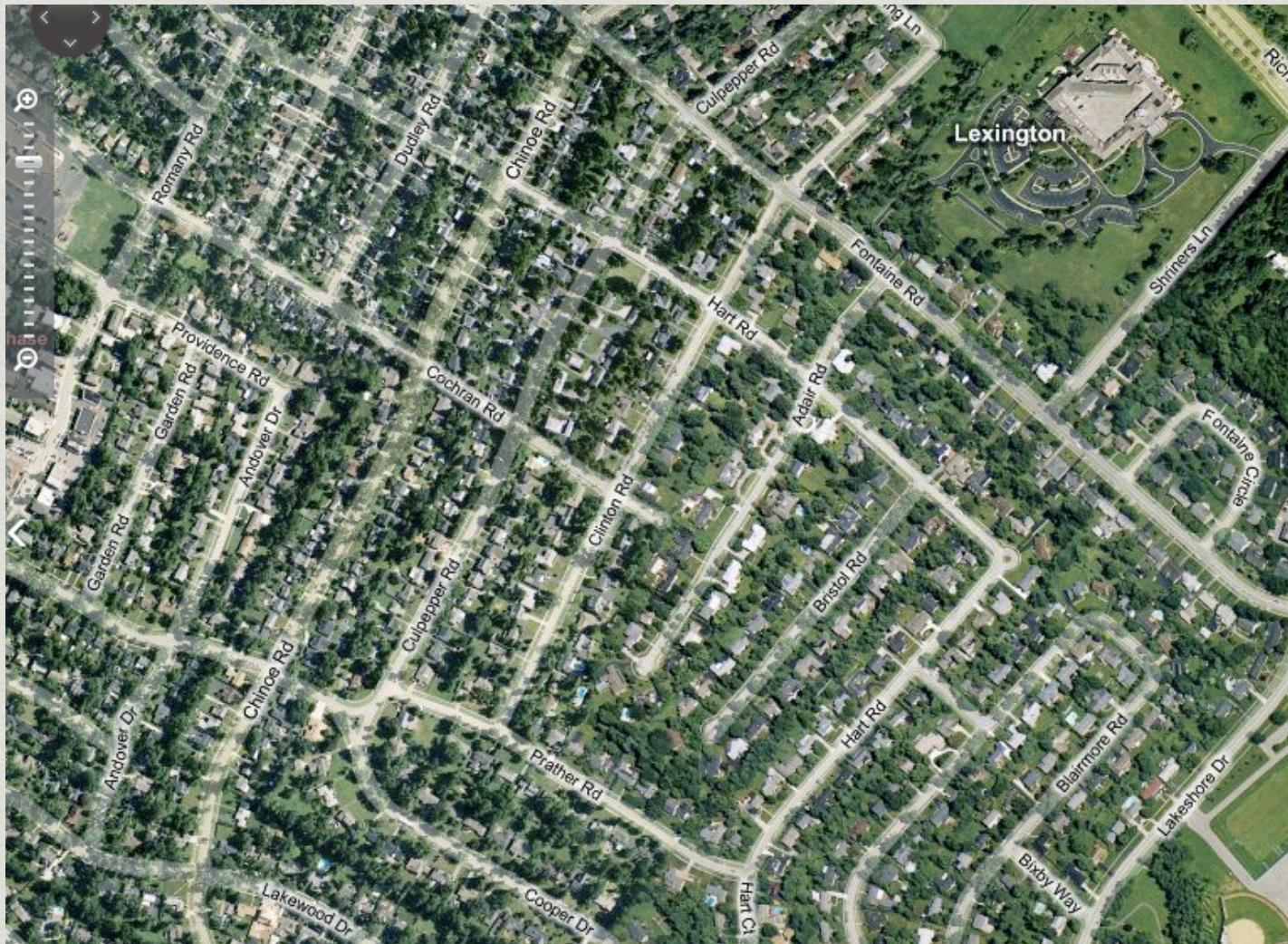
- Biggest supporter of this model is Hillier and the Space Syntax body of research.
- Space Syntax focuses on using advanced technology and research methodologies to assess levels of street use in relation to crime.
- Focus on movements, accessibility, land use, block size.



Encounter Model

Research Findings

- Presence of strangers can act as a natural policing mechanism.
- Crime incidents, particularly residential burglary, are concentrated in the more isolated and less accessible streets.
- More permeable layouts with higher pedestrian movement, have less crime.
- Cu-de-sacs are isolated and thus are actually more likely to increase incidents of burglary.



