



APPENDIX D: ACTIVE DESIGN

ACTIVE DESIGN FOR A HEALTHY SACRAMENTO COUNTY

ACTIVE DESIGN GUIDANCE: PURPOSE

The purpose of this chapter is to promote quality design that enhances community aesthetics, reflects the community character and reinforces the community's and County General Plan goals of sustainable design. When these guidelines are properly applied to projects, we achieve quality design and we also improve the public's health, safety and livability. There is a need to improve the health of our communities. Application of the Active Design strategies will help to achieve these goals, provide overall planning and design principles, and guidelines for commercial districts.

Active design strategies are identified by this icon.



Decisions on how and where to build homes, businesses, shopping centers, parks and schools all have significant impacts on human health. Mixed land uses (job/housing/retail proximity), densities, community connectivity, and active transportation (walking and bicycling) choices can all promote and increase walking and physical activity. By incorporating Active Design strategies into the built environment, physical activity and improved health can be achieved.

Active Design is not only healthy, it is also sustainable design. While enhancing the public's health, it also reinforces the goals of environmental sustainability by reducing energy consumption and greenhouse gas emissions, improving air and water quality, and preserving the natural environment. These strategies and guidelines are grounded in the data that the design of the built environment can have a crucial and positive influence on improving public health and is an essential tool in reversing the most pressing public health problems of our time.



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THE CHRONIC DISEASE AND OBESITY EPIDEMIC: HEALTH ISSUES

For the last few decades, environmental and public health professionals have made great strides in helping to build and maintain a healthy society. Whereas infectious diseases were the gravest health threats of an earlier era, the biggest killers of our time are non-infectious, chronic diseases such as heart disease and stroke, cancer, chronic lung disease and diabetes, for which the leading risk factors are obesity, physical inactivity, poor diets and smoking.^{1, 2}

Over the last two decades, obesity has become epidemic in California and the United States. Overweight/obesity, defined by a Body Mass Index or BMI over 25, now affects two-thirds of the adult population in California and Sacramento County. About one in three California children (31%), ages 10-17, is overweight or obese, and 43 percent of elementary school children in Sacramento County are overweight or obese.³ (BMI is a measure of body fat that classifies adults into four categories: underweight, normal weight, overweight and obese.)

Obese children are ten times more likely to be obese adults than normal-weight children. The underlying causes of obesity — physical inactivity and a surplus of dietary calories — are second only to tobacco as the major causes of premature death.

Obesity increases the chances of developing type 2 diabetes,⁴ which has more than doubled in recent years and leads to complications such as blindness, limb amputations, cardiovascular disease, and kidney failure. Type 2 diabetes is increasingly found among children, leading to medical complications in early adulthood, with serious consequences for quality of life and health care costs.

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- 1 2010 California Obesity Prevention Plan: A Vision for Tomorrow, Strategic Actions for Today. Sacramento, CA. California Department of Public Health, California Obesity Prevention Program, 2010.
 - 2 Mokdad AH, et al. Actual causes of death in the United States, 2000. *Journal of the American Medical Association*. 2004;291(10): p. 1238–1245.
 - 3 Babey SH, Wolstein J, Diamant AL, Bloom A, Goldstein H. A Patchwork of Progress: Changes in Overweight and Obesity Among California 5th, 7th-, and 9th-Graders, 2005-2010. UCLA Center for Health Policy Research and California Center for Public Health Advocacy, 2011.
 - 4 Narayan KM, et al. Lifetime risk for diabetes mellitus in the United States. *Journal of the American Medical Association*. 2003; 290(14): p. 1884–90.





The California Health Interview Survey ⁵ showed that 63 percent of Sacramento County residents fail to meet recommended guidelines for physical activity — 30 minutes a day, 5 days a week — putting them at high risk for being overweight and obese. According to the CDC only about 20 percent of U.S. adults are meeting both the aerobic and muscle strengthening components of the federal government’s physical activity recommendations.

Chronic disease and obesity exact a toll not only on our health but also on our economy in the form of rising health care and disability costs and declining productivity and workforce availability. In 2000, the total direct and indirect health care costs attributable to obesity in the United States were estimated to be \$117 billion, ⁶ which is equal to each U.S. resident in the year 2000 paying \$415 each. In 2006, the California Center for Public Health Advocacy estimated that the health care costs related to obesity in California were close to \$41 billion. ⁷ More far-reaching economic consequences include fuel expenses and costs from insurance, disability, absenteeism, and decreased productivity for the business sector. ⁸ This economic burden is only anticipated to grow. If the current rate of increase in obesity continues, the total health care costs attributable to obesity are anticipated to double every decade, reaching \$860 to \$960 billion by 2030.

LACK OF PHYSICAL ACTIVITY AND A SUPPORTIVE BUILT ENVIRONMENT: CONNECTING DESIGN AND HEALTH

Part of the reason for today’s lower rates of physical activity compared to the past is the changed built environment. Over the past 60 years, development patterns have been focused on the ease and speed of movement for automobiles and the dramatic separation of uses. Neighborhoods and communities are built with large distances between homes, jobs, schools, and shopping centers, forcing people to use vehicles for everyday trips. As a result, people use cars today for nearly every trip from home, even when the distances they need to travel are short. In fact, according to the National Household Travel Survey 28% of all trips today are less than one mile and yet 72% of those trips are taken by automobile.

