PEDESTRIAN- AND TRANSIT-FRIENDLY DESIGN:
A Primer for Smart Growth

by Reid Ewing

SMART GROWTH NETWORK

Based on a manual prepared for the Florida Department of Transportation and published by the American Planning Association

The Smart Growth Network is a coalition of private sector, public sector, and nonprofit partners seeking to create better neighborhoods, communities, and regions across the United States. It is coordinated by the U.S. Environmental Protection Agency's Urban and Economic Development Division.

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For more information, contact the Smart Growth Network at 202-962-3591 or via the Smart Growth web site at www.smartgrowth.org

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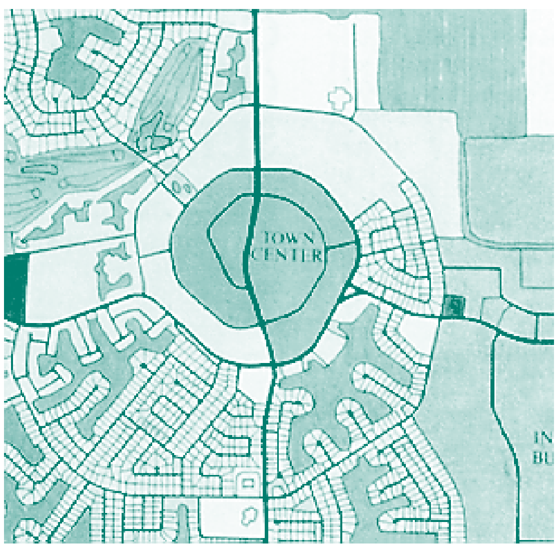
Introduction

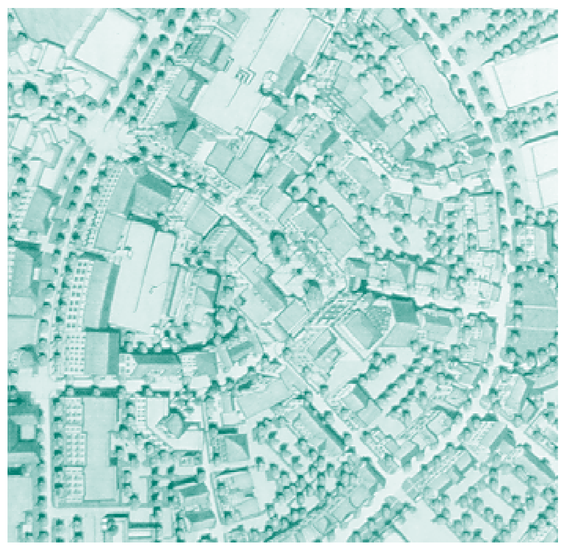
Urban design differs from planning in scale, orientation, and treatment of space. The scale of design is primarily that of the street, park, or transit stop, as opposed to the larger region, community, or activity center. The orientation of design is aesthetic, broadly defined. Design lies somewhere between art, whose object is beauty, and planning, whose object is functionality. The treatment of space in design is three-dimensional, with vertical elements as important as horizontal ones in designing street space, park space, and other urban spaces. Planning, on the other hand, is a singularly two-dimensional activity (as illustrated below left.)

Another primer available from the Smart Growth Network, *Best Development Practices: A Primer for Smart Growth,* approaches development and redevelopment from a planning perspective. Scant attention is paid to aesthetics, small-scale elements, and the vertical dimension of development. The present primer takes the opposite tack, giving more attention to design than to planning. The two primers are meant to be read in tandem.

This primer is based on *Pedestrian- and Transit-Friendly Design,* a manual prepared for the Florida Department of Transportation (FDOT) and the American Planning Association (APA). The primer and manual draw primarily on three sources—the classic urban design literature, the best transit-oriented design manuals, and our own transit-related studies undertaken to give the manual an empirical base.

Zooming in from Planning to Design (Miami Lakes, FL)





Source: Dover & Kohl, South Miami, FL

Checklist of Pedestrian- and Transit-Friendly Features

Pedestrian- and transit-friendly design features fall into three classes: those deemed essential; those deemed highly desirable; and those deemed nice but somewhat incidental. Even the third class will encourage street life, walking, and transit use, but for transit operators, local governments, and developers, the priorities are as indicated.

It must be acknowledged up front that sorting pedestrian- and transit-friendly features into three classes involves a leap of faith. But sort we must. Choices must be made in the alignment of transit routes, in the amenities offered along walking routes, in the development practices that are required rather than simply encouraged.

From the longer list of 23 pedestrian- and transit-friendly features in the FDOT/APA manual, the sections that follow highlight 12. They are described in detail, and illustrated with photos from walkable places and with graphics reproduced from award-winning design manuals. The other 11 features are simply acknowledged by name. For a detailed discussion of these features, see the manual upon which this primer is based.

The 12 highlighted features seem to relate more to pedestrians than to transit users. But since virtually all transit users are pedestrians at one or both ends of their trips, the distinction is illusory. Pedestrian-friendly features are also inherently transit-friendly. They set the context in which transit operates and, as transit operators are discovering, have as much to do with ridership as do service headways, fare levels, and other transit operating characteristics.

Interestingly, many of these 23 features are now perceived as critical enough to the success of transit to have found their way into the new surface transportation act, the *Transportation Equity Act for the 21st Century*. The act earmarks funds for bus shelters, landscaping, street furniture, walkways, public art, transit connections to parks, and other "transit enhancements." It also creates an entirely new program, the Transportation and Community and System Preservation Pilot Program, which provides funding for coordinated land use and transportation planning, traffic calming, and transit-oriented development.

Essential Features

#1 Medium-to-High Densities

Densities in the United States have taken a nose dive over the past 40 years. Before mechanized transportation, gross densities were in the range of 40 to 80 people per acre; such densities compressed enough activities into a small area to allow people to walk to almost everything. Today, in developing areas, gross densities are one-tenth the historical norm. Such low densities are practical only because the automobile allows us to overcome great distances.

People confuse high density with high rise. High densities can be achieved with small-scale buildings by raising lot coverages to 50, 60, or even 70 percent. Conversely, high-rise buildings afford only moderate densities if surrounded by acres of parking and lawn. Pedestrians are comfortable with small-scale buildings and high lot coverages. They are uncomfortable with high-rise towers and low lot coverages. "[M]uch of the criticism of high-rise living and its socially alienating effects is not due to its high density but to its low density at ground level," where nearly all public interaction must occur.[1]

The weight of available evidence points to the importance of density in promoting walking and transit use.[2] Higher densities mean more residents or employees within walking distance of transit stops and stations. They mean more street life and the added interest and security that goes with having more people around. They mean a greater propensity to walk or use transit, and lower auto ownership rates.

Low Rise with High Density vs. High Rise with Low Density at Ground Level

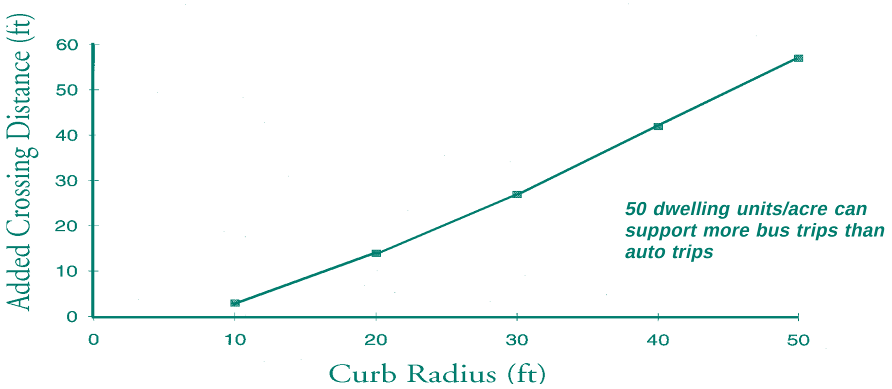
(The Kentlands, MD)

(Las Colinas, TX)

The old rule of thumb is that seven units per acre are required to support basic bus service. For premium bus service, the required residential density rises to 15 units per acre. For rail service, it is even higher. Such high densities are also required for active street life and viable neighborhood businesses.

As important as high residential densities, perhaps more important, are high employment densities. The rule of thumb in this case is that 50 employees per acre are necessary to support premium transit service.

Transit Productivity Thresholds (According to One Source)



Source: Denver Regional Council of Governments, *Suburban Mobility Design Manual*, Denver, CO, 1993, pp. 11-12.