Grid style streets, few cul-de-sacs, and walkable all lead to less crime.

Encounter Model

Problems with Encounter model research

- Space Syntax doesn't measure actual levels of use as much as estimates of use.
- Fails to distinguish between pure cul-de-sacs and "leaky" cul-de-sacs
- More recent research has indicated that it is "leaking" cul-de-sacs that are more associated with crime than traditional cul-de-sacs. (Hillier, 2004)
- Connected grid-style streets can be vulnerable to crime if they are designed with a system of access by rear alleys. (Hillier, 2004)

Enclosure Model

Enclosure Nutshell: Limiting connectivity by controlling access to strangers means residents can more readily distinguish strangers and potential criminal behavior and thereby reduce opportunities for crime.

Idea behind Enclosure model is to control access and limit the presence of strangers in an area.

Does not advocate cul-de-sacs, only the prevention of excessive permeability which can lead to increased victimization chances.

Overall, there are over 60 studies indicating increased connectivity leads to higher levels of crime.

Enclosure Model-Research

Street Layouts

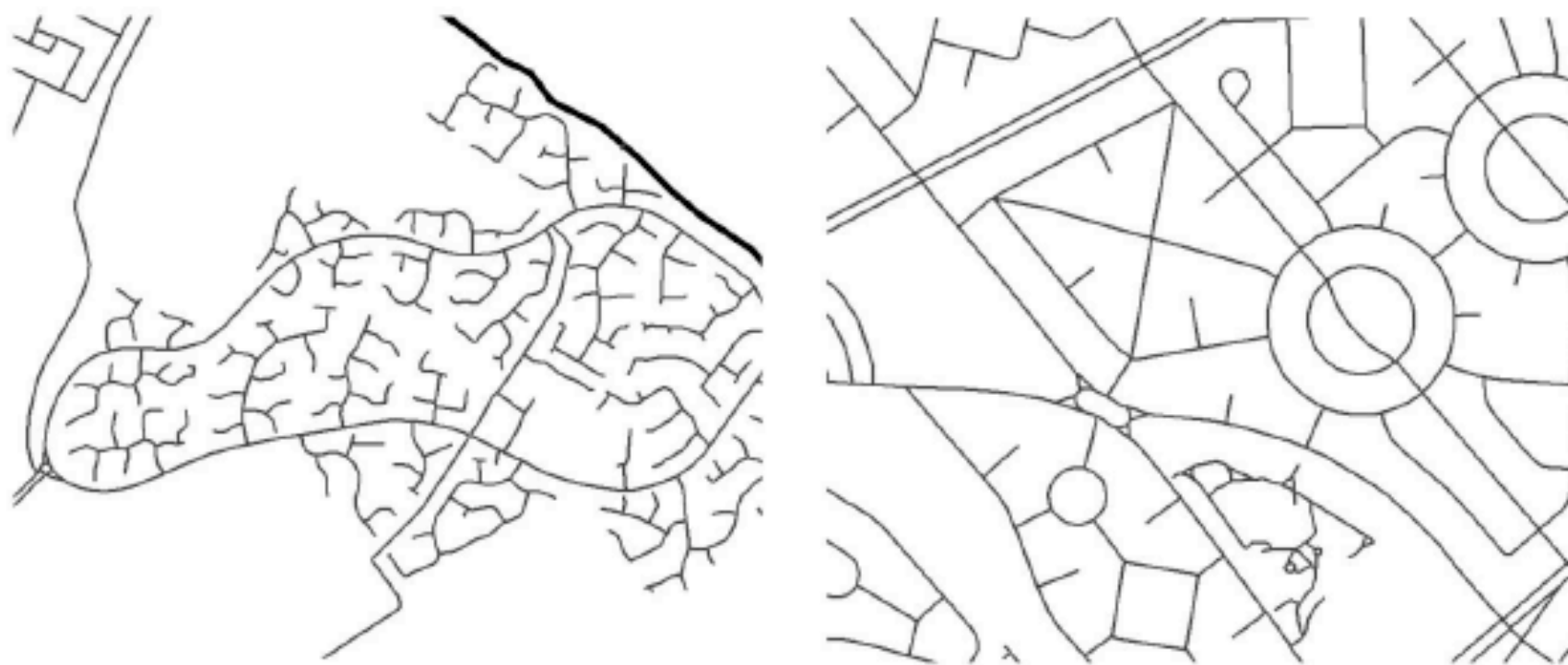
- ✿ Areas with unregulated access have more crime than areas with street layouts with more restricted access (Eck, 1997).
- ✿ An extensive and compelling body of research over the last 30 years consistently indicates that levels of crime are higher in more permeable, accessible, well-used street networks (Cozens and Love, 2009).
- ✿ Results indicate that being in an integrated location reduces crime risk by 42%, but being in a highly connected space increases it by 31% (Hillier, 2004).
- ✿ Over providing of permeability where it does not increase integration-essentially the provision or permeability without use-is a security hazard in housing areas (Hillier, 2004).