⁵ California Health Interview Survey: <http://healthpolicy.ucla.edu/chis/Pages/default.aspx>

⁶ U.S. Department of Health and Human Services. The Surgeon General’s Call to Action to Prevent and Decrease Overweight and Obesity. 2001.

⁷ Chenoweth & Associates, Inc. The Economic Costs of Overweight, Obesity, and Physical Inactivity Among California Adults. 2006. California Center for Public Health Advocacy. 2009.

⁸ Thompson D, et al. Estimated economic costs of obesity to U.S. business. American Journal of Health Promotion. 1998;13(2): p. 120–127.





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The design of our communities encourages this dependence on cars, which in turn leads to a number of health hazards in the built environment. Increased auto use contributes to elevated pollution levels, and fast-moving vehicles make the roads hazardous for the pedestrians and bicyclists that choose active transportation.

In recent years, physical activity levels at work, at home, and from transportation have decreased. The design of our buildings, streets, neighborhoods, and communities often makes physical activity difficult to achieve. Physical activity, once part of our normal lives, has been designed out of daily routines.⁹ Sedentary jobs have taken the place of manual labor, cars have replaced walking or bicycling, elevators and escalators have supplanted stair climbing, and televisions, computers, social media and video games have displaced active leisure pursuits, especially among children.

The biggest opportunity for improving public health may lie in changing these daily lifestyle norms. Community design that encourages the replacement of automobile use with walking and bicycling not only increases physical activity and ensures pedestrian safety, but also addresses numerous other health issues. The less we drive, the fewer collisions we have, resulting in fewer traffic injuries and deaths. As automobile use decreases, vehicle emissions decline, resulting in cleaner air. Chance interactions on the street lead to stronger social connections and mental wellness.¹⁰

Well-designed public transit systems and access to transit can also help to increase physical activity levels and community health. Americans who use transit spend an average of 19 minutes a day walking between transit stops and destinations; and 29% meet the U.S. Surgeon General's recommendation of at least 30 minutes of physical activity per day by walking to and from transit.^{11, 12}

9 Brownson RC, Boehmer TK, Luke DA. Declining rates of physical activity in the United States: what are the contributors? *Annual Review of Public Health*. 2005;26:p. 421–443.

10 Leyden, K. M. Social capital and the built environment: the importance of walkable neighborhoods. *American Journal of Public Health*. 2003; 93(9): p. 1546-51

11 Besser LM, Dannenberg AL. Walking to Public Transit: Steps to Help Meet Physical Activity Requirements. *American Journal of Preventive Medicine* 2005; 29(4) 273-280.

12 Wener, RE and Evans GW. A morning stroll: levels of physical activity in car and mass transit commuting. *Environment and Behavior*. 2007; 39: p. 1–13.





Community design can also address concerns over public safety and fear of assault, which are reasons given by people for choosing not to walk, use public transit, use recreational facilities or allow their children to play outside or walk to school. While many variables influence violence and crime in communities, aspects of the physical, built environment can also be designed to discourage crime. Appropriately placed landscaping, lighting, windows, porches, signs and more all contribute to a safer built environment. Crime Prevention Through Environmental Design (CPTED) provides additional design guidance to create safer communities.

CREATING AN ACTIVE SACRAMENTO: THE KEY ISSUE

The design of a neighborhood influences how its residents will live. Planners, designers and architects can foster physical activity by designing spaces and streets that encourage walking, bicycling, and other forms of active transportation and recreation. A diverse mix of land uses, co-location of food markets and other retail, green belts and parks, along with a well-connected street system, and a good public transit system all facilitate increasing physical activity among residents. Narrow, quiet, well-shaded streets can encourage walking and bicycling among young and old alike. Streets that are safe for all will encourage more active use.

It is important to recognize that Sacramento County is very diverse and that the planning and design techniques that follow may apply differently depending on the context. In general, the more urban the context, the easier it will be to create these active communities since urban areas typically provide a well-connected network of streets with sidewalks and nearby destination. However, many of these concepts can also work well in suburban areas if careful attention is given to the layout of streets, parks, trails and commercial areas. In rural parts of the County, attention needs to be paid to providing places for people to walk or ride a bicycle either on the shoulder of roads or on separated trail networks.

It is also important to note that the design criteria that support active lifestyles discussed below depend on one another to have the most impact. Creating a compact, mixed use community that lacks good connectivity or a neighborhood with great streets but no nearby destinations will not support active lifestyles as well as a community that brings together all these key elements.