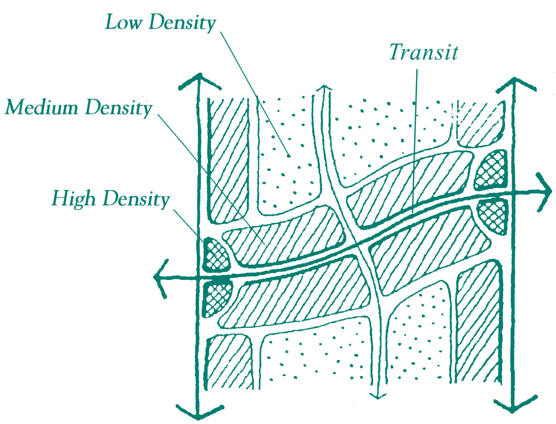
Ideally, the very highest densities will be closest to transit stops. A density gradient will maximize transit ridership. While densities may decline with distance from stops, they will average at least the threshold values within the quarter mile service area around stops.

#2 Mix of Land Uses

#3 Short to Medium Length Blocks

There has been a trend toward longer and longer blocks, and correspondingly fewer and fewer intersections within development and redevelopment areas. This is true not only in the suburbs, where superblocks are the norm, but also in central cities where blocks plus interior rights-of-way have been consolidated to create larger building sites. "The practice [of block

Transit Ridership Maximized by a Density Gradient



Source: Ontario Ministry of Transportation, *Transit-Supportive Land Use Planning Guidelines*, Toronto, 1992, p. 18.

consolidation] contributes to a city scaled to cars and is a grave error," assuming pedestrian-friendliness is a goal.[3]

By mapping different cities at a common scale, Allan Jacobs determined that Venice, Italy, has about 1,500 intersections in a typical square mile, while the city of Irvine outside Los Angeles, California, has 15 intersections per square mile.[4] Downtown Los Angeles has about one-tenth as many intersections as Venice, and 10 times as many as Irvine. People familiar with these three cities would doubtless rank their walkability in the same order. Jacobs also found that downtown Boston, as an example, had lost more than one-third of its intersections through block consolidations.

Reasons why walkability depends on block size are numerous. Most obviously, more intersections mean more places where cars must stop and pedestrians can cross. Also, short blocks and frequent cross streets create the potential for more direct routing; that is important to pedestrians, much more so than to high-speed motorists. Finally, a dense network of streets disperses traffic, so that each street carries less traffic and can be scaled accordingly; this makes streets more pleasant to walk along and easier to cross.

There may be psychological factors at work as well. It has been suggested that more intersections give pedestrians more sense of freedom and control as they need not always take the same path to a given destination; that more intersections make a walk seem more eventful, since it is punctuated by frequent crossing of streets; that more intersections may shorten the sense of elapsed time on walk trips, since progress is judged to some extent against the milestone of reaching the next intersection.[5]

For a high degree of walkability, block lengths of 300 feet, more or less, are desirable.[6] Blocks of 400 to 500 feet still work well. This is typical of older urban areas. However, as blocks grow to 600 to 800 feet or, even worse, to superblock dimensions, adjacent blocks become isolated from each other.

Street Maps at the Same Scale

(Venice, Italy)

(Downtown Los Angeles, CA)

(Irvine, CA)

Source: A.B. Jacobs, *Great Streets*, MIT Press, Cambridge, MA, 1993, pp. 221, 225, 249.

If blocks are scaled to the automobile (more than 600 to 800 feet on a side), midblock crosswalks and pass-throughs are recommended.[7] Mind you, these devices are poor substitutes for the real thing: frequent intersections offering directional choices and frequent streets with active uses on both sides. But they are better than nothing.

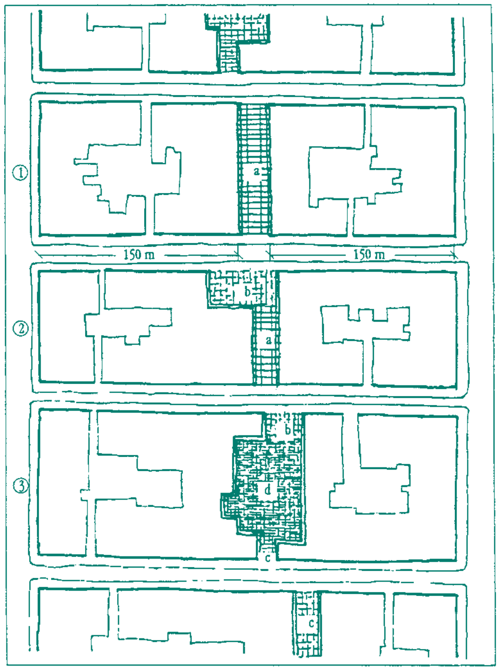
Long Block (Boca Raton, FL)

Short Block (Boulder, CO)

#4 Transit Routes Every Half-Mile

As city blocks have been replaced by superblocks, the spacing of through streets has increased. Within these large blocks, straight, continuous streets have given way to curving, discontinuous streets. The combination of curvilinear local streets and widely spaced through streets has left few residents within walking distance of transit lines.

Pass-Throughs on Blocks Longer than 150 Meters (492 Ft)



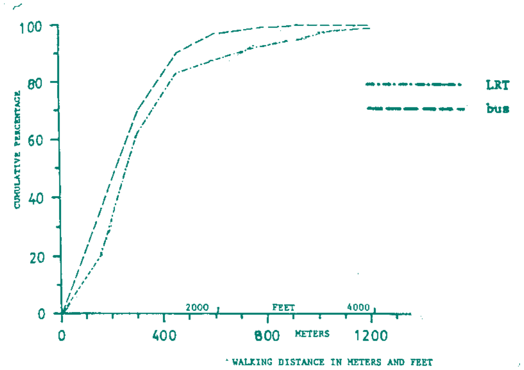
Pedestrian route as a network: 1) single open space type, 2) mixed open space type, 3) mixed open space type. Open space types: a) galleria, b) plaza, c) walkway, d) courtyard

Source: City of Toronto, *Urban Design Guidebook - Draft for Discussion*, Ontario, 1995, p. 31.

The old transit industry standard—that transit users will walk a quarter mile, or five minutes at three miles per hour, to a bus stop—is better than we might have guessed. If we convert reported walk times from the 1990 Nationwide Personal Transportation Survey (NPTS) into distances, and plot and smooth the resulting frequency curve, the median walking distance to and from transit stops is almost exactly a quarter mile.[8] Of course, young people may be willing to walk a little farther than older people, and users of premium transit (rail rapid, for example) may walk a little farther than regular bus users. But a quarter mile walking distance is a good rule of thumb for transit planning .

If a quarter mile is the farthest most people will walk, it follows that transit routes may not be farther than a half mile apart to blanket a ser-

Cumulative Walking Distances to Bus and Light Rail Transit

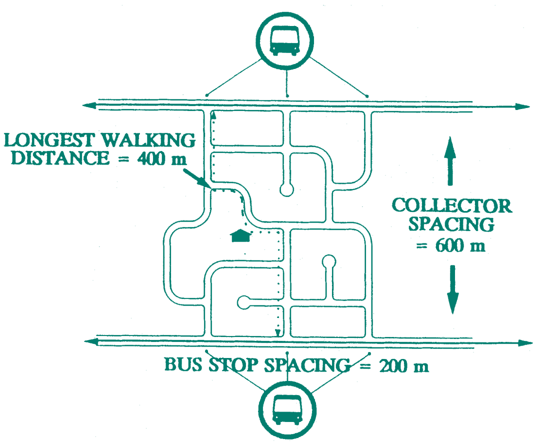


Source: P.N. Seneviratne, "Acceptable Walking Distances in Central Areas," *Journal of Transportation Engineering*, Vol. 3, 1985, pp. 365-376.

vice area. This assumes that transit stops are closely spaced along routes, as they usually are in the United States, and that local streets lead directly to stops, as they usually do in urban settings. If stops are infrequent or local streets are curvilinear, parallel routes must be even closer together.

This simple logic underlies the call in many transit-oriented development manuals for transit routes every half mile, and for collectors or arterials spaced accordingly.[9] Collectors and arterials are favored for transit use over local streets because of their wider lanes and greater distances end to end.

Collector/Arterial Spacing for Transit Access (400 meters = 0.25 miles)



Source: W. Bowes, M. Gravel, and G. Noxon, *Guide to Transit Considerations in the Subdivision Design and Approval Process*, Transportation Association of Canada, Ottawa, Ontario, 1991, p. A-8.

Half-mile spacing of higher-order streets and transit routes seems a reasonable target for network density; it was embraced as a best transportation practice in *Best Development Practices.*[10] To achieve the same network density in curvilinear network with irregularly spaced streets, there must be 4.0 miles of through streets for every square mile of land area.

#5 Two- or Four-Lane Streets (with Rare Exceptions)

#6 Continuous Sidewalks Wide Enough for Couples

As American society has become increasingly auto dependent, new streets have been built without sidewalks or with sidewalks on only one side. In a fit of circular reasoning, traffic engineers and developers have argued against sidewalks on the grounds that no one will walk anyway. The engineers and developers are right in one sense: sidewalks by themselves will not induce walking. Other pedestrian-friendly features must be present as well, which is one reason why this first reference to sidewalks appears fairly late in this section.