Enclosure Model-Research

Cul-de-sacs

- ✿ Results clearly show cul-de-sacs to have lower rates of burglary and this is particularly the case with sinuous cul-de-sacs (Johnson and Bowers, 2010).
- ✿ “Leaky” cul-de-sacs can increase victimization rates.
 - ✿ “Leaky” cul-de-sacs are those where there are footpath connections between otherwise closed cul-de-sacs.
- ✿ “Leaky” cul-de-sacs increase crime since the modifications effectively create through roads for both residents and others (Sheard, 1991).

Fig. 2: Types of cul-de-sac (Left: mostly sinuous, Right: mostly linear)



Enclosure Model-Research

Corner Locations

- ✱ Houses at corner locations are more likely to be burglarized than those on other parts of the road (Paulsen, 2009)
- ✱ Homes on cul-de-sac streets that were burglarized were more likely to be located on corners that intersected with main arterials or connector streets (Paulsen, 2009; Hakim, et. al, 2001).

Enclosure Model-Research

Alleys:

- ✿ The POE in the vast majority (80%) of all residential burglary is the rear of the house.
- ✿ Connected grid style streets are more vulnerable to crime if they are designed with a system of access by rear alleys (Hillier, 2004).



Access and Movement

Streets and Road Networks

- ✿ Streets in single-family residential zones should be laid out in direct, open, well-used routes and minimize underused and segregated segments.
- ✿ Cul-de-sacs are only used where appropriate and not to the point that they prevent adequate connectivity with the larger community.
- ✿ When cul-de-sacs are used they should be short in length and not interconnected through sidewalks or footpaths i.e., “leaky cul-de-sacs” should be discouraged.

Access and Movement

- ✿ Public access to the rear of single-family residential homes via alleys or streets is discouraged and when used should be designed to provide maximum surveillance and lighting in order to reduce opportunities for crime.
- ✿ Streets in single-family residential zones should be wide enough to allow for on street parking but not so wide that speeding would be promoted.

Access and Movement

- While it is accepted that through routes will be included within development layouts, the designer must ensure that excessive permeability or redundant and/or unnecessary ingress and egress points do not compromise the development's security.
- The provision of permeability without use is a security hazard in housing areas.