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ACTIVE DESIGN STRATEGIES

Compact, Mixed-Use Communities

People are more likely to meet recommended levels of moderate physical activity if they can incorporate such activity into their daily routines. This means people are choosing to walk, bike or take transit to reach daily destinations (i.e., work, school, and home) rather than driving. Therefore, creating environments where walking and biking is the easy choice means providing a greater mix of destinations located closer together. As a general rule of thumb, people are reasonably willing to walk 5 – 15 minutes (approximately 1/4 to 3/4 mile) and are more likely to consider riding a bike for trips between 1/2 to 3 miles. Research has shown that residents living in mixed-use, compact communities are four times more likely to walk for trips under 1 mile in length.¹³

Compact, mixed-use communities also increase the accessibility of transit by placing more “customers” within proximity of transit stops. It is important to note that not all areas in Sacramento County are currently served by bus or light rail. Therefore, building “transit-ready” communities that are compact, walkable, and have a mix of uses will help ensure the success of future transit expansion. Access to public transportation is linked to increased physical activity, since transit use typically involves walking or bicycling to a bus or light rail stop.¹⁴ Transit riders tend to walk 19 minutes a day, which is three times the amount of the average American. Commuting by transit rather than the automobile has been shown to increase as residential density increases, especially in neighborhoods designed around transit stations.¹⁵

13 L. Frank et al., Linking Objectively Measured Physical Activity with Measured Urban Form: Findings From SMARTAQ, *American Journal of Preventive Medicine*, at 117-1255 (February 2005).

14 Ewing R. *Pedestrian- and Transit-Friendly Design*. Washington, DC : Urban Land Institute/American Planning Association; 2009.

15 2010 California Obesity Prevention Plan: A Vision for Tomorrow, Strategic Actions for Today, Sacramento (CA): California Department of Public Health, California Obesity Prevention Program, 2010.

Uses can be mixed vertically or horizontally. The first photo shows a mixed use project in Davis, CA, with apartments over a restaurant. The second shows a shopping center in Salinas, CA, where housing has been built next to a supermarket. (Photos: Local Government Commission)





Communities designed to provide greater opportunity for transit use, walking or bicycling can also help improve opportunities for physical activity among low-income people. Access to fitness facilities is more prevalent among certain groups in the population — typically, individuals with higher levels of education and income. However, when walking and cycling as part of transportation are considered, socioeconomic discrepancies in physical activity are reduced.¹⁶ In addition, those that live in compact, mixed-use communities are found to drive less or not own a car at all, which are significant benefits to those with restricted incomes.

Compact, mixed-use communities are especially important for the health and vitality of seniors. Currently, one out of five seniors does not drive. Research has found that individuals aged 65 and over who live closer to shops and services are more likely to walk and use public transportation, and take more total trips outside the home.^{17, 18} By 2030, it is projected that 25% of the adult population in the greater Sacramento region will be over the age of 65. The land use patterns, housing options, and mobility options we currently have, and will be developing in the coming years, will play a significant role in affecting — for better or for worse — the growing senior population's ability to remain active, independent, and engaged with family, friends, and community.

Choosing to walk or bike depends on more than just distance and proximity but also sense of safety, comfort, topography, and overall aesthetics.

Connectivity

A roadway network should be designed with pedestrians and bicyclists in mind. An average person walks about 3 miles per hour and on a bicycle, can travel up to 8 – 10 miles per hour. Therefore, a key component of creating healthy communities and neighborhoods is ensuring a well-connected network of roadways and trails that provide residents short, direct routes to destinations.

¹⁶ Berrigan D, Troiano RP, McNeel T, DiSogra C, Ballard-Barbash R. Active transportation increases adherence to activity recommendations. *American Journal of Preventive Medicine*. 2006;31(3): p. 210–216.

¹⁷ Jana Lynott, et al. *Planning Complete Streets for an Aging America*. Washington, DC: AARP Public Policy Institute; 2009.

¹⁸ Bailey L. *Aging Americans: Stranded without Options*. Washington DC : Surface Transportation Policy Project; April 2004.





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The term connectivity is often used to describe how a roadway network is laid out and connected. In general, a roadway network with high connectivity will have short street blocks, numerous intersections, and minimal dead-ends (cul-de-sac). This type of roadway configuration will help reduce travel distance, increase route options, and allow for direct travel routes to destinations. All of these measures make walking and bicycling more feasible. Recent studies have underscored this point by demonstrating the association between increased pedestrianism and high street connectivity.^{19, 20}

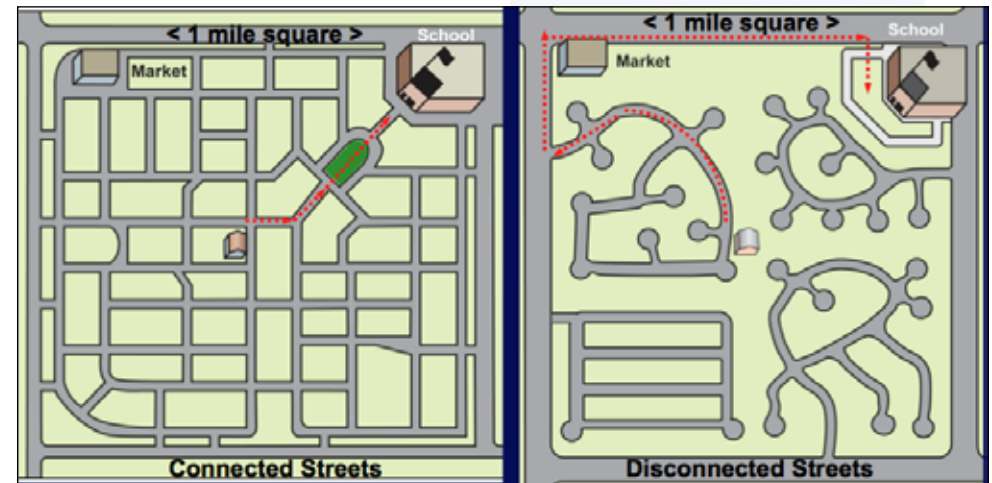
In comparison, a neighborhood with low connectivity will deter walking or biking. A poorly connected roadway often looks like a configuration of “loops and lollipops” that creates more circuitous trips and longer distance trips. This type of roadway layout funnels traffic onto a few arterial roadways resulting in wider roads that carry more cars travelling at higher speeds. This creates a hostile and dangerous environment for everyone, including motorists, cyclists and pedestrians. A study of 24 California cities in 2009 found a higher risk of fatal or severe crashes in cities with very low street network density.²¹ In addition, homes and businesses located next to these high-volume roadways usually require soundwalls, which can create additional physical barriers to pedestrian connectivity and decrease the overall visual appeal of the pedestrian environment.