In her famous tribute to cities and city life, Jane Jacobs devotes three chapters to the importance of sidewalks for street security, neighborly contact, and assimilation of children into adult society.[11] These valuable functions are performed on top of sidewalks' main function, serving as safe rights-of-way for pedestrians.

Lack of Sidewalk Connections

(Orlando, FL)

(Jacksonville, FL)

(Boca Raton, FL)

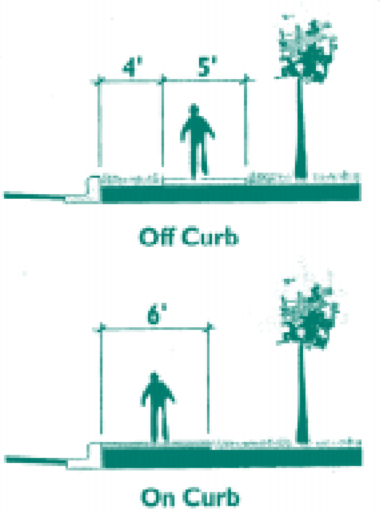
Just as streets are scaled to vehicular traffic volumes, so should sidewalks be scaled to pedestrian traffic volumes. Sidewalks should be wide enough to accommodate pedestrian traffic without crowding, yet not be so wide as to appear empty most of the time. A hint of crowding may actually add to the vitality and interest of the street. It is for this reason that some urban designers recommend maximum sidewalk widths as well as minimums.

Too Empty and Too Crowded (South Miami Beach, FL)

Manuals of the traffic engineering profession establish minimum sidewalk widths of 4 to 8 feet, depending on the functional class of road and the abutting land use. The state of Florida has adopted a standard width of 5 feet.[12] A 5-foot sidewalk is wide enough for two people to walk comfortably abreast, and thus represents a good dimension where pedestrian traffic is light, street furniture is limited, and buildings are set back from the sidewalk.[13] Where these conditions are not met, as in any respectable downtown, wider sidewalks are warranted.

To allow walking at near-normal speeds, sidewalks must provide at least 25 square feet per pedestrian at peak times.[14] More space is required, perhaps 40 square feet per person, to permit maneuvering around slower pedestrians and complete avoidance of oncoming and crossing pedestrians. At 100 to 150 square feet per person, sidewalks are still lively but give no hint of crowding.[15] If strolling couples are to pass one another without awkward maneuvering, it takes about 10 feet of clear sidewalk width. If street furniture (street lights, trash cans, newspaper boxes, etc.) is plentiful, an extra 2-1/2 feet of width must be allowed for clearance.[16] If buildings run up to the sidewalk, an additional 1 to 1-1/2 feet of width is desirable due to the tendency of pedestrians to maintain this clear distance from walls.[17] Given such considerations, it is easy to see how some leading urban designers have arrived at sidewalk widths of 10, 15, and even 20 feet as suitable for high-volume locations.

5- or 6-Foot Sidewalk for Light Pedestrian Traffic



Source: Glatting Jackson Kercher Anglin Lopez Rinehart, Inc., *Central Florida Mobility Design Manual*, Central Florida Regional Transportation Authority, Orlando, 1994, p. 2-6.

16-Foot Sidewalk for Heavy Pedestrian Traffic

Source: Edward D. Stone, Jr. and Associates, *Riverwalk Design Guidelines*, City of Fort Lauderdale, FL, 1986, p. 3.5.

Recommended Sidewalk Widths at High-Volume Locations

Alexander et al.	12 ft minimum/20 ft maximum
Untermann	8-9 ft minimum/12 ft desirable
Smith et al.	12-15 ft
Whyte	15 ft minimum/30 ft maximum
Calthorpe	15-20 ft
Sucher	12 ft

Sources: C. Alexander, S. Ishikawa, and M. Silverstein, *A Pattern Language - Towns · Buildings · Construction,* Oxford University Press, New York, 1977, pp. 171 and 287; R.K. Untermann, *Accommodating the Pedestrian - Adapting Towns and Neighborhoods for Walking and Bicycling*, Van Nostrand Reinhold Company, New York, 1984, p. 105; S.A. Smith *et al., Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas - Research Report*, National Cooperative Highway Research Program Report 294A, Transportation Research Board, Washington, D.C., 1987, p. 52; W.H. Whyte, *City - Rediscovering the Center*, Doubleday, New York, 1988, pp. 76-78 and 93-94; P. Calthorpe, *The Next American Metropolis - Ecology, Community, and the American Dream,* Princeton Architectural Press, New York, 1993, p. 79; and D. Sucher, *City Comforts - How to Build an Urban Village,* City Comforts Press, Seattle, WA, 1995, p. 142.

No Midblock Crosswalk
(Orlando, FL)

Midblock Crosswalk
(Orlando, FL)

Midblock Crosswalk with Refuge Island
(Williamsburg, VA)

#7 Safe Crossings

As streets have gotten wider, blocks longer, and roadway design speeds higher, street crossings have become treacherous. Even at supposedly safe signalized interactions, pedestrians crossing with the signal are exposed to danger from turning motorists. Street corners have been rounded off; right-turn-on-red has become near universal. Motorists making right turns need hardly slow down at all; they tend to look to their left for oncoming traffic rather than their right for crossing pedestrians. Motorists making left turns do so under protected conditions at multiphase signals; having exclusive turn arrows, they tend to make turns without carefully scanning their environment for pedestrians.

After sidewalks, the next most important pedestrian safety feature is marked and lighted crosswalks. Most injuries and fatalities involving pedestrians occur as pedestrians attempt to cross streets, and a disproportionate number are at night.[18] Accident rates are significantly lower where marked crosswalks are provided and crossings are lighted.[19]

Richard Untermann, a leading authority on pedestrianization, recommends marked crosswalks every 100 feet on pedestrian streets.[20] To maintain such close spacing, crosswalks must be provided at midblock locations. While some traffic engineers are less than enthusiastic about them, midblock crosswalks have two salutary effects: they slow down traffic in the immediate vicinity, and they discourage pedestrians from crossing between parked cars.[21]

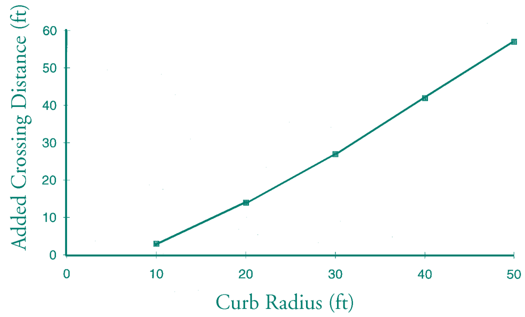
Pedestrian crossings can be simplified, and pedestrian safety improved, by designing street

Small Corner Radius in a Traditional Town (Dade City, FL)

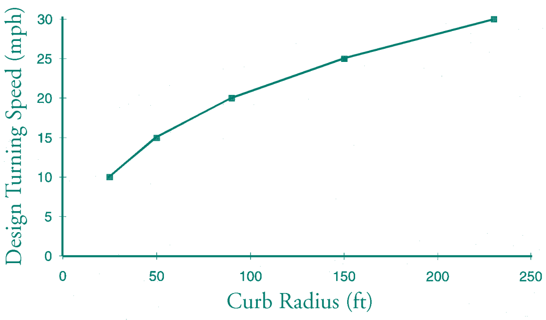
Large Corner Radius in a Contemporary Development (Orlando, FL)

corners to be sharp rather than rounded. Historically, corners at intersections had radii of only 2 to 5 feet; they are now 25 to 50 feet, often more. Untermann advocates a return to corner radius of only 5 to 10 feet on streets with curbside parking; with curbside parking, vehicles turning from the travel lane have an effective corner radius much larger than 5 to 10 feet.[22]

Crossing Distances vs. Corner Radii



Turning Speeds vs. Corner Radii



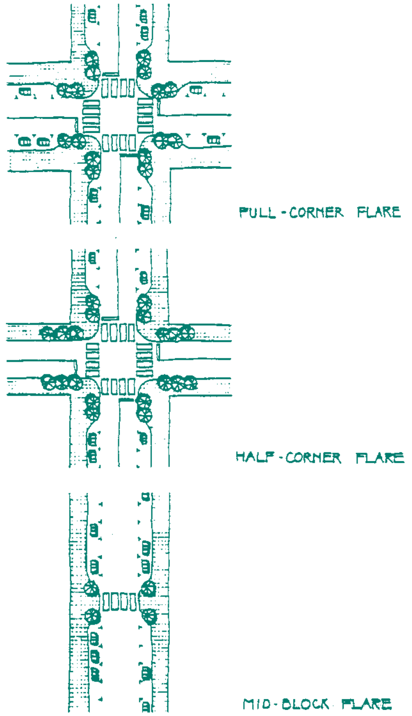
Source: American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, Washington, D.C., 1990, pp. 197, 714.