Overly wide street



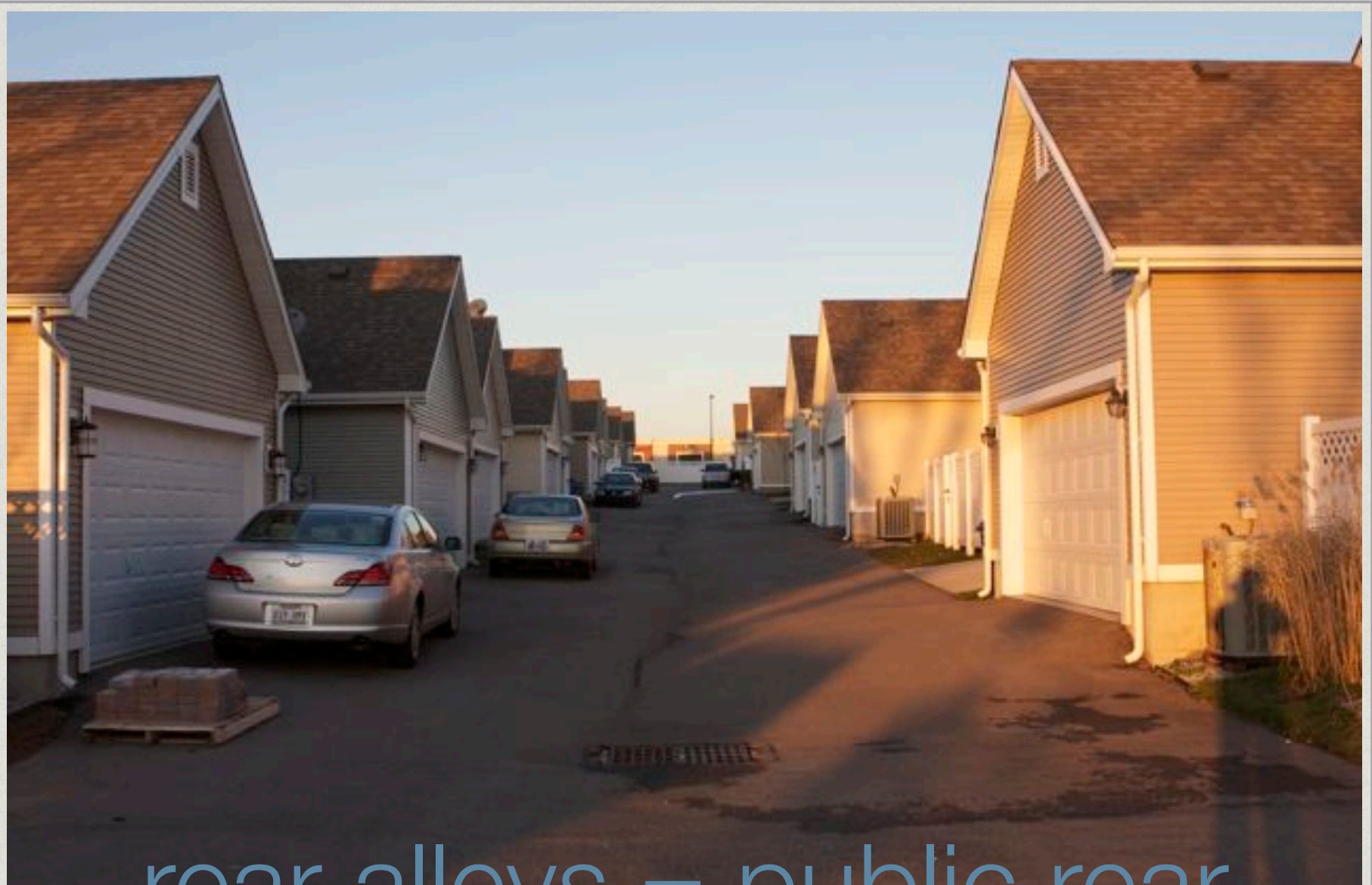
smaller more
manageable street



closed cut through



leaky cul-de-sac



rear alleys = public rear
access to homes

Trails and Footpaths

Issues:

- ✱ Increasingly trails and pedestrian trails are being seen not as amenities within a community, but as a public necessity.
- ✱ Cities such as Boulder, CO and Atlanta, GA have pioneered large interconnected pedestrian trails as public use transportation.
- ✱ **HOWEVER**, for many in the public trail locations often engender fear of crime and victimization.

Trails and Footpaths

Crime and Trails/Footpaths:

- ✿ Trails and their location generally induce fear in one of several ways:
- ✿ **Burglary/Larceny:** Trails located behind residents homes will make them more likely to be victimized.
- ✿ **Property Values:** Trails and their associated crime will negatively impact property values.
- ✿ **Assaultive Crimes:** Many trail users fear victimization while walking on trails.

Trails and Footpaths

Research Results:

- ✱ Research indicates that houses situated along pedestrian trails do NOT have increased likelihood of burglary (Paulsen, 2009).
- ✱ Less than 1% of all residential parcels located along off-road pedestrian trails were victims of burglary (Paulsen, 2009).
- ✱ Parks and trails have been found to be positively associated with the value of residential property (Troy and Grove, 2008).

Trails and Footpaths

Recommendations

- ✿ Sidewalks and routes for pedestrians, cyclists, and vehicles should not be segregated from another, but should be at street level and visible from both roads and homes. Networks of separate footpaths to unsupervised areas facilitate crime and anti-social behavior and should be avoided.
- ✿ Sidewalks and pedestrian routes should be laid out so as to prevent the creation of unofficial trails throughout a neighborhood.
- ✿ Sidewalks and pedestrian routes should be designed to be open and not obscured by vegetation or aspects of the built environment.

Trails and Footpaths

- Sidewalks and pedestrian routes should be laid out with direct routes to destinations that will encourage the use of the sidewalk.
- Movement frameworks based upon primary routes and shared spaces, remove the need for under used alleyways, short-cuts, footpaths and a large number of minor access points that can become vulnerable to or facilitate crime.
- Public sidewalks and pedestrian routes should **NOT** run **TO** the rear of, and provide access to, yards or houses.