19 Hess PM, Moudon AV, Snyder MC, Stanilov K. Site design and pedestrian travel. Transportation Research Record.2001;1674: p. 9–19.

20 Baran PK, Rodriguez DA, Khattak AJ. Space syntax and walking in a new urbanist and suburban neighborhood. Journal of Urban Design. 2008;13(1):p. 5–28.

21 Study by Wesley E. Marshall and Norman W. Garrick, “Street Network Types and Road Safety: A Study of 24 California Cities,” August 2009

In a traditional, well-connected street system it is possible for a child to walk to school from the neighborhood since there is a direct route on slow, local streets. On the right, with disconnected streets, kids are typically driven to school. This means more traffic on the arterials. The trip home requires three left turns, which often creates the need for traffic lights. This, in turn, causes more congestion and wider streets, as virtually all trips must be made on arterial streets. On the left, even if people drive, they are less reliant on the arterial system, as they have more access points. (Graphics: Courtesy of Federal Highway Administration “Design for Pedestrian Safety” course)



Connectivity creates a walkable street system by:

- Reducing walking distances;
- Offering more route choices on quiet local streets; and
- Dispersing traffic – reducing reliance on arterials for all trips.



A roadway network that works for bicycles and pedestrians also works for other modes of travel. Transit use is improved in communities with high connectivity. Recent research has indicated that transit stops in areas with well-connected street grids are used more heavily than those in areas with less connected streets.²² Transit service can include light rail, bus rapid transit, regular bus service and local or neighborhood shuttles. Creating a more connected street network that includes shorter route options also has a positive impact on overall performance of the network since it provides more redundancy and route choices. A system with low levels of connectivity will typically require several large arterial roadways and longer signal cycles at intersections while a well-connected street system relies on smaller streets, shorter blocks, slower speeds, fewer stops and signals and shorter signal cycles when signals are required.

A highly connected roadway network also improves the delivery of key local government services, such as emergency response. This type of network offers far more links and approaches for fire trucks and police rushing to an emergency. This is especially important when one route may be blocked. Research has also shown that a fire station is able to serve three times as much area with a connected roadway network as in an area with unconnected streets.²³ Other benefits include increases in the efficiency of services such as garbage collection and street sweeping.

In terms of crime and safety, it is important to note that connectivity should be considered and applied differently based on the settings (i.e. urban, suburban, and rural). For example, high connectivity might best deter personal crime in a more urban area with heavier foot traffic and “eyes on the street.” However, a lower level of connectivity might better serve a suburban area with less foot traffic and concern centered on property crime prevention.²⁴ Regardless of community type, good pedestrian connectivity using street networks, separate pathways and trails are key elements in providing active transportation choices.

22 Lund H, Wilson RW, Cervero R. A reevaluation of travel behavior in California TODs. *Journal of Architectural and Planning Research*. 2006;23(3): p. 247–263.

23 Susan Handy, Robert G. Paterson and Kent Butler (2004), *Planning for Street Connectivity: Getting From Here to There*, Planning Advisory Service Report 515, American Planning Association.

24 Paulsen, Derek J. “Crime and Planning” CRC Press, 2013.





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Plazas, or public places, can come in all shapes and sizes. This small plaza in Monterey, CA, (on the left) takes space that might otherwise be used for the street and creates a seating area for a coffee shop and other local businesses. In a residential setting, the plaza in the Doe Mill neighborhood in Chico, CA, (on the right) is organized around residents' mailboxes. (Photos: Local Government Commission)

Site and Street Design that Foster Health

The measures discussed above — density and connectivity — are general tools used to characterize physical environments that foster active living. There are additional measures, which are subtler and speak to how people perceive and interact with their physical environment. The urban design qualities discussed below refer to how people feel when they walk, bike, or drive along a street, and are good measures of site and street design that facilitate healthy lifestyles:





The photo at the top is from a small town in California and captures urban design qualities that can create a great environment for walking. The buildings and trees enclose the street but the store windows allow for transparency. Architectural details, awnings and benches give the street a human scale and the different materials and textures make the street imageable and complex. The photo on the bottom, Michigan Avenue in Chicago, IL, shows how these qualities can also apply to a dense urban environment. Although the buildings fronting this street are high-rise, the awnings, doorways and landscaping help to create a human scale setting in which pedestrians feel comfortable. (Photos: Local Government Commission and Dan Burden)