He also recommends a 5- to 10-foot radius on low-volume residential streets without parking lanes; the occasional service or emergency vehicle can swing wide into the opposing travel lane when traffic is light.

The smaller corner radii shorten crossing distances for pedestrians (see first figure). They also compel motorists to slow down as they negotiate corners (see second figure). And they discourage dangerous rolling stops.

Pedestrian crossings can be further simplified, and pedestrian safety enhanced, by flaring sidewalks at intersections and midblock crosswalks. This is the exact opposite of what is usually done at intersections; corners are usually cut back to make room for turning vehicles. Sidewalks flared in this manner form *safe crosses*. Safe crosses reduce crossing distances and make waiting pedestrians more visible to motorists.

Sidewalks Flared to Form Safe Crosses



Source: City of Toronto, *Urban Design Guidebook - Draft for Discussion*, Ontario, 1995, p. 25.

Safe crosses are nothing more than *neck-downs, chokers,* or whatever you choose to call them, combined with crosswalks. When combined with speed tables (raised to the level of sidewalks), crosswalks form what are sometimes called *raised crossings* or *plateaus*, powerful traffic calming devices placed where they will do the most good for pedestrians.

Safe Cross
(San Luis Obispo, CA)

Raised Crossing
(Eugene, OR)

#8 Appropriate Buffering from Traffic

#9 Street-Oriented Buildings

The growing dominance of the automobile has been accompanied by changes in architecture and site planning that cause buildings to relate poorly to streets. Buildings have spread out rather than up, stepped back from the street, and had their windows and doors reduced in number, reoriented away from the street, or glazed over.

These changes have minimal effect on motorists as they whiz by. But pity the poor pedestrian, who has less to look at, feels more isolated, and has farther to go to reach any destination. Important urban design qualities have been lost in the process, including accessibility, safety, visual enclosure, and transparency/human presence.

As a convenient rule of thumb, buildings should be set back no farther than 25 feet from the street edge, for beyond that they lose their tangible connection to the street.[23] Ideally, buildings will be flush with the sidewalk or set back just far enough for a modest yard, forecourt, or landscaped area in front. Surface parking will be to the side or rear of buildings; parked cars should not dominate the streetscape by projecting beyond adjacent building fronts. If any off-street parking is allowed in front, and it is best not to allow any, it should be no deeper than a row or two.

The principle of *visual enclosure* can be used to fine tune building setbacks. Visual enclosure of streetscapes occurs when bordering buildings are tall enough in relation to street width to block most of a pedestrian's cone of vision. The term "outdoor room" is sometimes applied to streetscapes that are so visually enclosed as

Street for Automobiles with Parking in Front

Street for Pedestrians with Parking in Back

Source: Denver Regional Council of Governments, *Suburban Mobility Design Manual*, Denver, CO, 1993, p. 29.

Strong Connections to the Street Thanks to Small Setbacks and Building Projections

(Santa Barbara, CA)

(San Diego, CA)

(Davis, CA)

to be roomlike. The "walls" of the room are the vertical elements that bound and shape street spaces, usually buildings.

By making a street more roomlike, we also make it more pedestrian-friendly. People like rooms; they relate to them daily in their homes and work places, and feel comfortable and secure in them. Drivers respond to the sense of enclosure by slowing down, making the street that much more pedestrian-friendly.[24]

The experts disagree on exactly what height-to-width ratio is desirable for a sense of enclosure and intensely experienced three-dimensional space (see the height-to-width table to left).

Height-to-Width Ratios for Street Enclosure

(according to different experts)

Alexander et al.	1:1 ideal
Hedman	1:1 - 1:2 ideal
Lynch and Hack	1:4 minimum 1:2 - 1:3 ideal
Duany and Plater-Zyberk	1:6 minimum
A. Jacobs	1:2 minimum 1:1 ideal

Sources: C. Alexander, S. Ishikawa, and M. Silverstein, *A Pattern Language - Towns · Buildings · Construction,* Oxford University Press, New York, 1977, p. 490; R. Hedman, *Fundamentals of Urban Design,* American Planning Association, Chicago, IL, 1984, pp. 58-59; K. Lynch and G. Hack, *Site Planning*, MIT Press, Cambridge, MA, 1984, p. 158; A. Duany and E. Plater-Zyberk, "The Second Coming of the American Small Town," *Wilson Quarterly,* Vol. 16, 1992, pp. 19-48; and A.B. Jacobs, *Great Streets,* MIT Press, Cambridge, MA, 1993, p. 280.

Too Little Enclosure (Sarasota, FL)

About Right Enclosure (San Diego, CA)

A common rule of thumb is that viewers should never be farther away from the defining street edge than three times the enclosure height; this implies a *minimum* height-to-width ratio of 1:3.

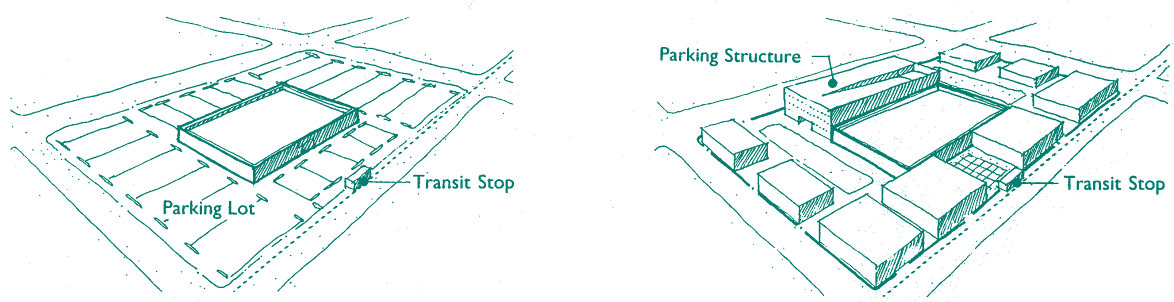
If we take a residential street with a 30-foot right-of-way and place 20-foot high dwellings along it (spaced side by side to create a continuous streetscape), the maximum front setback for a 1:3 height-to-width ratio is 15 feet. If we take a commercial street with 60-foot right-of-way and place 20-foot storefronts along it, they must sit directly on the right-of-way line.

As streets get wider, bordering buildings must rise to contain street space; at some point, even tall buildings will not do the job. Street trees must take over as imperfect substitutes. Or street vistas must be terminated by strong markers such as monuments or prominent buildings; spatial definition is thus achieved by means of focal points rather than enclosure.

The other requirements for street-oriented buildings are that main entries face the street, and that windows, in significant numbers, be at street level. For security and transparency, buildings cannot turn their backs or blank sides to the street.[25] The best streets are replete with doors and windows.[26]

This plea for street-oriented buildings does not preclude stores set back from the street in suburban shopping centers, office towers set back behind urban plazas, or any similar building arrangements. It simply means that in such cases, outbuildings must be placed along the street to create strong, positive corners and reasonably continuous streetscapes. Even regional shopping malls with inner courtyard space can be designed with a secondary street orientation. Malls can extend to the street on one or more sides, stores can have separate entrances and

Mall Intensified through the Addition of Outbuildings

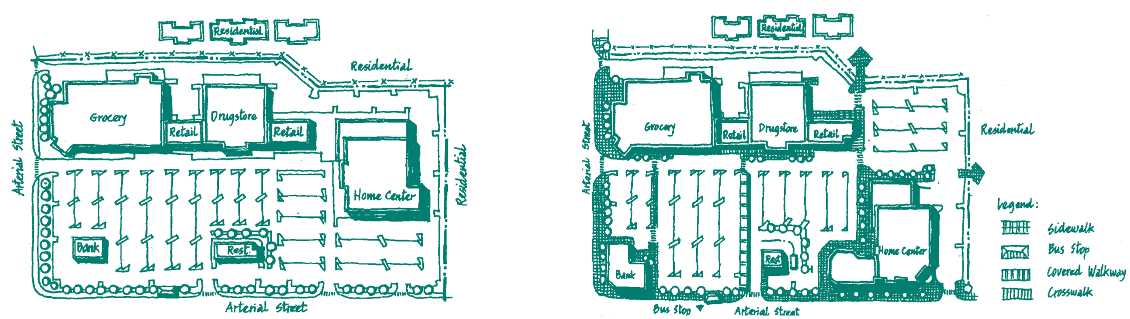


EXISTING SURFACE PARKING LOT

FUTURE INTENSIFICATION

Source: P. Calthorpe, *The Next American Metropolis - Ecology, Community, and the American Dream*, Princeton Architectural Press, New York, 1993, p. 111.