Trails and Footpaths

- Landscaping set-backs must be a minimum of 6 feet from any sidewalks or pedestrian route and should be stair stepped so that tall vegetation does not compromise surveillance.
- When segregated pedestrian routes are unavoidable, designers should consider making it a focus of the development. In these cases, design should be:
 - As straight as possible;
 - Minimum of 10 feet wide;
 - Devoid of potential hiding places;
 - Overlooked by surrounding buildings and activities.



sidewalk behind townhomes



trail into rear of townhome neighborhood



Trail located appropriate distance from road.



uninspired sidewalk



more attractive street and sidewalk



je [Report a concern.](#)

Inspired street and sidewalk



improper landscaping near sidewalk.

Site Design

Issues

- ✱ More than any other aspect of safe design, extra thought needs to go into site design.
- ✱ Site design decisions are more permanent than other design decisions, more expensive and basically impossible to change after construction.
- ✱ Importantly, how neighborhoods, commercial areas, retail areas, and other built environments are laid out is critical to reducing opportunities for crime.

Site Design

- * Good site design is essential for design issues such as surveillance, lighting, ownership, and activity spaces to function correctly.
- * If site design is not correctly done, then surveillance, lighting, ownership, and activity space will be difficult if impossible to get correct
- * Developers need to work together when designing developments.
 - * Prevent multiple conflicting uses in a development.
 - * Prevent opportunities from developing from poor layout

Site Design

Recommendations

- ✿ Homes should be situated so that few sides are exposed to the public realm.
- ✿ Parking is on the property or on the street directly in front of house.
- ✿ Single-family residences incorporated into a mixed-use design should ensure that publicly visited areas are situated on the periphery of a neighborhood.
- ✿ Garages are front facing and do not extend outward from the residence to the point that surveillance is compromised to any great extent.

Site Design

Recommendations

- Garages located in the rear of a property are not accessible by rear alleys or other little used roads that provide inadequate surveillance as well as direct access to the rear of a home.
- Spacing between houses should be designed to prevent the creation of “alleys” where surveillance is minimal. Where spaces between houses are minimal, windows and/or lighting needs to be incorporated to enhance safety and reduce blind spots between residences.
- **GATED NEIGHBORHOODS ARE STRONGLY DISCOURAGED**



Recessed door and garage cut out



“opposite” entrances should be avoided



active fronts promote safety



Mixed use developments need to be sited correctly



Avoid “house alleys” which compromise surveillance

Surveillance

Issues

- ✱ Fear of crime is high in areas where surveillance is compromised.
- ✱ Actual crime victimization is higher in areas where surveillance is minimized.
- ✱ Opportunities for crime
- ✱ Cameras and natural forms of surveillance are well known to be effective at reducing crime opportunities.
- ✱ Opportunities are reduced when locations are surveilled

Surveillance

- ✱ Neighborhoods where all publicly accessible spaces are overlooked provide for more safety and less criminal victimization.
- ✱ While cameras and other forms of mechanical surveillance can provide adequate crime prevention in some circumstances, natural forms of surveillance created by design and neighborhood activity are often superior in impact and cost.
- ✱ **While designing in surveillance should form a core aspect of crime prevention, it should not be relied on as the sole strategy for crime prevention.**

Surveillance

Recommendations

- ✿ Houses are situated so that they face each other, maximizing surveillance and avoiding blind spots or hiding places.
- ✿ Windows are located on all sides of the home to maximize visibility.
 - ✿ Minimum two windows on first floor of front and rear of home.
 - ✿ Minimum of one window on first floor on each side of home.

Surveillance

- ✱ Entrances to homes are in front of the home, directly from the street.
- ✱ Public areas, playgrounds and open green spaces are purposefully built and situated where there is natural surveillance from residences.
- ✱ If parking is provided in a rear garage, adequate surveillance is provided.
- ✱ While fencing is strongly encouraged on the sides and rear of homes, it should be no greater than 4 feet in height and should be of a *visually* permeable design.

Surveillance

- ✱ Privacy fencing that is of a height of 6 feet and is of a design that prevents visual permeability, is strongly discouraged as it prevents adequate surveillance and has been shown to facilitate burglary.
- ✱ Landscaping designs and plantings, includes trees, plants, bushes or hedges should not compromise the natural surveillance of the property.
 - ✱ Surveillance “from Home”
 - ✱ Surveillance “of Home”