Imageability is the quality of a place that makes it distinct, recognizable and memorable. A place with high imageability is unique; it contains physical elements arranged in a way that captures attention, evokes positive feelings, and creates lasting impressions. Public plazas illustrate the potential health benefits of imageability. A public plaza is a publicly accessible space that excludes cars and promotes walking by providing pedestrians with a safe, comfortable space to gather, play, or simply watch things go by. Plazas often constitute welcome “interruptions” or places of respite from the urban grind, and provide destinations for those engaged in active transport.²⁵

Enclosure describes the degree to which urban design elements visually define streets and other public spaces. Adding tree canopies, on-street parking and placing buildings closer to the street to create a sense of enclosure, or an “outdoor room,” slows cars and improves pedestrian comfort.²⁶

²⁵ Ewing R. Pedestrian- and Transit-Friendly Design. Washington, DC : Urban Land Institute/American Planning Association; 2009.

²⁶ Dan Burden, et al. “Street Design Guidelines for Healthy Neighborhoods” 1999.



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Human Scale refers to size, texture and articulation of physical elements that match the size and proportion of humans, and correspond to the speed at which humans walk. Elements such as building detail, pavement texture, street trees, and street lights and furniture contribute to the human scale of a space.

Transparency describes the degree to which people can see or perceive what lies beyond the edge of a street or other public space. Windows and entrances along the street create an interesting and engaging environment that draws pedestrians along the sidewalk. Being able to see beyond the edge of buildings and being seen creates a safer environment for people on the street and inside buildings.

Complexity refers to the visual richness of a place. Complexity can be achieved in a number of ways. For example, the incorporation of temporary and permanent public art installations into the streetscape provides for a more attractive and engaging environment. Artistic bike racks are available that can incorporate art with functionality. Increasing the number of outdoor cafes enhances street activity. These examples contribute to the attractiveness of urban places, which in turn can encourage their use by pedestrians and bicyclists.²⁷

SITE DESIGN

Several site design features can be integrated into a community in order to help achieve imageability, enclosure, human scale, transparency, and complexity—and, in turn, encourage walking and biking trips:

Shorter Building Setbacks

When buildings are set back far from the street edge, the roadway appears to be very wide. This may result in excessive vehicle speeds, creating an unsafe environment for pedestrians, bicyclists, and drivers. Conversely, buildings set closer to the street edge foster a sense of enclosure. The addition of buildings and

As streets get wider and faster, the tendency is to set buildings further back from the street and locate parking between the buildings and the street. This creates an automobile-dominated environment in which buildings are surrounded by a sea of parking and walking is discouraged. However, more communities are redesigning their shopping centers as shown above with parking located behind and alongside the buildings to create more of a main street environment. (Photo and Graphic: Dan Burden)



²⁷ Identifying and Measuring Urban Design Qualities Related to Walkability (Ewing R, Clemente O, Handy S, Winston E, Brownson RC. Active Living Research, 2005.)



trees that are adjacent to the sidewalk create a “street wall” that frames the street and narrows a driver’s field of vision. Taller buildings placed close together create a solid street wall and add to the sense of enclosure. People tend to feel more comfortable walking on streets with a sense of enclosure.²⁸ People also tend to drive slower and more safely.

Street-Facing Building Entrances

Crime Prevention Through Environmental Design (CPTED) utilizes strategies to deter criminal behavior and increase peoples’ sense of safety through the design of the built environment. Utilizing CPTED strategies as part of active design standards can reduce crime and increase community safety. These principles including natural surveillance, natural access control, and territorial reinforcement relate to building entrances.

Good site design utilizes natural surveillance. Building entrances designed to face the street helps maximize visibility and natural surveillance. Providing easily identifiable store and building entrances helps foster positive social interaction among legitimate users of private and public space. Creating an atmosphere that does not encourage or invite unlawful activity can help reduce opportunities for criminals. Other physical elements can support natural surveillance including well-designed and placed landscaping, and lighting that provides for nighttime illumination of parking areas, walkways, entrances and exits.

Good site design also utilizes natural access control. The placement of exits, fencing, lighting and landscaping and the clear differentiation between public and private space is used to limit or control access and reduce the opportunity for crime. This can be achieved by providing sidewalks, pathways, pavement, lighting, landscaping and signage that clearly guide the public to and from entrances and exits.

By clearly delineating private space, a sense of ownership among residents is established, and creates an environment where “intruders” are more easily identified. Buildings, low fences, landscaping and other features can be used to express ownership and define public, semi-public and private spaces. Territorial reinforcement can be achieved with pavement treatments, landscaping, elevated porches, steps, signage, screening and fences that define and outline ownership of property.



²⁸ Streets and Sidewalks, People and Cars: The Citizens Guide to Traffic Calming.



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Parking Design that Considers Active Transport

In general, when parking is available, people use it. Research in California indicates that increased parking supply may result in reduced active transportation and public transit use.²⁹ An oversupply of parking increases the walking distances between business and other destinations, and reduces land available for other uses. Furthermore, parking lots increase heat island effect. This effect occurs when on hot, sunny days the sun heats dry, exposed surfaces, such as roofs and pavement, to temperatures hotter than the air, while shaded or moist surfaces — often in more rural surroundings — remain close to air temperatures. Heat island effect can compromise human health, contributing to respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, and heat-related mortality.³⁰ Heat island effect can also increase air pollution and impacts to water quality. Well-designed car parking will reduce unnecessary automobile travel, particularly when walking, bicycling, and public transit are convenient alternatives. Pedestrian and bicycle access points should be well identified. Parking should be provided for people with disabilities to support their needs for access and physical activity.