Shopping Center Redesigned to Connect to the Street



Source: Snohomish County Transportation Authority, *A Guide to Land Use and Public Transportation—Volume II: Applying the Concepts*, Lynnwood, WA, 1993, pp. 2-2 and 2-3.

display areas facing the street, and, if necessary, service corridors and loading docks can be provided within the mall itself.[27]

#10 Comfortable and Safe Places to Wait

(end of Essential Features)

Highly Desirable Features

#11 Supportive Commercial Uses

#12 Gridlike Street Networks

#13 Traffic Calming along Access Routes

#14 Closely Spaced Shade Trees along Access Routes

If the "right" trees are planted at the "right" spacing in the "right" locations, they contribute to nearly all pedestrian-friendly design objectives. These include comfort/safety, human scale, linkage, visual enclosure, complexity, coherence, and sense of place.

Generally, the right trees are shade trees that will grow to 50 to 70 feet at maturity and have a canopy starting at a comfortable 15 feet or so above the ground. In a place like Miami, shade is always required, and wind often required, for outdoor comfort.[28] The constant movement of branches and leaves, and the ever-changing patterns of light created, add to the visual complexity of the streetscape. The low canopy contrasts with the monumentality of wide spaces and tall buildings, creating human scale within larger volumes.

The right spacing of trees places them close enough together to form a continuous canopy over the sidewalk and a buffer between street and sidewalk. This requires spacing of 30 feet or less center to center, not the 50 to 70 feet called for in land development codes. When trees are first planted, they must be close together to define street space at all. As they mature over decades, closely spaced trees will have higher, more translucent canopies that produce an uninterrupted quality of light and shade. Nearly all the streets cited as outstanding examples by Henry Arnold in his insightful book, *Trees in Urban Design*, have street trees no more than 30 feet apart.[29]

The right location for street trees is between the street and the sidewalk, as close to the curb as engineering standards permit. Trees planted between the street and sidewalk provide a physical and psychological barrier between large-mass vehicles and small-mass pedestrians. In this location, trees visually limit street space, thereby calming traffic; they extend pedestrian space from buildings to the street; and they shade

Trees Mediating Scale of High-Rise Offices
(Miami, FL)

Street Trees Spaced Less Than 30 Feet Apart

(Santa Barbara, CA)

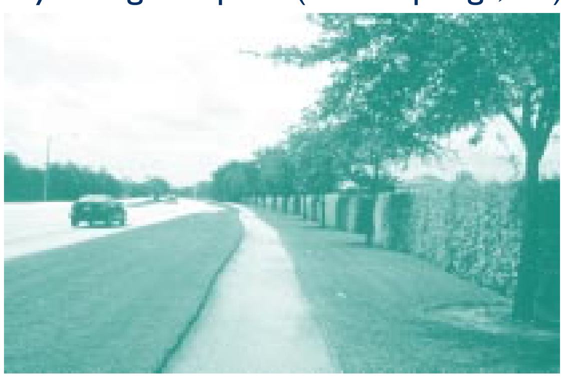
(Davis, CA)

the entire right-of-way, both street and sidewalk.[30]

The standard suburban practice is just the opposite of what is recommended here. Small ornamental and flowering trees, fruit trees, and palms substitute for substantial shade trees. They are placed far apart and set on the far (building) side of the sidewalk, where they pose less risk to errant vehicles. It is a perverse world, indeed, where errant vehicles are afforded more protection from trees than pedestrians are from errant vehicles. Used thus, trees may decorate a street or screen an unpleasant view, but contribute little to the fundamentals of good design, such as spatial definition and pedestrian safety.

Tree Row Limiting Motorists' Psychological Space (Ft. Lauderdale, FL)

Tree Row Expanding Motorists' Psychological Space (Coral Springs, FL)



#15 Little Dead Space, or Visible Parking

Designers promote active street-level land uses with fervor. Inactive uses, those generating few pedestrian trips, are avoided like the plague. Inactive uses create dead street spaces.

Parking lots have become the principal source of dead space in cities. No less authority than William H. Whyte considers them worse than blank walls.[31] Parking lots crowd out active uses, leaving people with less reason to come to an area and park in the first place. Empty metal shells and expanses of flat black asphalt are less interesting than almost any building imaginable.

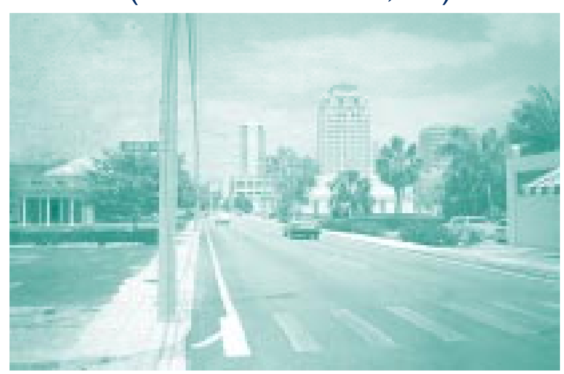
Nine percent is said to be the upper limit on the amount of land area devoted to parking; beyond that, people sense that the environment is no longer theirs but rather belongs to automobiles.[32] Downtown pedestrian counts in small cities fall as the amount of open parking increases.[33] None of the Great Streets featured in the book by that name has an abundance of parking, either off street or on.[34]

To meet the nine percent target, or come close, it is necessary to:

- set maximums on the amount of parking supplied by developers, not just minimums as in most land development codes;
- give credit for curb-side parking against the amount of off-street parking required;

Dead Spaces (Boston, MA)

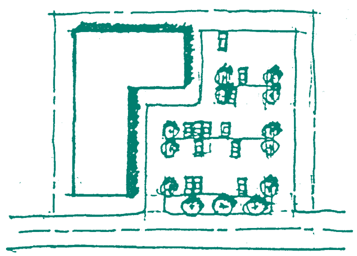
(West Palm Beach, FL)



reduce the amount of parking required whenever land uses with different peaking patterns share parking lots;

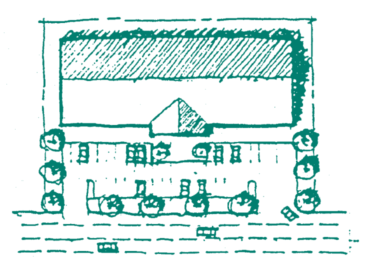
- substitute parking garages for surface parking lots; and/or
- build satellite parking facilities to free pedestrian streets from heavy parking demands.

Parking Placed to the Side of Buildings



Source: M.L. Hinshaw and Hough Beck & Baird, Inc., *Design Objectives Plan: Entryway Corridors - Bozeman, Montana*, 1992, p. 43.

Parking Limited to a Row or Two in Front of Buildings



Source: M.L. Hinshaw and Hough Beck & Baird, Inc., *Design Objectives Plan: Entryway Corridors - Bozeman, Montana*, 1992, p. 42.

Examples of enlightened parking policies can be found around the United States. Guidance in devising such policies is available from many sources.[35]

Where surface parking remains after such policies are adopted, it should be placed behind buildings (the best) or to the side (the second best). If placed in front, surface parking should be limited to a row or two to preserve the street orientation of buildings. Peter Calthorpe recommends that parking lots occupy no more than one third of the frontage along pedestrian-oriented streets, and no more than 75 feet in a stretch.[36] Even these figures may be too high for pedestrian streets.

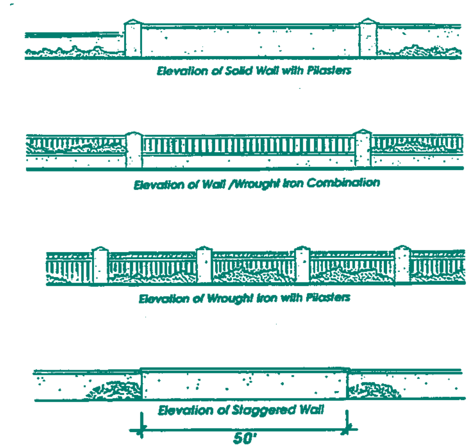
While parking lots have the potential to be almost park- or plaza-like, it happens so seldom in practice that screening parking with walls, hedges, or berms is advisable along public streets. If low and articulated, such screens form a nice street edge that is both complex and transparent.

The other major source of dead space in cities is blank walls—windowless or reflective glass building facades, garage-dominated residential streets, and flat security walls. While blank walls can define and enclose space, the resulting space is characterless. It takes architectural details, surface textures, modulation of light and shade, or changes in color to inject life into space and hold pedestrian interest.[37]

Whyte has toyed with the idea of calculating a "blank wall index" for urban places, equal to the percentage of blank walls up to 35 feet above street level.[38] If such an index were devised and measured over space and time, it would be high

Wall That Screens Parking without Spoiling the Street Edge (Mount Dora, FL)

Articulated and Landscaped Walls and Wall-Fence Combinations



Source: City of San Bernardino, Calif., *Title 19 - City of San Bernardino Municipal Code*, 1991, p. II-145.

in cities, even higher in suburbs, and on the rise everywhere. Instead, downtowns and main streets should have at least 50 percent of their ground-floor frontage devoted to retail uses, and all glass fronts should be of the see-through variety.[39] Where blank walls are unavoidable, they should be articulated and/or softened with plantings.

