

Street Design Guidelines for Healthy Neighborhoods



by Dan Burden

with Michael Wallwork, P.E., Ken
Sides, P.E.,
Ramon Trias, and Harrison
Bright Rue

Local Government Commission

January 2002

The Center for Livable Communities

The Center for Livable Communities helps local governments and community leaders be proactive in their land use and transportation planning, and adopt programs and policies that lead to more livable and resource-efficient land use patterns.

Center programs can help jurisdictions expand transportation alternatives, reduce infrastructure costs, create more affordable housing, improve air quality, preserve natural resources, conserve agricultural land and open space, and restore local economic and social vitality.

The Center for Livable Communities is a national initiative of the Local Government Commission, a nonprofit, non-partisan, membership organization of elected officials, city and county staff, and other interested individuals throughout California and other states.

For more information about the Center and its other publications, please contact us at:

☎ (800) 290-8202

Acknowledgements

Special thanks to the members of the San Joaquin Residential Street Design Guidelines Advisory Committee

Fred Allen
Parks Planning Manager
City of Modesto

Lynn Azevedo
Planning Director
City of Los Baños

Jana Coons
Planner I
City of Turlock

Butch Cope
Deputy Director
Planning and Community
Development Services
County of Merced

Paula Fernandez
Associate Traffic Engineer
City of Lodi

Marta Frausto
Associate Transportation
Planner
California Dept. of
Transportation

James Hamilton
Planning Manager
City of Turlock

Chris Hatfield
Senior Transportation Planner
California Dept. of
Transportation

John Hofmann
Principal Planner
City of Merced

Margaret Kavanaugh-Lynch
Planner, Community
Development Department
City of Tracy

Greg Kirkpatrick
Field Representative
American Farmland Trust

Steve Kyte

City Manager
City of Turlock

Andrew Malik
Economic Development Director
City of Tracy

Dave Mitchell
Supervising Environmental
Planner
San Joaquin Valley Unified
Air Pollution Control District

Bill Nichols
Strategic Planning Manager
City of Modesto

Eugene M. Palazzo
Planning Director
City of Riverbank

Terry Parker
Office of Air Quality and
Transportation Planning
California Air Resources Board

Jeffrey Pernstein
Interim Director
Community Development Dept.
City of Tracy

Tracy Roemer-Bettencourt
Environmental Planner
San Joaquin Valley Unified
Air Pollution Control District

Dianne Keil Smith
Senior Planner
Community Development Dept.
City of Stockton

Eric Veerkamp
Associate Planner
Community Development Dept.
City of Lodi

Charlie Woods
Director of Planning and
Community Development
City of Ceres



Street Design Guidelines for Healthy Neighborhoods

■ January 2002

Principal Author Dan Burden, Walkable Communities,
Inc.

Contributing Michael Wallwork, P.E.
Authors Ken Sides, P.E.
 Ramon Trias
 Harrison Bright Rue

Editors Dave Davis, Sharon Sprowls,
 and Paul Zykofsky, AICP

Funding U.S. Environmental
 Protection Agency (Region IX)
 San Joaquin Valley Unified
 Air Pollution Control District

 UC San Francisco / California
 Department of Health Services

Photography Dan Burden, Walkable Communities,
Inc.

Design Dave Davis



Healthy Neighborhood

Table of Contents

I. Introduction

Overview	2
How Did Current Street Standards Become the Norm? 3	
Origins of the Healthy Street Design Guidelines ...	4
Methodology Behind the Guidelines	6

II. Using This Guidebook

9

III. What Are Healthy Streets?

Healthy Streets Create Healthy Neighborhoods ...	12
Conventional Streets Create Conventional Neighborhoods	12
Eliminating the Need for Conventional Street Hierarchy 13	
Healthy Street Categories	13
1. Alleys, Lanes, Streets, and Trails	
2. Transitional Avenues and Main Streets	
3. Boulevards and Parkways	
Where to Find Traditional, Healthy Streets	17
Measuring A Street's Success	17
Meeting People's Six Basic Needs	18

IV. Conventional Street Design Problems

1. Public Safety for Drivers Only	23
2. Higher Neighborhood Speed Regulations	23
and Tolerances	
3. Compromises in Safety, Access and Mobility ..	24
4. Compromises in Recovery	24
5. Compromises through Reduced Yielding	24
6. Compromises in Comfort	24
7. Compromises in Liability and Risk	25
8. Law Enforcement Difficulties.	25
9. Larger Curve Radii and Higher Speeds	26
10. Faster Intersection Turning Speeds	27
11. Creating Safer Streets Benefits Everyone	27

Healthy Neighborhood

V. Healthy Neighborhood Street Design Principles

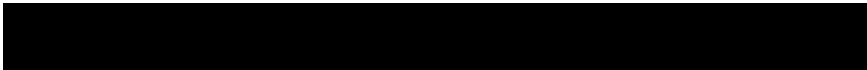
1.	Walkable Neighborhood Size and Mixed Uses .	28
2.	Interconnected and Diverse Street Pattern ...	29
3.	Shorter Block Length	29
4.	"Outdoor Rooms" and Front Porches	29
5.	Traffic Dispersion	30
6.	Speed Control through Geometrics	30
7.	Narrower Lane Widths	30
8.	Narrower Intersections with Smaller Radii	31
9.	Tee Intersections	31
10.	Curves	31
11.	On-Street Parking	31
12.	Nature Strips, Landscaping and Trees	32
13.	Sidewalks	33
14.	Curbs and Gutters vs. Swales	34
15.	Street Furniture	35
16.	Street Lighting	35
17.	Bus Stops	35
18.	Street Crossings – Crosswalks and Medians ..	36
19.	Smaller Curb Return Radii	36
20.	Corner Sight Triangles	37
21.	Bicycles	37
22.	Snow Removal	38
23.	Emergency Vehicles	38
24.	Utilities	39
25.	Resolution of Conflicts	39
	Conclusion	40

Appendices

A.	AASHTO "Green Book" Excerpts	41
B.	Fire Code Notes	47
C.	"Skinny Streets" Excerpts, by Livable Oregon ..	48
D.	Design Matrix for Healthy Streets	back cover

Healthy Neighborhood

Resources 51



Healthy Neighborhood

I. Introduction

A major shift in the way we design neighborhoods is "taking it to the streets" all across America. People are working together to identify better ways to design new neighborhoods or retrofit existing ones to be more interactive, walkable, enjoyable and livable. After years of neglect, street design is re-emerging as a major element of neighborhood street engineering, town planning and real estate development.

Several real estate studies reveal that the top preference in purchasing a home combines low traffic volume, slow street speeds and minimal noise. Many people seek neighborhoods with parks, schools and other activities nearby for their children, while many "baby boomers" – anticipating the changing mobility of their older years – are asking for sidewalks, trails, greenways, and open space.

The desire for healthy, interactive neighborhoods is not a new phenomenon, but only quite recently have real estate marketers started to promote quiet, neighborly streets as a main incentive to buy houses in particular neighborhoods. A recent Rutgers University study determined that "small towns" rank highest on the list of five different types of living places. Fifty percent of Americans want to buy homes in village-style neighborhoods, compared with 22 percent for conventional suburbs (Eagleton Institute, 1987).

Before Walt Disney Corporation built Celebration, its new town in Florida, they conducted an extensive market study of what homebuyers wanted. Focus groups revealed that one out of every two Americans wanted to live in a village-style or traditional neighborhood. However, since less than one percent of current new development is styled on older, traditional patterns, a major demand for neighborhoods that retain old town living styles goes unfulfilled.

The types of streets our grandparents lived on are still the best streets types today. To build these quiet streets and street patterns we must look both into the



A traditional street in an older neighborhood in Philadelphia.

Healthy Neighborhood

Overview

Traditional streets are an important component of healthy neighborhoods and livable communities. Pedestrians in most cities say they want well-designed neighborhood alleys, lanes and streets that keep motorist speeds between 10 and 25 mph, and provide on-street parking, sidewalks, shade, benches, street lamps, and other community amenities.

These design elements combine to create an ideal environment that encourages walking, bicycling and a sense of community: streets should be well connected to offer a variety of walking routes and to distribute motorized

traffic. Streets should have regular terminating vistas – prominent features where they end or at the apex of curves – and offer plenty of variety along the way. Intersections should have turning radii that require low speeds, yet allow access by infrequent street users such as fire trucks, sanitation trucks, and delivery vehicles. Ideally, blocks are not longer than 300-450 feet. Houses are located close to the street. Parks, schools, churches and small shops are found at walkable distances from



A new traditional street in The Kentlands, Maryland.

each home.

Walkable, bike-friendly, transit-oriented neighborhoods eliminate the need for many non-essential, motorized trips. Traffic volume, speed and noise are reduced. By slowing motorized traffic, people discover that the front portions of their homes are pleasant places. They spend more time in front yards and porches, and meet neighbors along walkways and at street corners.

Putting more people outside further slows traffic and enhances neighborhood security. As more people meet, make friends, and share information, neighborhood bonds are strengthened and people watch out for each other. Over time, parents feel more comfortable about allowing their children to be outdoors more often, and they permit children to walk or bike to many of their

How Did Current Street Standards Become the Norm?

As researchers examined town codes nationwide, they found that new towns typically copied existing codes or adopted published standards without question. Rarely had anyone conducted research to find the right combination of elements needed to make streets successful. This lack of understanding has often resulted in noisy, high-speed, high-volume roads, which isolate neighborhoods and increase the need for auto trips.

In *Rural By Design*, Randall Arendt captures this copycat code syndrome of neighborhood street-making. He cites *Residential Streets*, published jointly in 1990 by the American Society of Civil Engineers (ASCE), National Association of Home Builders (NAHB) and the Urban Land Institute (ULI), which strongly criticizes current street-making practices. According to *Residential Streets*, current practices can be attributed to early standard-setting based upon readily available state highway department manuals. Several states still set standards for local, neighborhood street-making. While these standards may be acceptable for major roads, they are out of character in a neighborhood and produce inappropriate driving behavior by motorists.