In multifamily and commercial settings:

- Parking located behind or on the side of buildings, with adequate lighting and security provided for safety will provide access to buildings but will not dominate the frontage along a street. If parking must be placed next to sidewalks it should be buffered with landscaping or low walls.
- Well-designed pedestrian access and connectivity from transit stops through parking lots to retail and businesses is important in providing safe passage and encouraging people to walk and utilize transit for their shopping trips.

Sustainable Landscaping

Native, water-efficient, and climate-appropriate landscaping is a site design feature that offers numerous health benefits. Sustainable landscaping practices lower heat island temperatures and improve air and water quality. In various settings, views that include landscaping have a positive impact on health: College students with more natural views from their dorm windows score higher on attention tests;³¹ workers with a view of nature from their desks claimed 23% fewer sick days than workers without views

29 Lund H, Wilson RW, Cervero R. A reevaluation of travel behavior in California TODs. *Journal of Architectural and Planning Research*. 2006;23(3): p. 247–263.

30 US EPA. "Heat Island Effect: Basic Information" <http://www.epa.gov/hiri/about/index.htm>

31 Tennessen, Carolyn M., and Bernadine Cimprich. "Views to Nature: Effects on Attention." *Journal of Environmental Psychology* 15.1 (1995): 77-85.





of nature;³² patients recovering from surgery in hospital rooms with window views of natural scenes had shorter postoperative hospital stays, received fewer negative evaluations in nurses' notes, and took fewer potent painkillers than matched patients in similar rooms with windows facing a brick wall.³³

Trees can play an important role in reducing crime rates and domestic violence, and can also increase social ties. In a study of Chicago public housing residents, University of Illinois researchers found that buildings with high levels of greenery had 52% fewer property and violent crimes than apartment buildings with little or no vegetation. Green spaces draw people outdoors, increasing surveillance and discouraging illegal activity. The green and groomed appearance of an apartment building is a signal that owners and residents care about a property, and watch over it and each other. Greener common areas also facilitated stronger social ties. The more trees and landscaping in the common spaces, the more those spaces were used by residents. Those individuals living closer to green spaces enjoyed more social activities, had more visitors, knew more of their neighbors, and reported committing fewer acts of aggression toward household members than those living near barren spaces.³⁴

STREET DESIGN

Poor street design results in physical environments that are dangerous to pedestrians and bicyclists. When people do venture out to walk on poorly designed streets, they often face high-speed traffic and dangerous situations that result in high rates of pedestrian injuries and fatalities. These conditions further discourage people from walking and bicycling.

Walkable streets form the backbone of friendly, interactive, safe and secure neighborhoods. Along these streets, people know their neighbors. Walkable streets allow responsible motorists who live in or travel through the neighborhood to feel most comfortable at lower rather than higher speeds. Motorists traveling too fast for the neighborhood feel uncomfortable on curves, at intersection turns, and with the short length of blocks. Motorists who go the correct speed feel relaxed and in tune with the neighborhood. Neighbors, in turn, feel comfortable and safe walking, riding a bicycle, or chatting with neighbors along such streets.³⁵

³² Kaplan, Rachel, and Stephen Kaplan. *The Experience of Nature: a Psychological Perspective*. Cambridge: Cambridge UP, 1989. Web. \.

³³ Ulrich, R. S. "View through a Window May Influence Recovery from Surgery." *Science* 224.4647 (1984): 420-21.

³⁴ Human – Environment Research Laboratory, University of Illinois at Urbana Champaign.

³⁵ Dan Burden, et al. "Street Design Guidelines for Healthy Neighborhoods" 1999.



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In residential neighborhoods where traffic volumes are low, streets should be designed to be narrow and slow to create an environment where pedestrians and cyclists can fit in. Ideally, the design of the street should establish that motorists will feel most comfortable at about 25 mph. The wide residential street shown on the top allows motorists to feel comfortable traveling at much higher speeds. By contrast, the narrow street shown on the bottom will allow cars to move more slowly and calmly through the neighborhood and will also work well for people walking or riding a bicycle. (Photos: Local Government Commission)

Healthy streets are walkable streets, best measured by how pedestrians act and feel when walking along them. Strolling along healthy streets, pedestrians feel relaxed. They enjoy the experience of walking in this environment and feel connected to their surroundings. Pedestrians in healthy street environments feel confident and in control, and do not feel threatened when encountering strangers.