Parking garages, desirable in other respects, add to the blank wall index of cities. They should be disguised to look like neighboring buildings, with the same proportions of vertical and horizontal elements and with the same building materials. Or they should be hidden behind trees and other landscaping so their appearance becomes less problematic. For added interest, parking garages can have retail outlets at street level or retail display cases in their stead.

Parking Neatly Hidden

(San Diego, CA)

(Atlanta, GA)

#16 Nearby Parks and Other Public Spaces

Nearby parks and other public spaces (playgrounds, plazas, gardens, squares, etc.) serve as attractions for pedestrians. People are more likely to walk when they have some place specific, and nearby, to go. "Around the block," or the subdivision, is a poor substitute for a real destination.

Public spaces contribute more to the street environment when they appear as extensions of street and sidewalk rather than as stand alones. If a good pedestrian street is an outdoor room, then a good park, playground, or plaza is another room *just off* the main room, or an alcove within the main room.

Used in this manner, public spaces punctuate the street network, break up long stretches, and grace streets with beginnings and endings. They give the streets upon which they sit a special character, something lacking in modern street networks.[40] They add complexity, legibility, and sense of place to the street environment.

William H. Whyte's study of plazas in New York shows just how important connections to the street and sidewalk can be. Well-connected plazas generate a substantial amount of impulse use. Sunken or elevated plazas do not. "If people do not see a space, they will not use it."[41]

Parks and Plazas as Extensions of Main Streets

(Palo Alto, CA)

(Winter Park, FL)

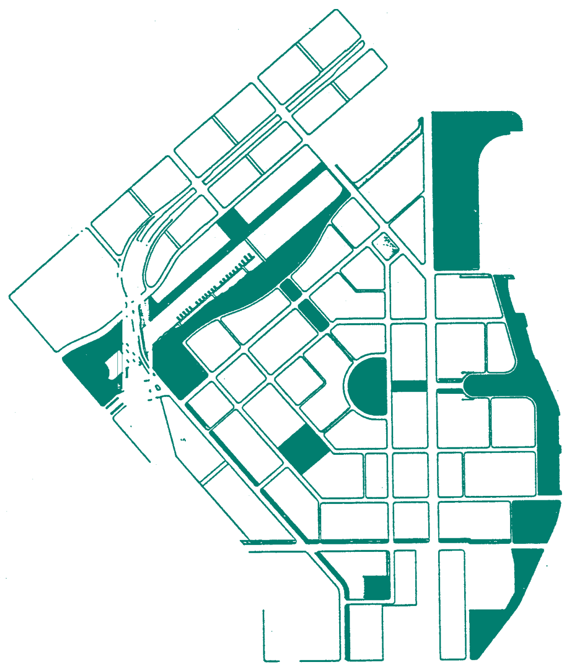
Public spaces also contribute more to the street environment when they draw on a variety of land uses nearby rather than only one. A single dominant use produces patrons with similar schedules (mothers in mid-afternoon, office workers at lunch time). Nearby spaces are depopulated at other hours.

Plaza Built into a Conventional Shopping Center (Boca Raton, FL)

Plaza Created by Flaring a Sidewalk Along a Shopping Street (Hollywood, FL)

Generalized spaces, without any particular draw of their own, are populated naturally only where life swirls nearby.[42] There is particular synergism with shopping. Shoppers and other visitors animate public spaces, and public spaces in turn cause people to linger. Spaces can be as small as a flared corner or a recessed building entry equipped with a bench and shade tree. In fact, some of the most valued and heavily used spaces are the smallest. A hint of crowding may actually enhance appeal and festive character.

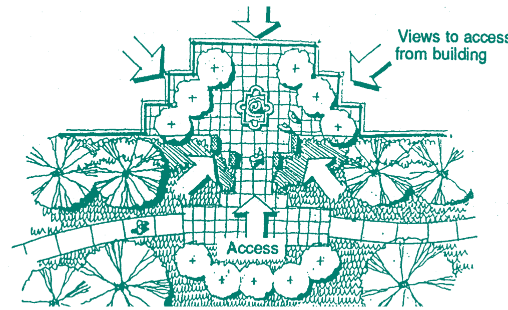
Public Spaces Linked to One Another



Source: City and County of San Francisco, *Mission Bay Plan - Proposal for Adoption*, 1990.

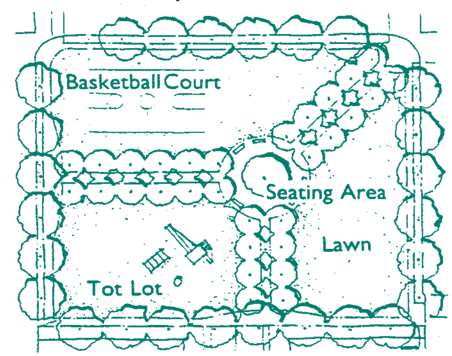
Best Development Practices offers design guidelines for parks and other public spaces.[43] Among them: Spaces should be highly accessible to pedestrians, linked to other spaces via sight lines, and crammed with activities and sensuous elements: trees, water, sculpture, etc.

Public Space Accessible from Several Directions



Source: Edward D. Stone, Jr. and Associates, *Riverwalk Design Guidelines*, City of Fort Lauderdale, Fla., 1986, p. 2.2.

Small Park Supporting Multiple Activities



Source: P. Calthorpe, *The Next American Metropolis - Ecology, Community, and the American Dream*, Princeton Architectural Press, New York, 1993, p. 92.

#17 Small-Scale Buildings (or Articulated Larger Ones)

#18 Classy Looking Transit Facilities

(end of Highly Desirable Features)

Nice Additional Features

#19 Streetwalls

#20 Functional Street Furniture

#21 Coherent, Small-Scale Signage

In traditional cities, buildings dominate streetscapes with their strong vertical lines and closeness to the street; landscaping and signage are secondary. In suburbs and suburb-like cities, roles are reversed. Buildings are so low, and are set so far back, that landscaping and signage become dominant image makers. The images created by suburban landscaping are generally positive, if a bit monotonous. The images created by signage are usually negative. "In their competition for the attention of the motoring public, merchants continually push the roadside visual envelope to its breaking point by erecting bigger, taller, and brighter signs."[44]

Local governments and large-scale developers have responded to the proliferation of garish highway signs by regulating the number, type, and size of signs. But while avoiding the chaos of the commercial strip, the result of zealous sign regulation can be almost as bad. Signs can cease to convey information effectively or to convey a sense of community character. They can be so standardized as to be tedious.

Kevin Lynch and other top designers have recognized the creative possibilities afforded by good signage.[45] If designed and applied thoughtfully, signs can add several pedestrian-friendly qualities to streetscapes: human scale, complexity, coherence, and sense of place.

The best signs convey a sense of place, either the place of business they advertise or the district in which it is located.[49] The most memorable places in Florida have signage to match: South Beach in Miami, Sanibel Island, Park Avenue in Winter Park, and other tourist meccas. Signs add to the fun and novelty of being there.

Memorable Signs, Memorable Places

(South Miami Beach, FL)

(Santa Barbara, CA)

Pushing the Envelop in Both Directions

(Fast Food in Las Vegas, NV)

(Fast Food in Key West, FL)

In land development codes, sign size limits usually relate to lot frontage; the wider the lot, the bigger the sign may be and/or the more signs may be displayed. A more sensible basis for sizing signage is the design speed of the street along which signs are located. Along high-speed commuting routes, relatively large and simple signs are required to convey a message. Conversely, along streets that are meant to be walkable, design speeds are much lower and signs should be scaled down. Based upon extensive study of traveler reaction times, the seminal work, *Street Graphics*, offers guidelines for sign area and letter height as a function of land uses and travel speeds. For streets with design speeds of 15 mph, sign area should be limited to six to eight square feet and letters limited to four inches in height; such signs are also ideal for pedestrians.[46] The accompanying table gives the complete set of guidelines.

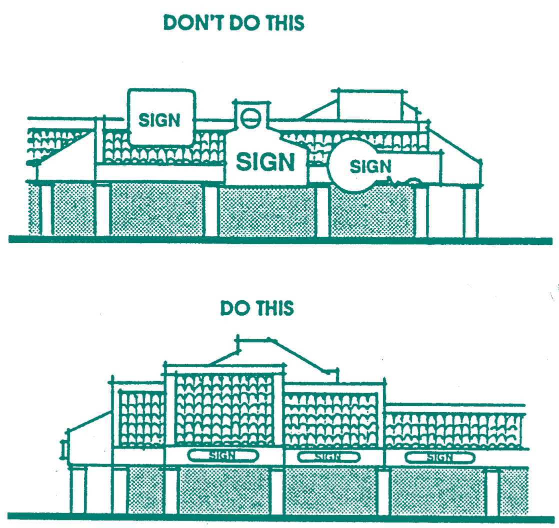
Sign Specifications as a Function of Street Width, Design Speed, and Land Use

Street Width	Speed	Letter Height	Total Area
Two Lanes	15 mph	4"	6-8 sq ft
	30	7	18-25
	45	10	36-50
Four Lanes	30	9	28-40
	45	13	64-90
	60	17	106-150
Six Lanes	30	9	28-40
	45	14	70-100
	60	19	134-190

* The lower end of the size range applies to institutional and residential areas, the upper end to commercial and industrial areas.