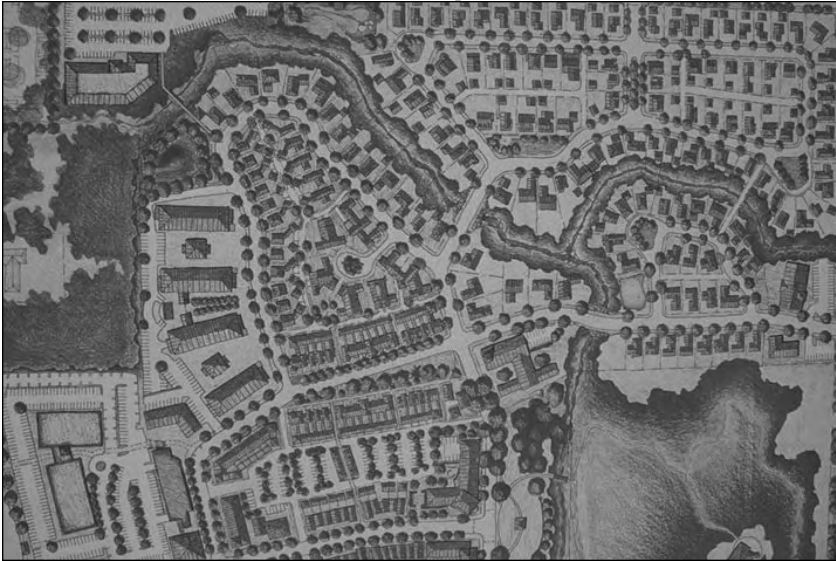
Street-making is a simple art. However, because it is crucial to neighborhood and community design, many disciplines must collaborate to achieve the best street patterns for each neighborhood. Motorist behavior is primarily dictated by street design. Left solely to traffic engineering, neighborhood street design often reflects



This Las Vegas neighborhood is isolated. Children must walk long distances in stark, hot, high-speed environments to get to a distant park,

Origins of the Healthy Neighborhood Street Guidelines

These street-making guidelines were initially prepared for communities in California's San Joaquin Valley under sponsorship of the Local Government Commission's Center for Livable Communities, and Walkable Communities, Inc. Funding was provided by the U.S. EPA Region IX, the San Joaquin Valley Air Pollution Control District, Walkable Communities, Inc., and the Physical Activity Health Institute of the University of California at San Francisco and California Department of Health Services.



In Fairview Village (Portland, Oregon), a density of 11-13 units/acre helped preserve wetlands and woodlands. Short blocks provide quick and safe access to schools, stores and the post office.

(artwork: Holt and Haugh)

ment, and infrastructure demands created by this growing population while trying to preserve their communities' historic rural character and the economic viability of their agricultural businesses. Responding to these concerns, a task force of planners, city managers, elected officials, and nonprofit representatives gathered to help develop these healthy neighborhood street design guidelines.

Although developed in the San Joaquin Valley, the guidelines can easily be applied to street design across the U.S. and were intended for national dissemination. These design principles are consistent with low-speed street-making across the country and are based on the larger planning concepts of "traditional" or "village-

Healthy Neighborhood

style" neighborhood design. Draft versions of these guidelines have already been used for state and national training courses and local street design in cities across the United States and Canada – and as far away as Australia.

These guidelines embrace the published art of street-making found in dozens of engineering, planning and town-making manuals. Many popular references were consulted and used in their preparation including the following: the often-quoted American Association of State Highway Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets ("The Green Book"); the Institute of Transportation Engineers (ITE) Traditional Neighborhood Development Street Design Guidelines; ITE's Traffic Engineering Handbook; Residential Streets: Objectives, Principles and Design Considerations, published by the American Society of Civil Engineers (ASCE), National Association of Home Builders (NAHB) and Urban Land Institute (ULI); and the ASCE's Residential Streets. The National Fire Code and the San Diego Metropolitan Transit Development Board's "Designing For Transit" manual were also used. A number of other town-making texts, such as Randall Arendt's Rural by Design and Christopher Alexander's The Timeless Way of Building and A Pattern Language, were also consulted.

All the street dimensions recommended in these guidelines fall within the acceptable guidelines and principles established by these important national and regional organizations.

Expect debate in your community. Manuals often offer diverse recommendations. They always have a range of values from which professional teams can select to achieve their goals. Planning, engineering, transit operations, safety and fire code bibles have descriptive lan-



Trail connector at the
University of
California at Santa
Barbara.

Methodology Behind the Guidelines

To prepare these street design guidelines, we assembled a team consisting of two professional engineers, an architect, a town planner, a historic redevelopment specialist, a citizen planner, an attorney, and a walkable communities instructor. To “field-test” the guidelines, our team measured successful streets across the country, asked both residents and motorists why they liked their streets, and counted the number of people walking and bicycling along them.

To prepare these guidelines, the team visited, measured and talked with residents and drivers in over 80 traditional neighborhoods and sixteen neo-traditional neighborhoods. Dan Burden, the principal author, recently completed a 30-month tour of 542 cities in each of the major regions of the U.S. and across North America. Meeting with groups interested in walkable communities in each of these cities, Burden has identified some of the most critical and common street-making issues, practices and principles.

A Nationwide Review of Neighborhood Street Design

The streets, neighborhoods and communities we studied were diverse. They included Cambridge, Massachusetts; Albany and Saratoga, New York; East Lansing and Kalamazoo, Michigan; Crested Butte, Grand Junction and Boulder, Colorado; the Ballard, Green Lake, Lake City and Capitol Hill neighborhoods in the Seattle area; Gig Harbor and University Place, Washington; Eugene, Oregon; Eureka, Davis, Chico, Santa Monica, Pasadena and San Diego, California; Denton, Arlington, Austin, McAllen and Dallas, Texas; Juneau and Anchorage, Alaska; Liberty, St. Louis, Springfield and Independence, Missouri; and Brevard, Asheville, Charlotte and Waynesville, North Carolina.

Among the new “traditional” neighborhoods we studied or visited were Seaside, Abacoa, Celebration, Mizner



In Washington, DC, parked cars create an important buffer, providing added pedestrian comfort and encouraging lower travel speeds.

Healthy Neighborhood

Park and Truman Annex in Florida; Middle Towne Arch in Norfolk, Virginia; Kentlands near Gaithersburg, Maryland; Laguna West, Village Homes and San Diego's 4S Ranch in California; Northwest Landing in Washington; and Fairview Village in Portland, Oregon.

Winter Park and Celebration, Florida

We used Central Florida as our laboratory to test the feasibility of these guidelines. In the Orlando area, we explored streets of early 1900s town-making in historic Winter Park and compared them to the new town of Celebration built in the 1990s. By comparing the streets of the past with those of today, we were able to draw up several workable points of contrast.

Our first calculations at the Winter Park Fire Department measured the width of their fire trucks. The trucks are 9.5 feet wide (from mirror to mirror). Explaining our interest in creating new street standards, we asked the local fire fighters to direct us to Winter Park's narrowest streets. After first assuring us that they could handle any street in town, they chose 20 streets for our study. Arriving at the designated tree-canopied neighborhood, we found streets as narrow as 16 feet with parking on one side. Other streets with parking on two sides had total widths of 22-24 feet. These streets were extremely narrow, richly canopied with 60-70-foot-tall oak trees, but workable as access streets to homes. The residents and motorists we talked with were pleased with every function performed on those streets.

Before leaving Winter Park, we should note that planners there today remind us that it is harder to defend these old, successful street designs to the current traffic engineers than it was to build them. The lost knowledge of traditional, healthy street-making takes its toll. It is essential that we rediscover this art, if for no other reason than to preserve the successful, historic living places of the past.

For a contrast to sleepy, historic Winter Park, we traveled to Central Florida's newly built town, Celebration,



An East Lansing, Michigan, standard, full-sized fire truck shown straddling a seven-foot parking bay.

Healthy Neighborhood

created by Walt Disney Corporation as one of the most complete and comprehensive "traditional" towns of recent years. In Celebration, we found many people out walking; children were plentiful along these quiet streets. A variety of streets enhance the community. One-way streets wrap around parks with on-street parking on one side of the street. We found the 18-foot lane section acceptable, if not delightful. Other street types featured average widths of 28 feet with parking on both sides of the street. Even with well utilized parking space on both sides, fire trucks traveling down this street have ample room. With cars parked on both sides taking up as much as 12 feet total, 16 feet is left for maneuvering fire trucks at whatever speed can be accommodated on the short, inter-connected blocks.

Celebration's residents described their streets as wholesome, charming and "just right." Some visitors, they told us, find "the streets slow them down too much." This pace makes residents happy, however. We regarded the 28-foot streets as too wide, but an acceptable compromise for wide-street proponents (although these streets would not reduce traffic speeds if adjacent homeowners did not park their cars there).



A lane in Celebration, Florida, is an excellent example of proper widths. The lanes are ten feet, and, with parking of seven feet, measure a total of 17 feet.

Of course, the criteria for evaluating street design is not simply whether it is wide enough for a truck or car to drive along or park on, but how it fulfills a multitude of traditional, healthy town-making and neighborhood/house design principles such as the ones this guidebook embraces.

Healthy Neighborhood

Part II

Using This Guidebook

This guidebook is based on “real world” examples of successful streets found in all regions of the United States. As a starting point for understanding and evaluating existing streets and planning new ones, the guidebook assembles the best street and town development practices, highlights the patterns, language and principles of modern urban designers, and incorporates successful practices from previous generations.

Who Should Use This Guide.