no surveillance for a highly vulnerable garage



GARAGE IS HIDDEN BEHIND HIGH FENCE AND TALL LANDSCAPING



poor natural surveillance



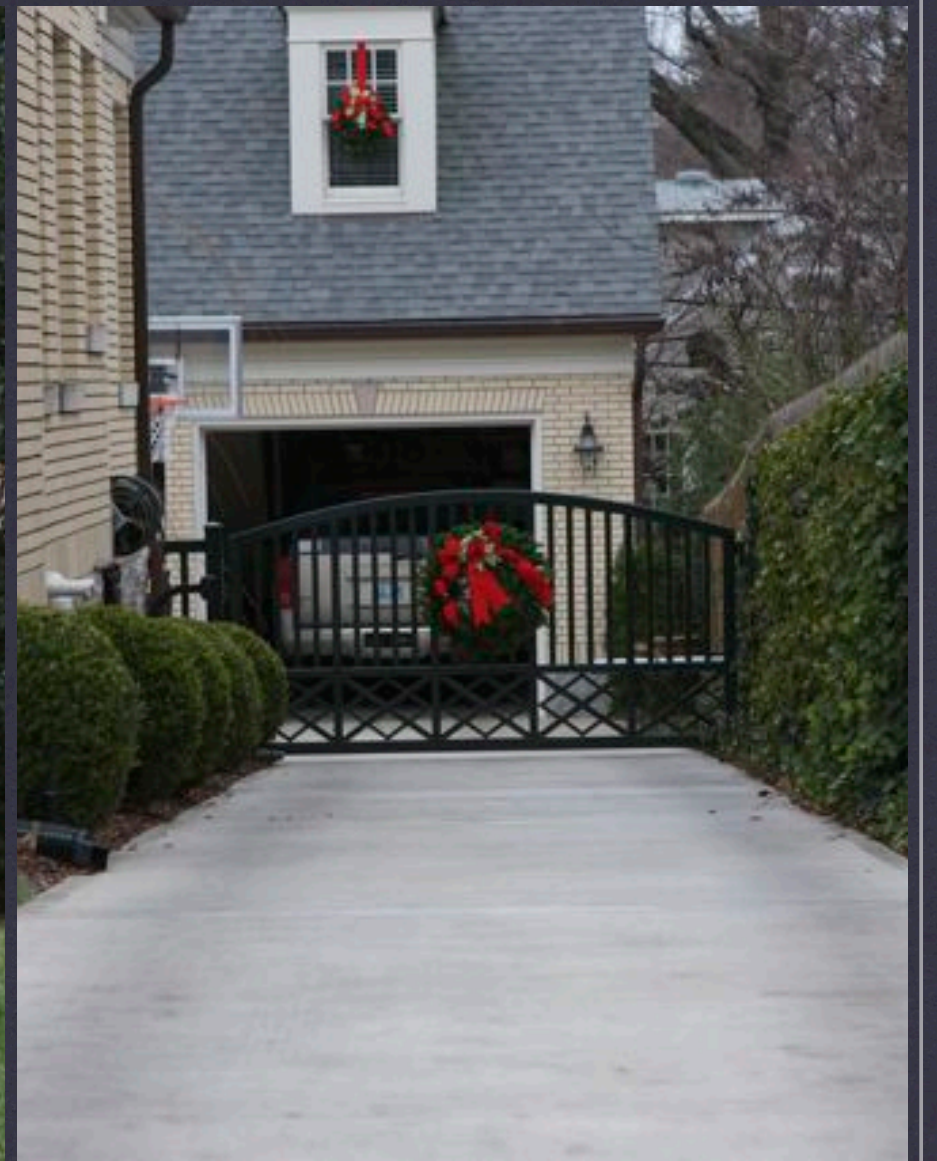
few windows and high fences







ample windows for natural surveillance





high fence with only partial permeability



high fence that is permeable



Worst of both worlds

Lighting

Issues

- ✱ Poor lighting is one of the leading causes of fear of crime.
- ✱ Research has shown that where lighting is weak or patchy, improving the levels and consistency of lighting reduces fear of crime and makes people feel more secure.
- ✱ Adequate lighting is crucial to making neighborhoods livable and ensuring legitimate activity after dark.
- ✱ It is important to balance the needs of security and livability by avoiding overly bright or harsh lighting.

Lighting

Recommendations

- A lighting management plan should be in place to ensure proper maintenance and usage of lighting. Among the items to be considered:
 - **Uniformity:** Lighting must be uniform throughout a neighborhood.
 - **Color Rendition:** Minimum of 60 on a color rendering index.
 - **Solar Switching:** Light must come on at dusk; go off at dawn.
 - **Light Pollution:** Light should never aim upward, but should be focused down and outward from the light source.