Source: W.R. Ewald, *Street Graphics - A Concept and a System,* Landscape Architecture Foundation, McLean, VA, 1977, pp. 52-53.

Chaotic vs. Coherent Sign Patterns

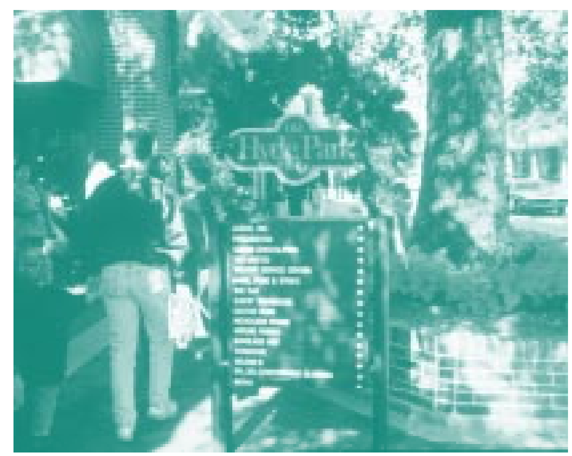


Source: City of San Bernardino, Calif., *Title 19 - City of San Bernardino Municipal Code*, 1991, p. II-133.

In general, visual complexity is good, for it helps maintain pedestrian interest. But "high complexity urban areas must also be highly coherent;" that is, they must be highly ordered.[47] The problem with a highway strip is not the surplus of information it imparts. Rather, it is the absence of structure to the information; massive doses of unstructured information overwhelm. As several visual preference studies have shown, including one study of street signage, scenes with moderate complexity and high coherence are the most favored of all.[48]

Signs visible in a single scene must have consistent vocabulary of heights, sizes, shapes, materials, colors, and lettering. Note that signs need not, indeed probably should not, be identical in all respects, just similar in a few.

Complex and Coherent Signage for Pedestrians (Tampa, FL)



#22 Special Pavement

When streets are conceived as outdoor rooms, the "walls" of the room are the buildings that bound and shape the street. The "ceiling" is the sky itself, which if bordering buildings are roughly the same height and close together, will be perceived as a ceiling through the power of suggestion. The "floor" is the street and sidewalk surface.

How important is the floor—its color, texture, and pattern—in making a street space feel more roomlike? On this the best minds disagree.[50] Special paving can contribute something to at least four qualities of pedestrian-friendly design: human scale, linkage, complexity, and coherence. Its contribution is necessarily limited, however, by the oblique angle at which pedestrians view pavement receding into the distance; any pattern quickly becomes indiscernible. Bricks, cobbles, precast pavers, and patterned concrete cannot compensate for otherwise poorly defined street space. And they are relatively expensive as streetscape improvements go.[51] Elaborate pavement is as expensive as large, closely spaced trees and has much less visual impact.

Thus, special paving is probably best used as an accent rather than as fill-in material, and used mainly where it serves some purpose other than a purely decorative one. Traffic calming is one such purpose. Used in a "gateway" entering a pedestrian zone, or in a crosswalk, textured pavement warns drivers to slow down and look out for pedestrians. For intensive traffic calming, an entire street section may be specially paved.

Poor Street Space Despite Streetscape Improvements
(Miami, FL)

Use of Textured Surfaces as Warning Devices

(Miami Lakes, FL)

(Santa Barbara, CA)

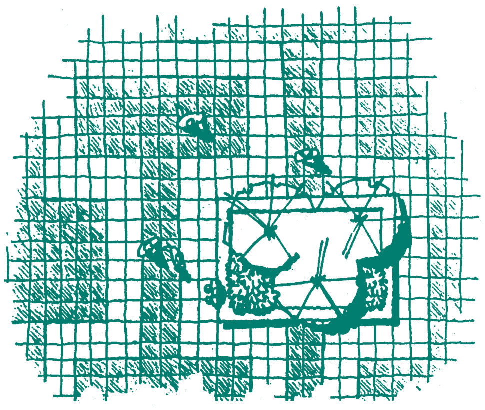
Use of Textured Surfaces for Intensive Traffic Calming

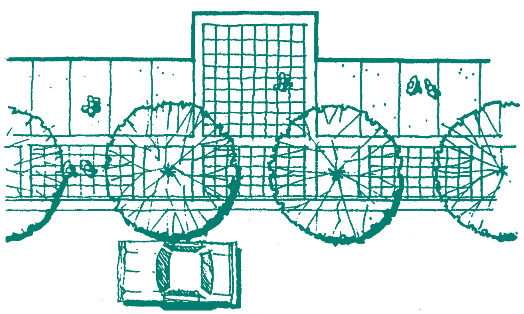
(Reston, VA)

(Seattle, WA)

Without costing a fortune, special paving may be used to visually break up large paved areas; provide linkage between buildings and streets, buildings and public spaces, or public spaces and one another; and clearly delineate pedestrian, bicycle, and motor vehicle rights-of-way where boundaries are not obvious.

Use of Special Paving to Break Up an Expanse or Link a Building to the Street





Source: Edward D. Stone, Jr. and Associates, *Riverwalk Design Guidelines*, City of Fort Lauderdale, Fla., 1986, pp. 3.3., 4.4.

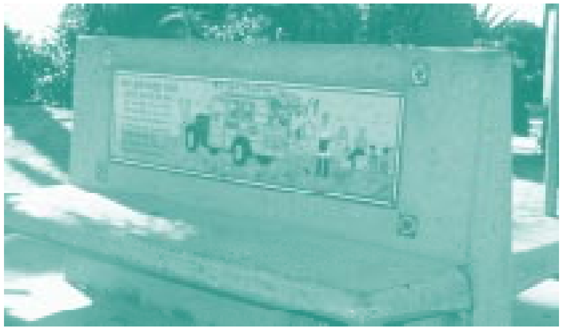
#23 Lovable Objects, Especially Public Art

Even spaces that are well-defined by buildings or other vertical elements may be characterless. That is, spaces may remain something less than places.[52] What are sometimes called "lovable objects" give meaning to places by making associations with the past, commemorating people and events, adding decorative richness, celebrating the natural environment, or introducing whimsy and humor.[53]

Associations with the Past, Decorative Richness, and Whimsy

(New York, NY)

(Santa Barbara, CA)



(Boston, MA)

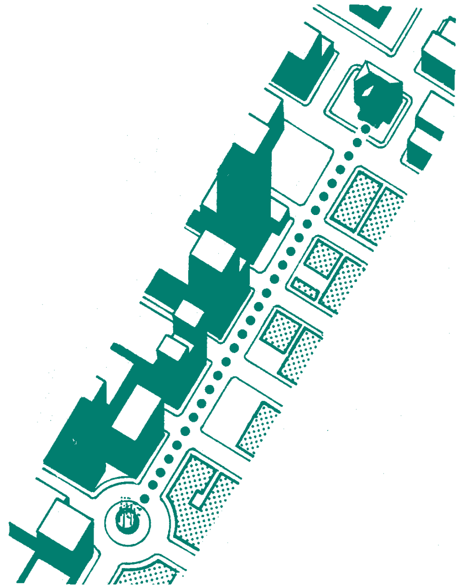
(San Francisco, CA)

Place Makers - Public Art That Tells You Where You Are profiles dozens of artworks that help define and enrich public places. The book defines public art broadly, as it should. Among the works it profiles are sculpture, murals, decoratively shaped fountains, inlaid pavements, and mosaic-covered benches.[54] Anecdotal evidence suggests that introducing public art—art in public places—can increase pedestrian activity.[55] Public art has this power because it is not just artistic, like art in private collections. It is place-making.

If public art is sufficiently monumental, it can overcome a fragmented frame of buildings that, by itself, could not contain space. The art must have a vertical thrust to serve as a marker, and an open design to grasp and hold the space around it.[56] This principle applies both to streets, whose end points can be marked with public art, and to parks and other public spaces, whose centers can be defined by public art.

Public Art Terminating a Street Vista (Stuart, FL)

Focal Points at Ends Compensating for Weakly Defined Street Space



Source: J.B. Goldsteen and C.D. Elliott, *Designing America: Creating Urban Identity*, Van Nostrand Reinhold, New York, 1994, p. 171.