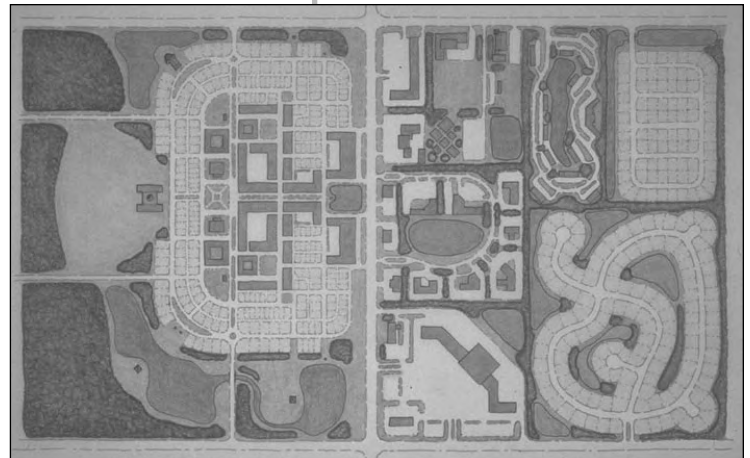
These guidelines can serve as a framework for people who want to build, operate, and maintain high-quality, healthy, traditional neighborhoods, towns, and city centers. The guidebook should be equally useful to elected officials, neighborhood leaders, developers, planners, engineers, architects, emergency responders, and others interested in livable communities and healthy neighborhoods. This guidebook allows practitioners – from the average citizen to the professional staff member – to create and maintain healthy streets for healthy communities.

Where These Guidelines Can Be Applied.

These guidelines can be used primarily to design new, traditional neighborhoods, but are also useful to help protect turn-of-the century and village-style neighborhoods. We share the concern of the Institute of Transportation Engineers’ Traditional Neighborhood Development Street Design Guidelines, which caution readers not to apply traditional, healthy neighborhood street guidelines to conventional neighborhoods.

Applying the Guidelines to Conventional Neighborhood Development.

Conventional, sprawl-style subdivisions have land uses that are highly segregated. Blocks and streets are



Traditional Neighborhood (TND) vs. Conventional development.

The area to the right of the vertical road is conventional. Homes are isolated from everything else, generating an average of 10-12 daily car trips per household. The TND area to the left has the same number of homes or lots. Everything is connected. Fire responders have better access, and transit is more workable.

Healthy Neighborhood

often wide and long, generating higher speed traffic. There are few ways in and out of a conventional subdivision neighborhood, and streets are organized on a rigid hierarchy in which minor streets feed into collector streets which then funnel into large arterials. As a result, conventional neighborhoods may not benefit – and may even suffer – from designs presented in this manual. Along with the Institute of Transportation Engineers, we recommend further research on how these principles and practices might affect conventional development before applying them to retrofit these neighborhoods. (See Part IV for further discussion of conventional street design.)

Using These Guidelines Successfully.



When vehicles travel at slow speeds, bicyclists fit right in, as on South Street, a traditional street in Philadelphia.

In contrast to the flexibility exhibited in conventional street design and construction, traditional, healthy neighborhood street measurements must be exact. When design specifications dictate that alleys should be 10-12 feet wide, for example, it is not wise to construct pavement at 14 or 16 feet. To obtain the desired motorist behavior on a traditional street, it must be designed and constructed with precision.

In some cases, specification values can be reduced; but in very few instances, should they be increased. For instance, although we found that 26-foot-wide roadways are most desirable, we measured numerous 24-foot and even 22-foot wide roadways, which had parking on both sides of the street and allowed delivery, sanitation and fire trucks to pass through unobstructed. By contrast, Celebration, Florida's 28-foot street widths work, but do not reduce speed as well as narrower streets. In traditional, healthy neighborhood street design, the old adage of "more is better" simply does not hold.

A note about street widths. While right-of-way dimensions (from property line to property line) are important in defining "the outdoor room" (see page 30), the critical dimension in creating safe, healthy, civilized streets is the width from curb to curb. In this document, all roadway dimensions are given from curb face to curb face. However, a key feature implied by this approach is that well-designed streets should always have a vertical

Healthy Neighborhood

curb (with the exception of alleys and roads in rural areas or adjacent to natural settings, such as parks). A vertical curb clearly distinguishes the space allocated for the automobile from the space provided for pedestrians and people in wheelchairs.

So-called "rollover curbs" found in many conventional neighborhoods encourage drivers to park their cars up on the sidewalk – ironically, to protect them from other cars often traveling at excessive speeds in the roadway. This not only creates a hostile environment for pedestrians and people with disabilities, but it defeats the potential street-narrowing effect that parked cars can help provide on many streets. Rollover curbs are also very difficult for people in wheelchairs to deal with.

If streetscape features, such as tree canopies, must be omitted because severe soil, desert or other constraints exist, street designers must consider alternative features to retain the quality of place.

Principles Guiding Healthy Neighborhood Development.

These guidelines will work in new or existing neighborhoods where many of the following elements are considered or favored:

- ① Higher "traditional neighborhood design" densities (6-12 dwelling units/acre), instead of conventional densities (1-5 dwelling units/acre).
- ② Mixed uses, including parks each 1/8 or 1/4 mile, schools each mile, convenience stores, plazas or other gathering places, a nearby post office, and other destinations that convert and absorb trips.
- ③ Homes that face or "greet" the street with friendly architecture (garages located in the rear or set back behind the façade).
- ④ Accessible transit within one-quarter of a mile.
- ⑤ Parks and homes that have "transparency," with many eyes on the street and on adjacent properties thus creating a safer neighborhood.

Part III

What Are Healthy Streets?

Healthy Streets Create Healthy Neighborhoods.

Healthy, or traditional, streets are networks of roadways and connector trails in communities, designed primarily for use by people, not just motorized vehicles. Such streets are designed for motorists to feel comfortable operating at low speeds (15-20 mph). Low traffic volume and low noise, easy access, and multiple routes to destinations are also featured. Pedestrian and bicycle movements are favored.

Walkable streets form the backbone of friendly, interactive, safe, secure neighborhoods. Along these streets, people know their neighbors, some of whom may live three blocks away. 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.

Conventional Streets Create Conventional Neighborhoods.

Conventional neighborhoods have a strong road hierarchy, with wide roads and broad intersections. These neighborhoods have long, unconnected blocks, with perhaps only a few entry points. They have ample off-street parking and cul-de-sac streets. Often the roads lack sidewalks and street-side landscaping. It is not unusual for these neighborhoods to lack schools, parks, churches, stores, and other conveniences and attractions.



A 16-foot wide, two-way lane in Kansas, City, Missouri, in a popular historic neighborhood.

Healthy Neighborhood

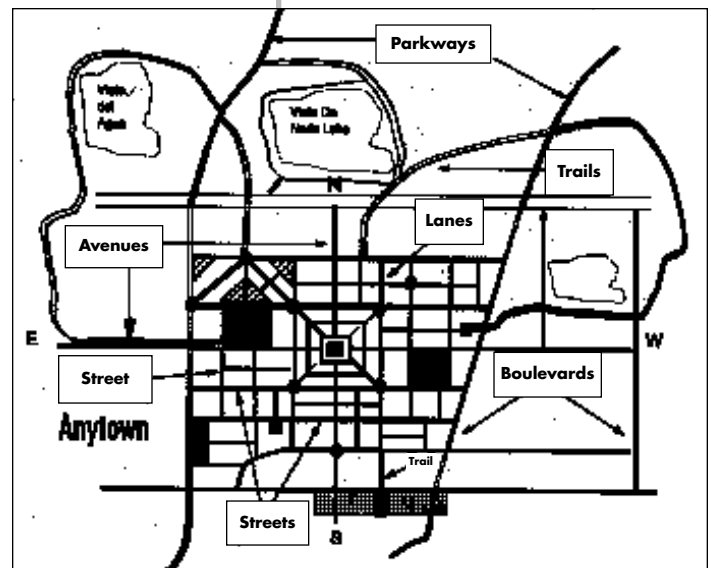
Since there are so few destinations within conventional neighborhoods, residents typically take 10 to 12 car trips per household every day. With few neighborhood destinations, most children also have to be driven or taken by bus to many locations, including schools and playgrounds. Motorists using these streets feel comfortable and safe driving at higher speeds (30-40 mph). People living in these neighborhoods have little or no desire to walk along these streets. Built following World War II, most of these conventional neighborhoods are considered "unsustainable" urban design, because they typically generate significant polluted water runoff, encourage fossil fuel consumption, create more individual motorized trips that generate more air pollution, and increase traffic congestion.

Eliminating the Need for Conventional Street Hierarchy.

Because conventional neighborhoods are laid out with a strong street hierarchy, they tend to concentrate traffic into collectors and arterial streets offering few, if any, alternate routes. Cul-de-sac streets run into higher volume sub-collectors, then into higher trafficked collector streets, and then major arterials. Healthy neighborhoods disperse traffic, making this hierarchy irrelevant. It is likely that most streets in new traditional neighborhoods will have low-volume traffic, with only a few distributor routes.

Healthy or traditional neighborhoods are less dependent on road hierarchy. They purposefully have narrow streets, short blocks, many connections, sidewalks, and landscaping. Many of these neighborhoods were built before automobiles were plentiful, although a few such neighborhoods are now being planned and built. Traditional neighborhoods often have schools, parks, churches, corner stores, post offices and other important destinations.

Children can walk or bicycle to schools in older neighborhoods. As a result of layout, connectivity, route choices and strong support for walking, children are often able to reach schools and other destinations by



A map of Anytown indicates proper designation, locations and connections of street types.

What Are Healthy

Healthy Neighborhood

themselves, which reduces the number of daily car trips. Well-designed, traditional neighborhoods are therefore considered "sustainable" development.

Healthy Street Categories.

The following types of streets are recommended for healthy street-making: trails, alleys, lanes, streets, main streets, boulevards, and parkways. The map of "Anytown" above indicates the proper designation, location and connections of these street types, which are essential to successful traffic distribution and management. The characteristics of these street types are outlined in the following pages and in the figures on pp. 19-22. There has been confusion in recent years on street naming by type of street. For example, a lane should be both the type and name of any roadway connecting single-family homes where parking is found on only one side. Consistent naming (i.e. lane, street, avenue) will help identify the purpose, function and design of roadways. We further recommend that names used in conventional neighborhoods, that lack functional or descriptive meaning (i.e. vista, circle, way, etc.), not be used to name roadways in healthy neighborhoods.



A Portland, Oregon, trail connection in a neighborhood near downtown.

Healthy, traditional streets are categorized by the work they perform for the neighborhood. For simplicity, street types can be broken into three groups:

- ❶ Category One: providing neighborhood access such as trails, alleys, lanes and streets;
- ❷ Category Two: roadways providing transitional access to neighborhood streets, i.e., avenues and main streets; and
- ❸ Category Three: roadways providing regional access, i.e., boulevards and parkways.