Lighting

- ✿ Exterior lighting is around the front and rear entrances as well as garage and/or side entrances.
- ✿ Public areas designed to be used after dark should be well lit.
- ✿ Importantly, all areas to which there is no legitimate access after dark should **NOT** be lit, in order to discourage activity and possible victimization.
- ✿ Street lighting is sufficient to illuminate on street parking, parallel sidewalks and individual house numbers.
- ✿ Sidewalks and pedestrian routes that are designed to be actively used at night should be well lit.

Lighting

- ✿ Landscaping, tree planting, and lighting plans should not be in conflict with each other.
- ✿ Light pollution should be minimalized and all local initiatives (dark skies) followed.











Ownership

Issues

- ✱ Uncertainty of ownership can reduce responsibility and increase likelihood of crime.
- ✱ Neighborhoods that promote a sense of ownership, respect, and territorial responsibility generally have lower crime.
- ✱ Neighborhoods should be built and maintained in a manner that encourages residents to take an active part in the ownership and responsibility of their community.

Ownership

Recommendations

- ✿ It is important that the boundary between public and private areas is clearly indicated through the use of fences, walls and hedges are placed appropriately to create safe and attractive places.
- ✿ In the front of homes where it is necessary to signify public/private divides it is best for walls, fences, or landscaping to be low, with a maximum height of 3 feet.
- ✿ Public areas within a neighborhood are clearly demarcated, designed with surveillance in mind, and well maintained.

Ownership

- ✱ Landscaping of public areas should be designed to fosters legitimate use and activity while retaining clear site lines for purposes of natural surveillance.
- ✱ Landscaping should be employed in order to create an attractive neighborhood, inspiring a pride of ownership in the neighborhood.
- ✱ Builders should avoid neighborhoods with only 1 or 2 housing styles as it diminishes sense of ownership.



no sense of territoriality



fence that is too high and non-permeable



public areas that promote pride in neighborhood



ownership of neighborhood



le [Report a concern.](#)

attractive public area



2 housing type neighborhood



variety of housing styles in neighborhood

Physical Protection

Issues

- ✱ A majority of break-ins and burglaries are a direct result of poor physical security COMBINED with other design factors creating easy opportunities.
- ✱ Vast majority of all burglaries are either forced entry through poorly constructed doorsets, or entry through un-locked doors.
- ✱ Second most popular entry method is poorly constructed or unlocked windows.
- ✱ Rear and areas of poor surveillance are top entry points

Physical Protection

- ✱ Physical protection focuses on the quality of initial construction as well as the inclusion of well designed security measures where appropriate.
- ✱ Physical protection should make a home a more difficult “target” for offenders.
- ✱ A premium is placed on the aesthetic quality of protective measures, so as to ensure that homes and neighborhoods are attractive places to live.
- ✱ Poorly designed and implemented physical protection can increase fear of crime.

Physical Protection

- ✱ Homes should be built with the highest quality materials possible.
- ✱ Doors, Windows, Locks, Fence materials.
- ✱ Complete doorsets are desired, where door, frame, and locks are built to work together.
- ✱ Sliding doors should be avoided on the rear of houses, unless they can be properly secured.
- ✱ Windows or other visual inspection methods should be employed on or near front doors.

Physical Protection

- ✱ All fences and gates in the rear of a home should have high quality locks.
- ✱ If alleys run behind a home they should be properly secured to prevent public access to the rear of the home.
- ✱ The potential negative visual impact of ALL crime prevention measures should be addressed, with a goal of making all crime prevention measures as attractive as possible.



improper window height and sliding doors



limited viewing at front door



Non-lockable fence in publicly accessible rear alley



negative visual impact from bars



visually attractive security gate

Activity

Issues

- ✱ Activity within a neighborhood can be both beneficial and detrimental depending on the type and location of activity spaces.
- ✱ Too much activity creates a potential sense of anonymity that can lead to increases in opportunity for crime.
- ✱ Crime can be deterred through “eyes on the street” from legitimate activities in a neighborhood.
- ✱ Neighborhoods where the level of human activity is appropriate create reduced levels of risk of crime and a sense of security.