Another measure of successful streets is the number of people walking along them. Streets are working especially well when pedestrians are using them and when people stop and talk with others. Walkable streets also foster a sense of ownership by everyone who uses them. People who feel comfortable on well-designed streets have the desire to protect and look after them. When a healthy street gets “sick,” the people who live on it want to nurture it back to health rather than move away. The health of a community can often be measured by the health of its streets.³⁶

Complete Streets

The Complete Streets approach ensures that roads are designed and operated to enable safe access for all users: pedestrians, bicyclists, motorists, and

³⁶ Dan Burden, et al. “Street Design Guidelines for Healthy Neighborhoods” 1999.





public transportation users of all ages and abilities. Sacramento County requires complete streets as part of its adopted improvement standards. This approach encourages communities to begin retrofitting poorly designed roads by adding sidewalks, trees, and bicycle lanes. Additional features that include reducing crossing distances, installing crosswalks and better bus stops all make walking and bicycling safer and more inviting for users of all ages and abilities. Good redesigns help reduce speed and conflict points, two big causes of crashes.³⁷ Safe environments for pedestrians and bicyclists maintain visual and sensory attention; streets are calm, narrow, and complex.

Traffic calming is a way to retrofit existing streets that are often too wide and that encourage motorists to travel at higher speeds than are desirable. It is a way to reduce the negative effects of automobile use, alter driver behavior and improve conditions for the property owner, retailer, walker and bicyclist. Maintaining slower speeds allows drivers to be more aware of their surroundings.³⁸ Traffic calming treatments affect the driver's perception of the street, and cause a change in his or her behavior.³⁹ Traffic calming treatments make use of horizontal and vertical deflection to slow motorists. Horizontal deflection treatments include curb extensions, medians, mini-circles and roundabouts. Vertical deflection refers to the use of speed humps or raised intersections or crossings.⁴⁰

Roads designed with the minimum width and minimum number of lanes practicable reduce traffic speeds and pedestrian crossing distances.⁴¹ Continuous medians or short median islands on multilane streets simplify the crossing and reduce pedestrian crashes by up to 40%. Shorter crossing distances are especially beneficial to the elderly and people with disabilities, who may require more time to cross the street.

Complete streets support physical activity among people with disabilities by making streets and paths accessible to them. A number of environmental design factors have been shown to increase leisure-time activity among people with disabilities, including the quality of the walking path, the provision of targeted

37 National Complete Streets Coalition and Local Government Commission. "It's a Safe Decision: Complete Streets in California." 2012.

38 Local Government Commission and Center for Livable Communities. "Streets and Sidewalks, People and Cars: The Citizens Guide to Traffic Calming." 2007.

39 Local Government Commission and Center for Livable Communities. "Streets and Sidewalks, People and Cars: The Citizens Guide to Traffic Calming." 2007.

40 Huang HF, Stewart JR, Zegeer CV. Evaluation of lane reduction "road diet" measures and their effects on crashes and injuries. Transportation Research Record. 2002;1784: p. 80-90.

41 Ewing R. Pedestrian- and Transit-Friendly Design. Washington, DC : Urban Land Institute/American Planning Association; 2009.





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Traffic calming comes in many shapes and sizes. The simplest tool is the speed bump, which can be effective on low-volume local streets but can be a challenge for emergency responders. Less severe treatments that use horizontal instead of vertical deflection tend to be equally effective and can also provide additional benefits. For example, the curb extension shown above not only slows vehicles entering and exiting the street but reduces the crossing distance for pedestrians and improves visibility. The mini-circle shown above can be used at intersections to slow vehicle speeds on all approaching streets and with attractive landscaping or public art can beautify the neighborhood and create a gateway. (Photos: Local Government Commission)

signage, and the accessibility of destinations and transportation along the path.^{42, 43, 44} Specific measures include: smooth, sufficiently wide paths that can accommodate a wheelchair or walker; paths with auditory crossing signals, adequate crossing times, clear signage, visible access ramps, and connections to walking, bicycling, and public transit routes.

⁴² Spivok M, Gauvin L, Brodeur J. Neighborhood-level active living buoys for individuals with physical disabilities. *American Journal of Preventive Medicine*. 2007;32(3): p. 224–230

⁴³ Spivok M, Gauvin L, Riva M, Brodeur J. Promoting active living among people with physical disabilities: evidence for neighborhood-level buoys. *American Journal of Preventive Medicine*. 2008;34(4):p. 291–298.

⁴⁴ Spivok M, Gauvin L, Brodeur J. Neighborhood-level active living buoys for individuals with physical disabilities. *American Journal of Preventive Medicine*. 2007;32(3): p. 224–230





Street intersections also need to be designed with all users in mind. In urban areas, that means building compact intersections that slow turning vehicles and shorten the crossing distance for pedestrians. Intersections of streets with on-street parking provide an opportunity to add curb extensions on the corners where vehicles are not allowed to park to shorten the crossing distance, improve visibility and slow vehicles making turns. Pedestrian crossings, especially at uncontrolled intersections, should include high-visibility crosswalk markings and signs alerting motorists to the crossing. At higher speed locations, additional tools including rapid flash beacons should be considered.