Category One – Alleys, Lanes, Streets and Trails.

Category One connectors, which form the heart of quiet neighborhood streets, function primarily to provide access to neighborhood destinations and make numerous connections within neighborhoods. All of these connectors – alleys, lanes, streets, and trails – provide access, utility and walking infrastructure. Traffic speeds of 15-20 mph are appropriate to such functions. Alleys, lanes and streets are measured on how well they

Healthy Neighborhood

add to the quality of the neighborhood by offering access, parking, tranquility, and safety.

Just like plant or animal cells, neighborhoods work best with many connections from the edges. Connections to centers of neighborhoods are appropriate too, but they should not move significant amounts of traffic, nor move that traffic too quickly. People entering neighborhoods should feel rewarded by ease of access to specific locations, but also encouraged to travel by foot or bicycle.

Trails (Figure 1-1, p. 19). Trails are non-motorized connectors through neighborhoods. They often follow their own independent rights-of-way or utility corridors. Serving as an independent alternative transportation system, trails connect many homes to parks, schools, transit stops, and other common destinations. Trails can provide access into commercial districts, linking with bike lanes for added access to more distant commercial districts, employment centers and major transit hubs.

Neighborhood trails also make connections to natural areas and parks, and should provide links to regional greenways and open spaces. In a healthy neighborhood, trails may comprise 20-40% of the total residential connectors. For example, Village Homes, a 1970s development in Davis, California, has more miles of trails than roadways.

Alleys (Figure 1-2, p. 19). Alleys are slow-speed (10-mph) service easements running behind and sometimes between rows of houses. Alleys (typically 10-12 feet wide) provide public service workers easy access to utilities and sanitation, and residents easy access to garages, backyards, and any accessory units. Alleys also offer second or third approaches for fire response.

Lanes (Figure 1-3, p. 20). Lanes are among the most desired types of access roadways in traditional, healthy neighborhoods. These narrow roads (typically 16-18 feet wide) are the prime means of access to single-family residences. Lanes allow parking on one side only. Thirty-eight-foot rights-of-ways are usually required. One-way lanes can operate around parks or nature pre-

Please note: All roadway dimensions are curb face to curb



An alley in the Old Town section of Key West, Florida, exhibits good alley form, with "eyes on the street," accessory units, and other

Healthy Neighborhood

serves. They also work well as two-way facilities in many other contexts. Landscaping and sidewalks fill the remainder of the available public right-of-way. Lanes are short, purposefully running only two to six blocks before they terminate.

Streets (Figure 1-4, p. 20). Streets are the other most common type of access road in healthy neighborhoods. Paved portions of these roadways are generally 24 to 26 feet wide. Streets provide access to single- or multi-family housing. Parking is provided on both sides. A right-of-way of 48 to 50 feet is typically required. Landscaping and sidewalks use the remainder of the available public right-of-way. Streets are also short, terminating in two to six blocks. They can also encircle a square or other public space. On-street parking should be encouraged. If on-street parking is light or non-existent, or limited to only one side, streets will fail to properly slow traffic.

Category Two – Transitional Avenues and Main Streets.

Category Two roadways connect neighborhoods to commercial centers. Avenues and main streets are “transitional” roadways: in addition to providing access, they carry large and more diverse amounts of traffic. Avenues and main streets host deliveries and efficient emergency responses. They anchor neighborhood commerce, serve bicyclists and pedestrians, and improve transit operations. Category Two streets must operate at low to moderate speeds, since many people live, work, shop, and play within these street environments. Parking is found on many, but not all, avenues and main streets.

Avenues (Figure 2-1, p. 21). Avenues connect neighborhoods to town centers, and as such can extend up to one mile. Roadways contain 17 feet of pavement per side – 6 feet for bicyclists and 11 feet for motorists – with raised medians in the center. Avenues can also operate without a median, although the raised center island is often preferred. On-street parking is optional. Triple-canopy landscaping, bike lanes and sidewalks are provided. Avenues are richly landscaped, since they are civic spaces that serve as gateways to town centers. Avenues should have the tallest, most spectacular tree



An avenue in Mountain View, California with a median, 12-foot travel lanes, 5-foot bike lanes, planting strip, and sidewalk setback from the roadway. High capacity is handled at each intersection, where

Healthy Neighborhood

canopies. They often have colorfully planted medians during spring and summer. Since avenues serve as the transition between the town and its neighborhoods, speeds should be kept low, typically 30 mph to keep neighborhood speeds low. Avenues also serve as major transit routes.

Main Streets (Figure 2-2, p. 21). Main streets provide access to neighborhoods, as well as places for neighborhood commercial and mixed-use buildings. On-street parking is very desirable. Due to the 20-25 mph, low-speed environment, bike lanes are optional, but preferred. Main streets usually do not have medians, but medians with low shrubs are acceptable if they do not detract from terminating vistas and attractive storefronts. To help pedestrians across the street and calm traffic, "bulbouts" – wider sidewalks that extend into the roadway – should be provided at intersections and, if blocks are long, at mid-block crossings.

Category Three – Boulevards and Parkways.

Category Three boulevards and parkways connect town centers to the greater region. Boulevards and parkways are essential for combining motorized and non-motorized traffic in safe, efficient, welcoming environments. Since the success of commerce and traffic circulation depends on effective street design, much attention has to be paid to the orderly and balanced movement of all transportation modes on boulevards and parkways. On these streets, car traffic, delivery trucks, emergency responders, and transit must operate with high levels of efficiency. Pedestrians and bicyclists must also be welcomed. Indeed, pedestrians and bicyclists have even greater need of support on these streets through bike lanes and sidewalks, due to the higher speeds and amount of traffic.

Boulevards (Figure 3-1, p. 22). Boulevards provide multi-lane access to commercial and mixed-use buildings, and they carry regional traffic. For these reasons, speeds on these streets are higher (30-35 mph). Boulevards have bike lanes and sidewalks, and they may have sections of parking to support commerce, parks, schools, and other attractors along their routes. In con-



A traditional street in Philadelphia's Society Hill attracts many users.

Healthy Neighborhood

ventional neighborhoods, boulevards are classified as "arterial" roadways.

Parkways (Figure 3-2, p. 22). Parkways bring people into town, or they carry traffic through natural areas. Parkways are not designed to accommodate adjoining development. Roadway speeds may be 45 mph or higher. When parkways enter towns, they become boulevards, and speeds are reduced to 30-35 mph. Bike facilities are found on the edges of parkways, separated by distances of 10 feet to hundreds of feet. In conventional neighborhoods and town designs, parkways are classified as "arterial" roadways.

Where to Find Healthy, Traditional Streets.

Healthy or traditional streets can be old or new, and are found in every region of the country. As a general rule, these streets were either built before the 1930s, following classic, pre-streetcar or streetcar era neighborhood designs, or are now being built again. The new streets are often found in neighborhoods that have "traditional neighborhood designs." Many other names have been given to these developments, including "livable," "traditional," "new urbanist," "transit-oriented develop-



Ocean Beach Drive,
South Miami Beach,
Florida.

This lively street,
with its popular side-
walk cafe, went from
heavy crime to the
second most successful
street in the Southeast
through a modest
street
re-design and a major

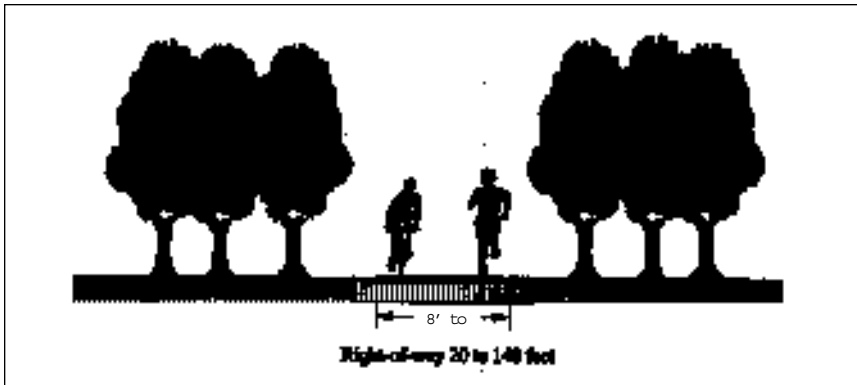
ment," "urban villages," and "pedestrian pockets." Whatever the label, these streets and neighborhoods are the ones idealized in movies and television shows, the streets that fill automobile magazine ads and our memories, the places we visit on our vacations.

Measuring A Street's Success.

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 espe-

Healthy Neighborhood



Trail

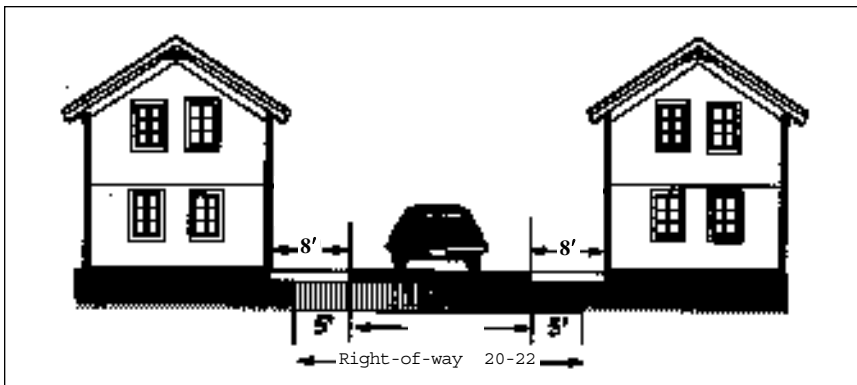
Purpose: Provides non-motorized access throughout the neighborhood.

Street Features

- Shade trees recommended
- Trail width 8-14 ft.
- Design speed 20 mph
- Stopping sight distance 125 ft.
- Clear zone of 3-6 ft.

Buildings and Land Use

- Link to make connections between all homes, parks and schools, and shopping districts



Alley

Purpose: Provides access to the rear of property.