Activity

Recommendations

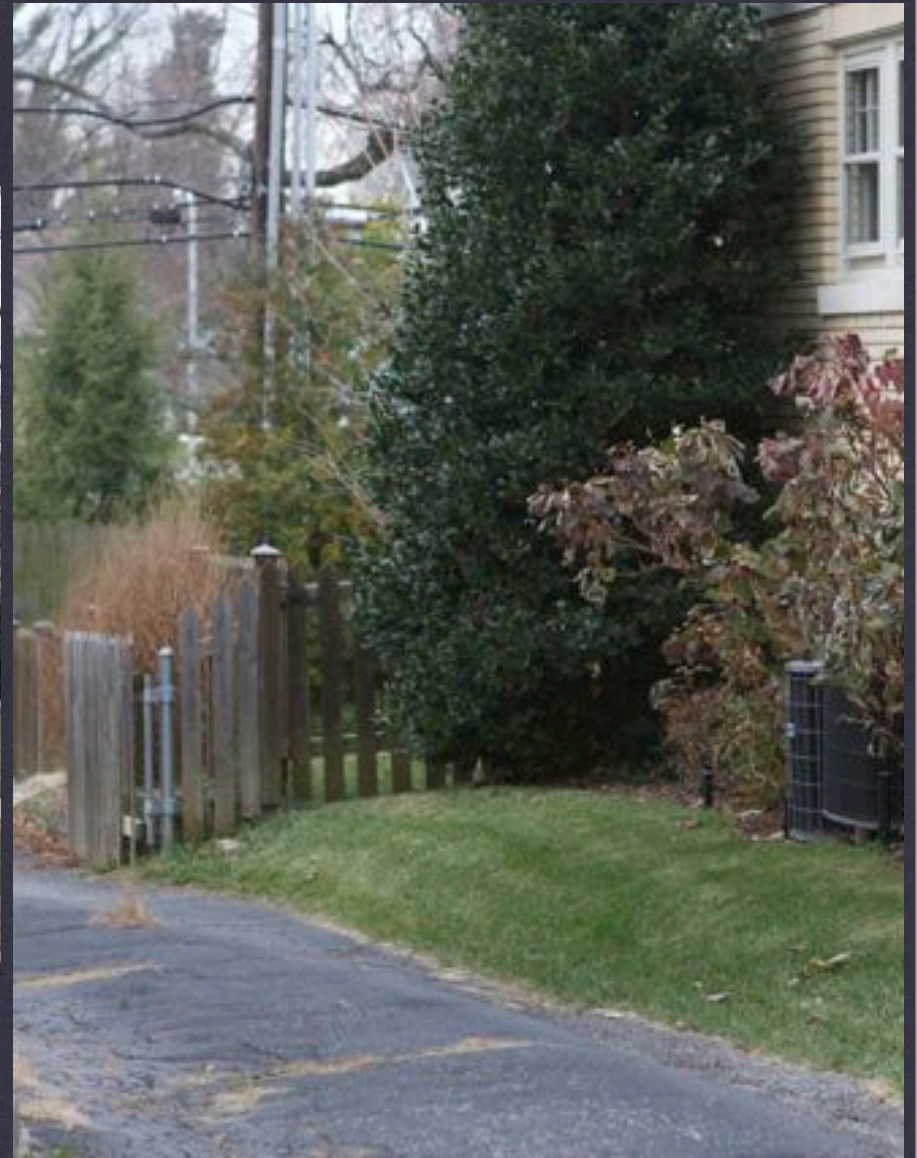
- ✱ All new neighborhoods should include proper outlets/ activity spaces for residents of ALL ages where surveillance is adequately maintained.
- ✱ Activity spaces should be situated within the overall neighborhood such that surveillance can easily be provided from nearby homes with safe routes for users to come and go.
- ✱ Toddler play areas and other activity areas that see little use at night should be designed such that they can be secured at night when there is little activity.

Activity

- ✱ Homes should have places where families can gather and play, but should not be isolated from the neighborhood.
- ✱ There is a maintenance program that ensures the public realm will be safely maintained.
- ✱ Public areas are designed so that they DO NOT inadvertently attract criminal elements.



physically and socially isolated yard



less socially and physically isolated yard

BOTH HOUSES HAVE .127 DEEDED ACRES AND ARE WITHIN 200 SQ. FEET IN SIZE



Kids playground built on “un-developable” land



Landscaping prevents surveillance of playground



Uninspired playground

Maintenance and Management

- ✱ The work of the developer is not finished when a neighborhood is completed.
- ✱ One of the most important factors in the reputation of a builder is the look and feel of the neighborhood and how well it maintains its status.
- ✱ Essential to maintaining value and adequate status is developing a maintenance and management proposal for the neighborhood.

Maintenance and Management

- ✿ Developers should establish neighborhood associations in all developments.
- ✿ The community must be actively involved in the maintenance and management of the neighborhood.
- ✿ Maintenance includes all areas of the neighborhood including landscaping, roads and sidewalks, and physical structures.









well maintained public areas