Public Art Centering a Village Green (Madison, FL)

Public Art Integrated into a Bus Stop (Orlando)

Source: Herbert - Halback, Inc., *Lynx - Customer Amenities Manual*, Central Florida Regional Transportation Authority, Orlando, 1994, pp. 4.8,5.3.

Endnotes

[1] P. Newman and T. Hogan, "A Review of Urban Density Models: Toward a Resolution of the Conflict between Populace and Planner," *Human Ecology*, 9, 1981, pp. 269-303.

[2] H.S. Levinson and F.H. Wynn, "Effects of Density on Urban Transportation Requirements," *Highway Research Record 2*, 1963, pp. 38-64; K. Neels et al., *An Empirical Investigation of the Effects of Land Use on Urban Travel*, The Urban Institute, Washington, D.C., 1977, pp. 60-66; G. Harvey, *Relation of Residential Density to VMT Per Resident*, Metropolitan Transportation Commission, Oakland, CA, 1990; R.J. Spillar and G.S. Rutherford, "The Effects of Population Density and Income on Per Capita Transit Ridership in Western American Cities," *ITE 1990 Compendium of Technical Papers*, Institute of Transportation Engineers, Washington, D.C., 1990, pp. 327-331; J. Holtzclaw, *Explaining Urban Density and Transit Impacts on Auto Use*, Sierra Club, San Francisco, 1991, pp. 18-24; P.W.G. Newman and J.R. Kenworthy, *Cities and Automobile Dependence: A Sourcebook*, Gower Technical, Brookfield, VT, 1991, pp. 34-68; R. Cervero, "Rail-Oriented Office Development in California: How Successful?" *Transportation Quarterly*, Vol. 48, 1994, pp. 33-44; L.D. Frank and G. Pivo, "Impacts of Mixed Use and Density on the Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking," *Transportation Research Record 1466*, 1994, pp. 44-52; L.D. Frank and G. Pivo, *Relationships between Land Use and Travel Behavior in the Puget Sound Region*, Washington State Department of Transportation, Seattle, WA, 1994, pp. 14-34; J. Holtzclaw, *Using Residential Patterns and Transit to Decrease Auto Dependence and Costs*, Natural Resources Defense Council, San Francisco, CA, 1994, pp. 20-21; R. Kitamura, P.L. Mokhtarian, and L. Laidet, "A Micro-Analysis of Land Use and Travel in Five Neighborhoods in the San Francisco Bay Area," Paper presented at the 74th Annual Meeting, Transportation Research Board, Washington, D.C., 1994.

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[7] S.A. Smith et al., *Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas - Research Report*, National Cooperative Highway Research Program Report 294A, Transportation Research Board, Washington, D.C., 1987, p. 25; R.L. Knoblauch *et al.*, *Investigation of Exposure Based Pedestrian Accident Areas: Crosswalks, Sidewalks, Local Streets and Major Arterials*, Federal Highway Administration, Washington, D.C., 1988, p. 54; and Post, Buckley, Schuh & Jernigan and J. Fruin, *Recommended Design Standards for the Florida Pedestrian Design Standards Development Study*, Florida Department of Transportation, Tallahassee, 1988, p. 32. The City of Toronto is contemplating an even stricter standard - a maximum block length of 150 meters (492 ft) before midblock pass-throughs are required. Planning and Development Department, *Urban Design Guidebook*, City of Toronto, October 1995 draft, p. 31.

[8] Travel distances were estimated assuming everyone walked at the National Personal Transportation Survey average speed of 3.16 mph. Curves were smoothed to account for people's tendency to round off travel times.

[9] Snohomish County Transportation Authority, *A Guide to Land Use and Public Transportation*, Technology Sharing Program, U.S. Department of Transportation, Washington, D.C., 1989, p. 7-6; W. Bowes, M. Gravel, and G. Noxon, *Guide to Transit Considerations in the Subdivision Design and Approval Process*, Transportation Association of Canada, Ottawa, Ontario, 1991, p. A-8; Ontario Ministry of Transportation, *Transit-Supportive Land Use Planning Guidelines*, Toronto, 1992, pp. 45-46; and Denver Regional Council of Governments, *Suburban Mobility Design Manual*, Denver, CO, 1993, p. 26.

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[11] J. Jacobs, *The Death and Life of Great American Cities*, Random House, New York, 1961, pp. 29-88.

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[17] Fruin, p. 44.

[18] National Safety Council, *Accident Facts*, Chicago, IL, 1993, pp. 55, 69.

[19] R.L. Knoblauch *et al.*, pp. 38-50.

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[24] D.T. Smith and D. Appleyard, *Improving the Residential Street Environment*, Federal Highway Administration, Washington, D.C., 1981, pp. 123-130.

[25] J. Jacobs, p. 35.

[26] A. Jacobs, pp. 285-287.

[27] See for successful examples, see T. Fisher, "Remaking Malls," *Progressive Architecture*, 69, November 1988, pp. 96-101; D. Schwanke, T.J. Lassar, and M. Beyard, *Remaking the Shopping Center*, Urban Land Institute, Washington, D.C., 1994, pp. 31-59; I.F. Thomas, "Reinventing the Regional Mall," *Urban Land*, 53, February 1994, pp. 24-27; and T. Lassar, "Shopping Centers *Can* Be Good Neighbors, *Planning*, 61, October, 1995, pp. 14-19.

[28] A bioclimatic chart relates human comfort to four major climate variables — temperature, relative humidity, sunlight, and wind. For an introduction to this subject, see G.Z. Brown, *Sun, Wind, and Light - Architectural Design Strategies*, John Wiley & Sons, New York, 1985, pp. 33-35 and 50-51.

[29] H.F. Arnold, *Trees in Urban Design*, Van Nostrand Reinhold, New York, 1993, pp. 173-181.

[30] Arnold, p. 56.

[31] Whyte, pp. 314-315.

[32] Alexander *et al.*, pp. 120-125.

[33] J.B. Kenyon, "A Model of Downtown Pedestrian Generation," in *Getting There by All Means: Interrelationships of Transportation Modes*, 8th International Pedestrian Conference, City of Boulder, CO, 1987, pp. 233-237.

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[37] A. Jacobs, pp. 282-284, E.N. Bacon, *Design of Cities*, Viking Press, New York, 1974; and R. Hedman, *Fundamentals of Urban Design*, American Planning Association, Chicago, IL, 1984, p. 1-7 and 57-70.

[38] Whyte, pp. 222.

[39] Whyte, p. 227.

[40] A. Jacobs, pp. 301 and 306-307. There is nothing special about most streets in urban areas, nothing that differentiates one from another. This has been a cause of concern for designers, for it makes the street network less legible to travelers and undermines any sense of place. See Hedman, 1984, pp. 89-93; and W.C. Ellis, "The Spatial Structure of Streets," in S. Anderson (ed.), *On Streets*, MIT Press, Cambridge, MA, 1986, pp. 115-131.

[41] Whyte, p. 129.

[42] J. Jacobs, pp. 89-111.

[43] Ewing, 1996.

[44] K.R. Bishop, *Designing Urban Corridors*, Planning Advisory Service Report Number 418, American Planning Association, Chicago, 1989, p. 7.

[45] K. Lynch and G. Hack, *Site Planning*, MIT Press, Cambridge, MA,1984, pp. 187-188.

[46] W.R. Ewald, *Street Graphics*, The Landscape Architecture Foundation, McLean, VA, 1977, pp. 52-53.

[47] T.R. Herzog, S. Kaplan, and R. Kaplan, "The Prediction of Preference for Unfamiliar Urban Places," *Population and Environment*, 5, 1982, pp. 43-59. Also see J.L. Nasar, "The Evaluative Image of the City," *Journal of the American Planning Association*, 56, 1990, pp. 41-53.

[48] J.L. Nasar, "The Effect of Sign Complexity and Coherence on the Perceived Quality of Retail Scenes," *Journal of the American Planning Association*, 53, 1987, pp. 499-509.

[49] Ewald, pp. 38-40.

[50] Among the designers perceiving special pavement as important are Lynch and Hack, p. 170; Untermann, 1984, p. 59; and R. Trancik, *Finding Lost Space - Theories of Urban Design*, Van Nostrand Reinhold, New York, 1986, p. 61. Minimizing its importance are Arnold, p. 10; Hedman, 1984, p. 82; and A. Jacobs, p. 300.

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[53] R.L. Fleming and R. von Tscharner, *Place Makers - Public Art That Tells You Where You Are*, The Townscape Institute, Cambridge, MA, 1981, pp. 7-15.

[54] Fleming and von Tscharner, pp. 20-109.

[55] Whyte, pp. 144-148.

[56] Hedman, 1984, pp. 85-87; and J.B. Goldsteen and C.D. Elliott, *Designing America: Creating Urban Identity*, Van Nostrand Reinhold, New York, 1994, pp. 171-172.