Street Features

- Average speed 10 mph
- Requires a 20-foot ROW
- Utility location underground on one side

Buildings and Land Use

- Residential – primarily single family
- Consistent building line recommended
- Provides rear access to garages
- Consider accessory unit above garage

Figure 1-1

Figure 1-2

Healthy Neighborhood

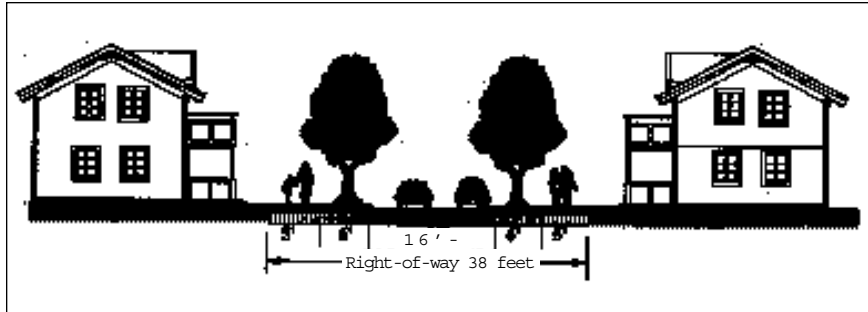


Figure 1-3

Lane

Purpose: Provides access to single-family homes.

Street Features

- Street width 16-18 ft. with curb, gutter and informal parking
- Planting strips 6 ft.
- Average speed 15 mph
- Requires a 38-foot ROW
- Utility location – underground or alley

Buildings and Land Use

- Residential – primarily single family
- Buildings brought close to sidewalk
- Consistent building line recommended
- Sidewalks 5 ft. on each side

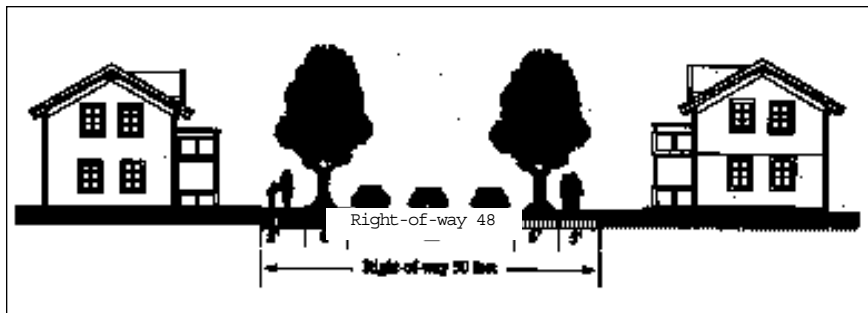


Figure 1-4

Street

Purpose: Provides access to housing.

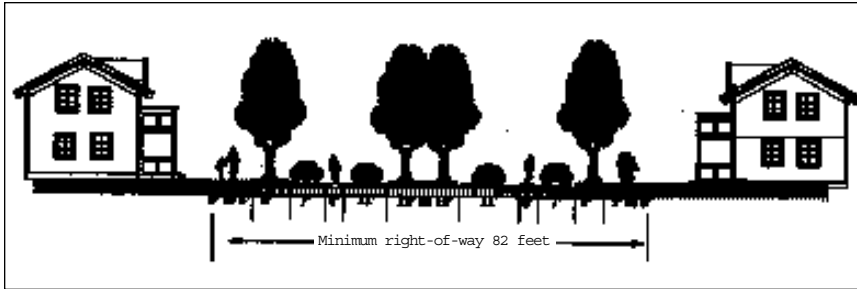
Street Features

- Street width 26 ft. with curb, gutter and informal parking
- Planting strips 6 ft.
- Sidewalks 5 ft. on each side
- Average speed 20 mph
- Requires a 48-foot ROW
- Utility location - underground or alley

Buildings and Land Use

- Residential – many residential types
- Residences brought close to sidewalk
- Consistent building line recommended
- Front porches encouraged

Healthy Neighborhood



Avenue with Parking

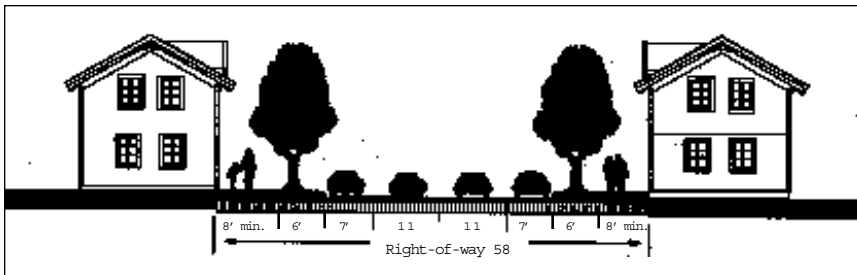
Purpose: Connects town centers and neighborhoods. Avenues go from neighborhoods to town centers, and are not long (no more than one mile). Avenues may circulate around a square or neighborhood park.

Street Features

- Street width 24 ft. on both sides of median with on-street parking (17 ft. if no parking), curb and gutter
- Median width 12-16 ft. and
- Travel lanes 11 ft.
- Maximum two travel lanes
- Bike lanes and planting strips 6 ft.

Buildings and Land Use

- Mixed residential and commercial use
- Buildings brought close to sidewalk
- Consistent building line recommended
- Place prominent public buildings and plazas at end of vista



Main Street without Median

Purpose: Provides access to, and a space for, neighborhood commercial and mixed-use buildings.

Street Features

- Travel lanes 11 ft. w/striped parking
- Maximum 6 travel lanes
- Planting wells 6 ft. / landscaped median optional, sidewalk
- Sidewalks minimum of 8 ft. each side recommended
- Average speed 20-25 mph

Buildings and Land Use

- Commercial and mixed use
- Buildings next to sidewalk
- Consistent building line recommended
- Pedestrian awnings, arcades, dining and retail

Figure 2-1

Figure 2-2

Healthy Neighborhood

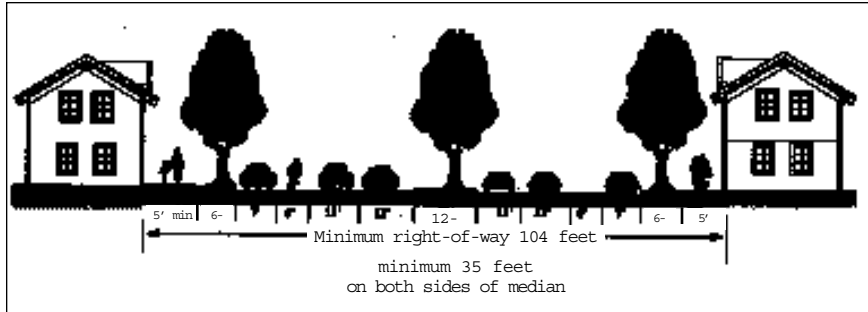


Figure 3-1

Boulevard

Purpose: Provides multi-lane access to commercial and mixed-use buildings, and carries regional traffic.

Street Features

- Lanes 11 ft. with striped parking and bike lanes
- Maximum 6 travel lanes
- Planting wells 6-11 ft.
- Sidewalks 5 ft. minimum each side
- Average speed 30-35 mph

Buildings and Land Use

- Commercial and mixed use
- Buildings next to sidewalk
- Consistent building line recommended
- Sidewalks and bike lanes on both sides
- Pedestrian awnings and arcades
- recommended

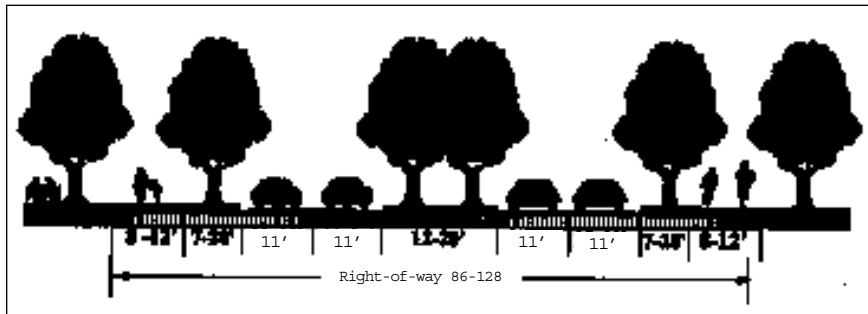


Figure 3-2

Parkway

Purpose: Parkways bring people into town, or pass traffic through natural areas. Parkways are not designed for development. When the parkway enters town, it becomes a boulevard.

Street Features

- Travel lanes 11-12 ft.
- Median width 12-20 ft.
- Average speed 45-55 mph
- Multi-use trails 8-12 ft.
- Planting strips 7-20 ft.
- Bike lane not adjacent to travel lane

Buildings and Land Use

- No buildings, preserve nature
- Parkways are designed to be on edge of towns, nature preserves or agricultural areas
- Multi-use trails may be on both sides. Criteria for dual trails

Healthy Neighborhood

Part IV.

Conventional Street Design Problems

Conventional street and neighborhood design have created problems, in large part because planners, engineers and urban designers failed to understand the principles behind roadway standards. To avoid making the same mistakes again, it is important that we understand the problematic traffic conditions created by conventional street design.

1. Public Safety for Drivers Only.

The safety of the public has been the highest law since Roman times. Unfortunately, conventional street design often looks only at the safety, comfort and liability of the public that drives. Many conventional neighborhoods are not designed to allow pedestrians and bicyclists to move safely, comfortably and conveniently along and across public streets and commercial driveways.



Conventional development near Las Vegas, Nevada.

2. Higher Neighborhood Speed Regulations and Tolerances.

In many states, the lowest speed that can be posted on a public street is 25 or 30 mph. According to the 1997 ITE Traditional Neighborhood Development Street Design Guidelines, "This regulatory practice may be grounded in attempts to eliminate so-called speed traps." Today, however, neighborhood speeds are often higher than 25 mph.

Speeds on today's roadways have increased because of:

- Higher posted speed regulation by states. Many towns take their neighborhood street design guidance from state highway departments.
- Forgiving street design "improvements." Design practices at state levels suggest that roadways be "forgiving" to incautious drivers. To achieve this tolerance, designers add geometrics for another 5-10 mph above the posted speed limit.