In healthy neighborhoods, people should feel comfortable walking at all hours. Street lighting helps pedestrians feel safer at night. Many neighborhoods prefer more numerous, smaller street lamps to the larger, more widely spaced, high-intensity lights often found in conventional neighborhoods. Low-angle, pedestrian scale lamps that emit full-spectrum light allow for more realistic colors at night, and they also reduce glare, letting people see the night sky.⁴⁵

Appropriately-Sized Sidewalks, Buffered from the Street

Good sidewalk design recognizes that sidewalks have many functions beyond providing a place for people to walk. Sidewalks need to provide space for all the “stuff” that we need on our streets including hydrants, lampposts, signs, trash receptacles, transit shelters, landscaping, trees, etc. Sidewalks also provide direct access to stores and businesses, and have become extensions for outdoor dining, shopping, and socializing. Pedestrians feel safer when separated from parking flows and parking spaces. Because of these different functions, it is important to design sidewalks that include the following zones: a curb zone that creates a vertical separation between the street and sidewalk; a furniture zone for all the “stuff” discussed above; a pedestrian zone for walking; and a frontage zone adjacent to buildings, doors and fences. The furniture zone provides an important buffer between moving automobiles and pedestrian spaces; landscaping and trees may be incorporated into this zone, as well as the frontage zone.

The incorporation of sustainable landscaping and trees into street design provides numerous health benefits. Trees make streets more attractive for active transport by providing a sense of enclosure. The

⁴⁵ Dan Burden, et al. “Street Design Guidelines for Healthy Neighborhoods” 1999.



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The design of sidewalks in residential neighborhoods affect the pedestrian environment. The top photo shows the problems with an attached sidewalk with a rolled curb: cars will tend to park on the sidewalk and create a hostile environment for people walking. This design fails to recognize that a comfortable sidewalk needs to have a well-defined curb zone, typically with a vertical curb that separates the street from the sidewalk. It also needs a “furniture zone” to provide a buffer to the street and space for trees, landscaping, hydrants, benches, etc. By contrast, the bottom image shows a well-designed sidewalk with a good furniture zone, ample and unobstructed space for walking, and a buffer for buildings and private spaces. (Photos: Local Government Commission and Dan Burden)



presence of trees on streets has been associated with higher rates of walking to school among children.⁴⁶ Trees also improve air and water quality and can reduce asthma rates in children by sequestering particulates, carbon and other emissions.⁴⁷ Trees reduce exposure to ultraviolet light from the sun, lowering the risk of skin cancer and cataracts. Noise can reach unhealthy levels in urban areas – trees reduce noise pollution by acting as a buffer and absorbing urban noise, especially high-frequency sounds that are the most distressing to people.⁴⁸

Trees calm traffic and, in turn, encourage walking. A treeless street can encourage higher speeds, increasing the frequency and severity of accidents. Street trees provide both visual interest and obstacles near the road edge, which encourage safer speeds and quieter neighborhoods. Closely spaced trees help



46 Larsen K, et al. The influence of the physical environment and sociodemographic characteristics on children's mode of travel to and from school. *American Journal of Public Health*.2009;99(3): p. 520–526.

47 American Lung Association (ALA). 1997. *Childhood Asthma: A Matter of Control*. Pamphlet.

48 McPherson, Gregory, James Simpson, Paula Peper, Qingfu Xiao, Dennis Pettinger, and Donald Hodel. *Tree Guidelines for Inland Empire Communities*. Rep. Western Center for Urban Forest Research and Education, USDA Forest Service, Pacific Southwest Research Station, 2001.



motorists gauge and control their speeds. Narrower streets combined with street trees also slow drivers down, while maximizing shading of heat-absorbing asphalt. Trees planted between the curb and sidewalk improve safety by adding a buffer between moving vehicles and pedestrians.

The provision of seating, drinking fountains, restrooms, and other infrastructure supports increased frequency and duration of walking.^{49, 50, 51} In focus groups, seniors reported that benches and restrooms would support them in walking more, while tripping and traffic hazards were deterrents.

Sidewalk width, an important aspect of good sidewalk design, is best when consistent with its use.^{52, 53} Sidewalks should be at least 5 feet wide to allow two adults to walk side by side. In front of schools or in commercial areas they should be wider to accommodate higher pedestrian volumes. In general, sidewalks should be wide enough to accommodate a range of pedestrian users safely, while not as wide as to feel empty. The needs of people with strollers, wheelchairs, or luggage should be considered.

MAINTENANCE

Good maintenance should follow good site and street design, and arguably impacts all of the urban design qualities discussed above. Maintaining public and private spaces helps reinforce ownership, pride and a sense of order. Poor maintenance or deterioration signals greater tolerance of disorder. Many law enforcement agencies subscribe to the “Broken Window Theory,” which emphasizes that the sooner broken windows are fixed or graffiti is removed or trash is collected, the less likely it is that vandalism will occur in the future. Design features that can facilitate better maintenance of a space include low-maintenance landscaping and lighting treatments, as well as signage indicating who to call when maintenance is required, for such issues as light bulb replacement and plant overgrowth.

49 Ewing R. Pedestrian- and Transit-Friendly Design. Washington, DC : Urban Land Institute/American Planning Association; 2009.

50 Whyte WH. The Social Life of Small Urban Spaces. Washington, DC : The Conservation Foundation; 1980.

51 Lockett D, Willis A, Edwards N. Through seniors’ eyes: an exploratory qualitative study to identify environmental barriers to and facilitators of walking. Canadian Journal of Nursing Research. 2005;37(3):p. 48–65.

52 Cervero R, Kockelman K. Travel demand and the 3Ds: density, diversity, and design. Transportation Research Part D.1997;2(3): p. 199–219.

53 Rodriguez DA , Joo J. The relationship between non-motorized mode choice and the local physical environment. Transportation Research Part D. 2004;9(2):p. 151–173.





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