Conventional Design

Healthy Neighborhood

- Modern car amenities cushion drivers and accommodate speed. Speeds are increased by new car designs that insulate drivers from the physical discomforts of the road, which might otherwise discourage high-speed driving.

The cumulative result of these various factors is much higher speeds than those posted.

3. Compromises in Safety, Access and Mobility.

Conventional street design compromises the safety, access and mobility of pedestrians and bicyclists when it allows for higher speeds that encourage many motorists to travel 30, or even 40-45, mph through neighborhoods. Further compromises are made by omitting sidewalks, placing sidewalks on only one side of streets, placing narrow sidewalks at the edge of roads where speeds are 30 mph and higher, and failing to offer frequent, convenient, identifiable places for pedestrians to cross streets. In conventional neighborhoods, bicyclists rarely find places to ride; thus, many choose to ride on sidewalks, which further imperils pedestrian safety.



Wide streets and long blocks in conventional neighborhoods encourage drivers to speed and discourage bicycling and walking.

4. Compromises in Recovery.

Higher speeds mean that motorists take more time and longer distances to slow down or stop. Speeds of 20 mph require a combined total of 106 feet of reaction and braking time. Speeds of 30 mph require 200 feet (four traditional home lots), and speeds of 40 mph require 320 feet (more than the length of a football field).

5. Compromises Through Reduced Yielding.

As motorists drive faster, they lose the ability to yield to pedestrians. Motorists traveling at 20 mph can easily spot pedestrians 150 feet away (three traditional home lots) and can make comfortable yields or stops. Thus, many drivers do yield or stop for others on foot or in wheelchairs. But at higher speeds of 35-40 mph, where distances of 300 feet are involved, most drivers find it uncomfortable and sometimes unsafe (due to trailing vehicles) to stop or yield. Many young, inexperienced drivers as well as some senior motorists travelling

Healthy Neighborhood

at higher speeds may not be aware of pedestrians at the increased distances they need to slow down.

6. Compromises in Comfort.

Using design elements that allow higher-speed travel, conventional neighborhoods encourage drivers to feel comfortable at 30-45 mph. As higher speeds become common, pedestrians and bicyclists feel less comfortable on streets. Many stop walking and bicycling and use their cars instead. Many parents feel that their children cannot play safely in front yards or walk to nearby destinations. As fewer people walk, motorists perceive that they are the only people using the streets, encouraging more aggressive driving behaviors and decreasing further non-vehicle users' comfort on the street. Donald Appleyard's *Livable Streets* documents the reduction in street use by pedestrians as traffic volumes and speeds increase.

The removal of trees from walking environments also discourages pedestrians from being out along neighborhood streets. Neighborhoods feel sterile and incomplete when streets lack tree canopies. In hot climates, the lack of shade especially discourages walking.

Designers following the conventional codes for street hierarchies of collectors and arterials purposely remove trees from street environments. With more width going to pavement on conventional roadways, many cash-strapped communities omit sidewalks and trees from development requirements. More pavement retains more heat, increasing discomfort for everyone in the neighborhood.

7. Compromises in Liability and Risk.

When pedestrians are hit by cars going 40 to 45 mph, they die 83% of the time, a jump from a 50% chance of sustaining a fatal injury at 30 mph. By stark contrast, the rate falls to a 3 to 5% chance of fatal injury among pedestrians hit at 20 mph.

Higher car travel speeds increase the frequency and severity of crashes because of the increased



A traditional street in
Society Hill,
Philadelphia.

Conventional Design

Healthy Neighborhood

reaction/braking times. Many risk management specialists have calculated the safety effects of design elements for motorists only. However, in many cities and urban centers, one-half of all fatal traffic injuries involve pedestrians.

It might be argued that not using speed-reduction design elements such as on-street parking, bulbouts, trees, terminating vistas, etc. could reduce property damage to autos. However, prioritizing potential damage to motor vehicles over the higher risk to people who might be permanently injured or killed is unwise. Considering the high cost of permanent injuries or fatalities to pedestrians, the lower speed approach to neighborhood design makes sense.



Before and after on Grandview Avenue in University Place, Washington. Before, motorists sped by homes at an average of 44 mph. Today, motorists travel at an average speed of 31 mph. Residents enjoy the lower speed, noise, and traffic. Sidewalks, bike lanes, on-street parking, medians and well-marked crosswalks

8. Law Enforcement Difficulties.

John Moffat, the Washington Governor's Highway Safety Representative and a former Seattle police captain in charge of traffic, states that it is impossible to enforce traffic laws when the playing field has no clear rules. He compares law enforcement with a game of basketball: if the court has no defined shape or lines and if the hoop keeps moving, then the referee cannot control the game. The same is true with police traffic work. Police cannot correct speeding behavior without help from engineering. When 50 to 85% of the public is speeding because roadway design says "It's OK to go fast," law enforcement officers have no place to begin. Only by designing roads where 85% or more of the public is compliant can the remaining few motorists be corrected.

To test out the premise that street design can reduce speeds more effectively than ticketing alone, a street study was conducted in University Place, Washington. Before being rebuilt, the wide, "rural," two-lane Grandview Avenue was a suburban connector whose traffic held constant speeds of 44 mph, although speed-limit signs encouraged speeds of 35 mph. A 1.1-mile section of the roadway was rebuilt to guidelines similar to those in this guidebook. Travel lanes were narrowed to 11 feet each, 5-foot bike lanes were added, a 2-foot landscaped edge and a 5-foot sidewalk were included, and trees were planted.

Healthy Neighborhood

Motorists on Grandview Avenue today operate at speeds of 27-30 mph, 14-17 mph below the former speed, and 5 mph below the still-posted 35 mph limit. On a street parallel to Grandview Avenue, traffic still moves at 44 mph. To see if traditional speed-reduction methods were as effective as street redesign, police patrolled this parallel street during a two-week test period. Over 300 traffic tickets were written to curtail speed on this road. With intense ticketing, speeds were lowered by only 4 mph.

9. Larger Curve Radii and Higher Speeds.

In *Rural By Design*, Randall Arendt documents another neighborhood traffic speed generator. Curves in conventional neighborhoods are designed so that motorists who round them do not slide sideways in their seats. Standards of 450- to 600-foot centerline radii on curves keep motorists comfortable at 30-35 mph. When tighter curves with centerline radii of 166 feet are used, motorists going more than 25 mph feel uncomfortable.

Arendt describes life growing up in a neighborhood where the street centerline radius in front of his home was 72 feet. Motorists rounded the curve at polite speeds of 15-18 mph, which improved safety. Rick Chellman, principal author of IIE's *Traditional Neighborhood Street Design Guidelines*, has determined that a centerline radius of 89 feet supports 20 mph comfort-level turns, while a 50-foot radius supports a 15 mph turn.

10. Faster Intersection Turning Speeds.

In conventional street-making, intersections are designed to allow motorists to turn from distributor roads as quickly as possible. Efficient turns reduce the chances of rear-end crashes by inattentive motorists following too closely. For this reason, conventional neighborhood streets – 30 or 36 feet wide with 30-foot corner radii – allow motorists to turn at 12-20 mph or faster. However, these higher turning speeds reduce the likelihood that motorists will yield to pedestrians where they most need support: crossing the



Large corner radius at intersections (bottom right of photo) makes distance pedestrian has to walk to cross the street significantly greater while allowing cars to go faster as they round the corner.

Conventional Design

Part V.

Healthy Neighborhood Street Design Principles

The pattern of the neighborhood – block lengths, use of terminating vistas, use of tee intersections, tree canopies, presence of people on streets, visual detail of buildings, attractive parks, creation of an “outdoor room,” and other techniques – can be used in combination to achieve desired street speeds.

The following 25 key elements of street design can help create healthy neighborhoods and livable communities.



Partial plan of Celebration, Florida, shows streets, lanes, alleys and trails.

Element 1. Walkable Neighborhood Size and Mixed Uses.

Limit the size of neighborhoods to a walkable scale. The optimal size of walkable neighborhoods is 1/4 to 1/3 mile from outer edge to center, or about a five- to ten-minute walk at an easy pace. By staying within this size and allowing a mix of uses, neighborhoods can meet many peoples' needs without sending traffic into other areas of town. Allowing religious institutions, schools, parks, and small commercial districts in neighborhoods can

eliminate as much as 40% of auto trips. Thus, mixed-use neighborhoods can reduce daily household trips to 4 to 6, down from 10-12 for households living in conventional neighborhoods.

Trip/Access Projections for Low-Acreage Developments at Modest Density. Walkable neighborhoods require from 40 to 85 acres of land for development. A 40-acre, lower density, walkable/transit supportive neighborhood generates approximately 1,680 trips (assuming seven dwelling units on each of the 40 acres, six auto trips per day per household). This level of auto trips requires a minimum of two neighborhood connections to properly disperse traffic on a low-volume basis. Two-entry distribution results in each street having 1.4 cars per minute (assumes a 10-hour distribution).

Trip/Access Projections for High-Acreage, Higher-

Healthy Neighborhood

Density Development. At the upper size of walkable, higher density neighborhoods, a 125-acre development with 10 dwelling units/acre (averaging six auto trips per day per household) would generate 7,500 daily auto trips. This number of trips would require eight neighborhood connectors to disperse traffic to the 1.5 cars-per-minute threshold. Thus, even at these densities, avenues can still be designed to accommodate low-volume traffic and remain desirable places to live, amenable for pedestrian crossings, and suitable for pleasant walks and other outdoor activities.

Element 2. Interconnected and Diverse Neighborhood Street Pattern.

Healthy neighborhoods require a variety of different street types, generally in a rectilinear or grid pattern. An interconnected street pattern with short block lengths provides multiple routes, diffuses automobile traffic and shortens walking distances.

A balanced mix of different street types makes neighborhoods accessible to residents, moves cars efficiently at low speeds and volumes, and keeps the neighborhood quiet, safe and pleasant. (See figures on pp. 19-22 for street types to include.)

Element 3. Shorter Block Length.

Conventional neighborhoods often allow block lengths of 600 feet or more, which allow motorists to gather speed between intersections. When stop signs are used to inhibit speeding, motorists often make up lost time by accelerating out of the stop and increasing speed through succeeding blocks. Traffic speeds can be reduced by making many blocks shorter (average 250-350 feet, with 500-foot maximum), which prevents motorists from comfortably travelling at higher speeds.

Element 4. "Outdoor Rooms" and Front Porches.

Cars are slowed and pedestrian comfort is improved by adding tree canopies, on-street parking and placing building closer to the street to create a sense of a more "enclosed" street, or "outdoor room." From the time of the Greek Empire, traditional street designers have achieved this comfortable sense of enclosure by



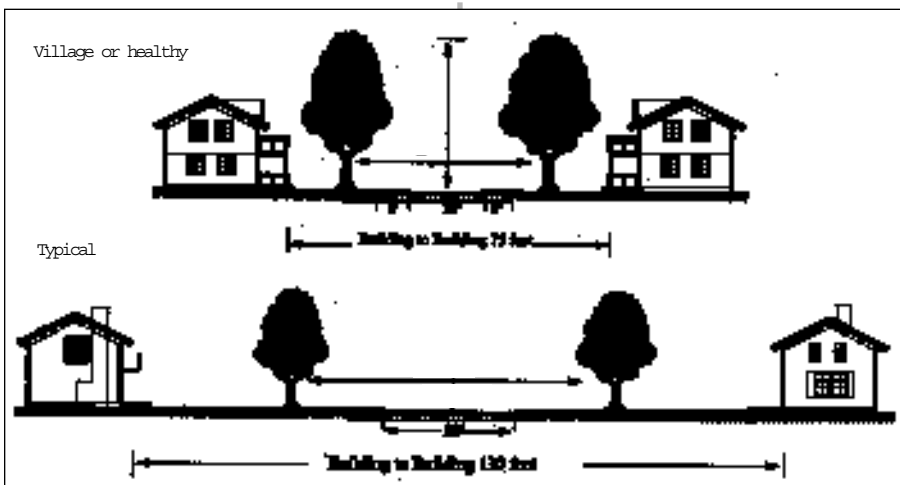
A well-designed bike trail connects residential developments midway between Amsterdam and Harlem, Holland.

Healthy Neighborhood

giving streets a ratio of 2:1 to 3:1 of width (from building to building) to building height. Thus, an 18-foot lane (40-foot right of way), with buildings 25 feet high, requires building-to-building separations of no more than 75 feet. Within these dimensions, the proper feeling of enclosure is achieved. With a 50-foot right-of-way, building setbacks should be about 12.5 feet for best effect, although a 25-foot setback is acceptable. People walking along the street like to feel that they can "reach out and talk to someone" sitting on the front porch, which is possible when porches are within 20 feet of the sidewalk.

Element 5. Traffic Dispersion.

Street capacity and momentary automobile delays do not create problems in a well-developed neighborhood street system. Due to the large number of street connections and short blocks, many neighborhood lanes and streets carry between 100 and 450 cars per day. This access keeps traffic volumes down to 7 to 35 vehicles per hour, making it unlikely



The Outdoor Room:
People want enclosure. The physical relationships of buildings, trees and streets make us feel comfortable or uncomfortable. The most satisfactory ratio is for the width of the street corridor (building to building) to be 2-3 times the height of the buildings. If the width exceeds the height by more than 4 times, we begin to lose any sense of enclosure.

ly that more than a few cars will ever be moving on the same block at the same time. This dispersion allows the following geometric principles to flourish.

Element 6. Speed Control through Geometrics.

The best known form of traffic speed control is through the use of roadway geometrics. These design parameters include street width, centerline radii of curves, stopping sight distances on hills and curves, and intersection turning radii. When the paved width of streets is kept narrow, motorists travel more slowly. When turning radii on curves, at intersections, and at driveways are kept low, motorists turn more slowly and are more likely to yield to pedestrians.

Speed can be greatly reduced through a combination of geometric features. Geometrics include the actual width of unoccupied streets, the practical width when cars are

Healthy Neighborhood

parked on each side, and the remaining width on streets narrowed at entry points (neckdowns) or through other traffic-calming devices. As a general rule, neighborhood streets should only be wide enough for 20 mph vehicle speeds, while accommodating infrequent street users such as sanitation and delivery trucks. Neighborhood streets can be arranged to allow the timely access of emergency vehicles into even the most narrow conditions by providing through access on larger avenue systems.

Element 7. Narrower Lane Widths.

Low-volume streets (0.1 to 1 car per minute) do not need wide travel lanes. Motorists using traditional streets learn to share space with other vehicles by traveling more slowly, and by pulling into open spaces between parked cars when needed. Keeping travel lane widths down to 9-10 feet per travel lane on local roadways helps keep motorist speeds to appropriate 15-20 mph levels on lanes and streets.

Element 8. Narrower Intersections with Smaller Radii.

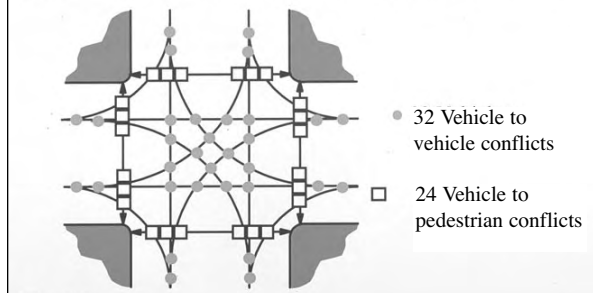
Frequent, narrow-width, smaller-radius intersections prevent motorists from attaining high speeds. AASHTO provides specific language supporting such intersections in areas with heavy pedestrian movements: "The minimum radius of curb return where curbs are used or the outside edge of pavement where curbs are not used, should be 15 feet." Due to low volumes of motor vehicles, occasional users of these streets are permitted to cross centerlines on both approach and departure sides of the intersections.

Buses rarely travel down traditional streets or lanes, but can negotiate these streets with little difficulty. On a recent trip into a neighborhood with 22-foot wide streets, a large bus (41 feet long, 8-1/2 feet wide) took 8 seconds to round the curve at the junction of two 22-foot wide interconnecting streets.

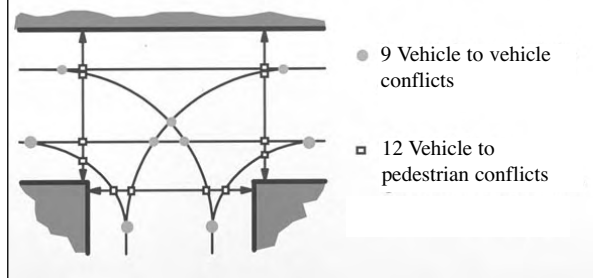
Element 9. Tee Intersections.

Tee intersections provide two traffic-calming and traffic-safety effects. First, they give designers an

Conflicts At a Four-Way Intersection



Conflicts at a Tee Intersection



Tee intersections are safer for pedestrians and motorists.

These diagrams compare the number of potential points of conflict between a tee

Healthy Neighborhood

opportunity to create strong terminating vistas. When motorists see that their routes soon end, they are less inclined to increase their car's speed. Second, a three-leg intersection reduces the number of potential points of conflict for motorists from 32 to 9. Pedestrians and bicyclists find tee intersections far more comfortable and hospitable. For pedestrians, the points of conflict are cut in half – from 24 to 12.

Element 10. Curves.

Curves can and should be retained in suburban development. Prominent buildings or other terminating vistas should be anchored at the apex of curves. Curves should have centerline radii of 90-120 feet, to force

motorists to drive more safely as they travel through neighborhoods. Most motorists feel uncomfortable rounding these types of curves at speeds higher than 20 mph.

Element 11. On-Street Parking.

Traditional streets favor on-street parking over off-street parking. On-street parking can be used as part of the strategy to reduce motorist speed through increased "side friction." On-street parking also creates conditions where large vehicles can use the added space at



On many boulevards, there is plenty of room to add bike lanes. Adding bike lanes on this boulevard in Augusta, Georgia, would also make it safer for vehicles by providing a buffer from the trees.

intersections to improve their effective turning radii. Sight lines are preserved at intersections with 30- to 50-foot parking setbacks from intersecting legs.

Even though many home buyers prefer the convenience of off-street parking, this preference should not completely dictate design. In conventional neighborhoods, garages can dominate up to 50% of a house's façade, which eliminates the personal connections that front porches can provide between the house and street. Pedestrians must negotiate frequent driveway crossings, with cars often blocking sidewalks. In healthy neighborhood design, sidewalk interruptions are reduced by providing on-street parking plus off-street parking through the use of alley entries to backyard garages. This design practice also helps keep sidewalks safe and enjoyable for pedestrians, people with disabilities, bicy-

Healthy Neighborhood

clists and children at play.

Element 12. Nature Strips, Landscaping and Trees.

Conventional neighborhoods often do not require street landscaping. When streets are stark, motorists increase their speeds. Healthy, traditional neighborhoods require green edges of 6 feet or more on each side and street trees to create a double canopy. With median trees on avenues, a triple canopy is created. These landscaped areas create a friendly, walkable environment by separating pedestrians from motorists and reducing auto speeds. Comparisons show that traffic speeds on many tree-lined streets are 10-15 mph lower than those on non-tree-lined streets. Although some dry regions of the country may not support green canopies, many desert communities, such as Albuquerque, New Mexico, are able to find species for landscaping. The shade that trees provide – reducing air temperature by as much as ten degrees – is even more critical in hotter environments.

The minimum recommended width for road-edge landscaped buffers is 6 feet. Buffers are sometimes limited to smaller dimensions, but these green edges are still very important. On some of Seattle's arterial streets, three-foot planting strips grow certain tree species that set stable vertical walls for streets and walkways.

Trees are planted in orderly rows in landscaped buffers and are set back from street edges or curb lines a distance of 3-4 feet. Trees are usually spaced 25-50 feet apart. While tree-planting intervals of 50 feet on-center are currently the standard in many communities, closer spacing of 25 to 35 feet can improve shade and better reduce speeds. Newly planted trees are usually required to have a chest height caliper diameter of 2.5 to 3 inches minimum. In a new development, the developer may need to maintain street trees for the first 18 months.

To maintain sight lines, trees and other objects should be restricted from corners for distances of 30 feet on

SHADING PAVED SURFACES

Unshaded concrete, asphalt and stone surfaces; such as parking lots, streets, and driveways, trap heat from the sun driving surrounding temperatures up by as much as 10 degrees in the summer. Shade trees can make outdoor spaces cooler and more inviting places.

- * Plant trees along driveways, patios and sidewalks to keep the sun from heating them up.
- * Trees should be no further than 10-15 feet from the paved areas to be shaded.
- * Plant trees 3-5 feet from the pavement edge to avoid root damage to the pavement.
- * Plant trees along appropriate street frontages.
- * Design adequate planter areas and provide a suitable soil environment to keep trees healthy.
- * Protect trees and plants from cars.
- * Provide adequate irrigation and provide as much pervious surface as possible to allow water to penetrate the soil.

Healthy Neighborhood

sides where motorists would look right, and 15 feet on sides where they look left.

Selecting the proper tree is crucial. Trees should be appropriate for the specific climate where they are planted. Species should be low-maintenance, easy to care for, and not uproot curbs and sidewalks. Trees and shrubs must be undercut to achieve clear center viewing spaces from 2 feet above ground to 7 feet under canopy. This undercut preserves essential sight lines, and provides convenient conditions for pedestrians who walk along the sidewalks. Evergreens and other non-deciduous trees that create high levels of screening should be avoided on corners. As a general rule, deciduous trees are best for roadside landscaping.

Colorful edges from seasonal plantings on street corners and in median noses can also calm traffic substantially. These spaces can be adopted by neighbors or area businesses, especially on higher-volume commercial streets, where benefactors can be acknowledged through small, tasteful signs.

Element 13. Sidewalks.

Sidewalks, which only came into use when higher speed carriages and cars became common, are essential in neighborhoods. Even with traffic speeds of 15-20 mph, children, seniors and people with disabilities cannot walk safely without sidewalks. Sidewalks by themselves do not reduce vehicle speeds, since they remove pedestrians from the street space. However, by collecting higher volumes of pedestrians, they remind motorists that neighborhoods are places for people.

Walking is a social activity. Two people should be able to walk side by side comfortably on a sidewalk, which requires a minimum width of 5 feet. Sidewalks should be separated from streets through the use of landscaped edges. Sidewalks next to curbs that do not have these green strips, must have a minimum width of 6 feet, so pedestrians still feel comfortable without a buffer between them and the traffic. Sidewalks should always



In Albany, New York, sidewalks in older neighborhoods allow seniors to get out of their homes and walk comfortably and safely on the street. Without a sidewalk, this resident would not get regular exercise or the social interaction she needs to maintain her

Healthy Neighborhood

be placed on both sides of the street. Designers should not speculate on which side of the street will have the added value of a place for people to walk or play.

Sidewalks need an additional 2 feet of width if they are adjacent to fences, walls, buildings and shrubs. When these objects are placed directly next to sidewalks, the first 2 feet of sidewalk is no longer functional because people will not walk that close to stationary objects. In downtown Portland, Oregon, sidewalks next to buildings include a 2-3-foot strip of colored pavers, which creates zones that subconsciously encourage people to window shop.

When can sidewalks be omitted? Sidewalks should not be omitted in traditional neighborhood designs. However, due to terrain such as steep hillsides or embankments, designers may have no choice but to put sidewalks only on one side of the street. In these rare cases, extra care should be taken to simplify street crossings. Streets with sidewalks on one side must meet Americans With Disabilities Act (ADA) requirements by ensuring that people with disabilities can still cross to accessible sidewalks.

When streets are created as very low speed environments (10-15 mph), and sidewalks and streets are at the same grade (the Dutch "woonerf"), sidewalk space should be defined by using colored paver stones, bollards, or other elements.

Element 14. Curbs and Gutters vs. Swales.

In *Rural By Design*, Randall Arendt argues that curbs and gutters can be omitted in some lighter-density, rural, village-style neighborhoods. For many reasons, swales are ecologically preferable in such rural areas. Natural sheeting of rain water to the edges of lanes or streets allows it to percolate down into the earth, dispersing harmful motor vehicle oil drippings and other pollutants into larger areas. Rural-edged roads can also serve as snow storage areas.

In neighborhoods where densities reach 7-12 units per acre, curbs and gutters are usually recommended.



A bus shelter with benches in Portland, Oregon, encourages people to walk and take transit.

Healthy Street Design

Healthy Neighborhood

Higher runoff of water sheeting from roofs and driveways requires added water retention and treatment. Curb and gutter treatments also encourage cars to park in an orderly fashion and not to intrude into the pedestrian's space by parking partly on the sidewalk. One creative option to handle storm water runoff and retention is to place curbs and gutters behind crushed, embedded stone, loose brick, or other permeable designated parking areas which direct motorists to appropriate parking spaces, and yet allow water to sheet into these porous areas for absorption into the soil. Innovative ways to handle storm water runoff and retention need to be explored further.

In urban areas, avenues, main streets, boulevards, and parkways require curbs and gutters because of their greater widths, volumes, and traffic speeds.

Element 15. Street Furniture.

Street furniture such as benches, waste containers, flower and shrub planters, trees, bollards, lamp posts, and kiosks encourage people to walk. Benches help seniors and the disabled, who need places to rest every 5-10 minutes when they walk for exercise, or ride public transit. Street furniture, in convenient pocket parks (the size

of one lot) or other gathering points such as mail-box groupings or bulletin boards, give residents a reason to come out of their houses, socialize and get to know their neighborhoods. When motorists see pedestrians along streets, especially in groups, they are reminded that streets have many public uses.

Element 16. Street Lighting.

In healthy neighborhoods, people should feel comfortable walking at all hours. Street lighting helps pedestrians feel safer at night. Many neighborhoods prefer more, 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. They also reduce glare, letting people see the night sky. Light poles 8-12 feet in height can achieve



A bulbout on a main street in Brunswick, Georgia, helps pedestrians cross the street by reducing the distance they have to walk and by making it easier for drivers to see them.

Healthy Neighborhood

these desired effects.

Element 17. Bus Stops.

Healthy neighborhoods create environments that support transit. Residents can take advantage of frequent, easily reached bus stops due to the high connectivity of streets. These bus stops are typically found on avenues, main streets and higher-capacity roads. Streets can be patterned so that residents never need to walk more than a quarter mile to reach the nearest stop. Bus stops should always provide shade and benches, which can often be created by combining stops with pocket parks. Without shade and a place to rest, senior residents and other riders feel uncomfortable waiting for buses. Street crossings leading to and from bus stops should be convenient and well-marked. Motorists should be able to see and anticipate where pedestrians are most likely to cross. Bulbouts should be considered as additional crossing aids to facilitate access to bus stops on avenues, main streets, boulevards, and parkways.

Element 18. Street Crossings – Crosswalks and Medians.

As a general rule, crossings should be well-identified on all avenues, main streets, boulevards, and parkways. Medians should be provided to aid in crossing all wider streets.

Marked crossings help teach children to identify the best places to cross the street. Crossings can also alert motorists of pedestrian activity, and increase their willingness to yield to pedestrians. Crosswalks create more friendly pedestrian environments, make it easier for police to enforce street laws, and likely increase predictability of pedestrian crossing points – which results in safer interactions between cars and pedestrians.

All signalized intersections should have marked crosswalks. Local convention should dictate the types of markings used for crossings. Typically zebra-style or ladder crossings are reserved for higher-volume pedestrian and motorist conflict areas, while parallel lines are used for lower-volume streets.



Pedestrian coordinator
Cara Seiderman measures a
popular street in
Cambridge, Massachusetts,
which has
a small curb radius.

Healthy Neighborhood

Where can marked crosswalks be omitted? For alley, lane and street corners, pedestrian crossings are always implied, although there may not be marked crosswalks. The law implies that crosswalks, marked or unmarked, exist at all points at which sidewalks and streets intersect. Many municipalities omit markings on side streets paralleling major roadways.

Element 19. Smaller Curb Return Radii.

Curb returns are the curved section of curb when one curbed street meets another. Alleys, lanes and streets in healthy neighborhoods should be designed for low turning speeds (6-10 mph). Curb return radii of 10 to 15 feet are ideal in keeping motorist speeds low. Some intersections on avenues, main streets and boulevards may need 25-foot radii. These larger curves should not create problems if sidewalks are set back 6-10 feet from curbs. On-street parking should be restricted 30 feet back from the intersection on each street leg so that infrequent users of neighborhood roads – such as safety vehicles, moving vans and delivery trucks – can turn efficiently. Large vehicles can use this additional space to make their turns safely.



Bicyclists fare best when conflicts are separated by a raised median.

By keeping street widths and corner radii narrow, pedestrians can cross neighborhood alleys, lanes and streets in 4 to 7 seconds. On wider streets – such as avenues, main streets or boulevards – protective medians which can be reached in 10 seconds allow pedestrians to cross in comfort and safety.

Element 20. Corner Sight Triangles.

Motorists approaching side streets must be able to see the dangers and obstacles that might confront them. Sight triangles are spaces where buildings, fences, walls, trees, and other landscaping are trimmed or set back to permit clear vision for prescribed distances. Motorists approaching at 20 mph need 107 feet to see a pedestrian or hazard and be able to stop in time. Motorists approaching at 30 mph need 196 feet, while those travelling at 40 mph need 320 feet of sight/stopping distance.

Healthy Neighborhood

Element 21. Bicycles.

Healthy neighborhoods provide high levels of support for bicycle use. Trails are created to link homes, schools, parks, transit, nature areas, and other common destinations. Bicyclists should be accorded support on all public and private roadway systems. Bicycle racks and more secure storage should be provided at public buildings, transit stops and other modal connection points. Studies have shown that 20% of all trips made in urban areas could be more conveniently made by bicycle. In some cities that have installed extensive bicycle facilities, cyclists account for 15-25% of all trips.

On alleys, lanes, and streets, where speeds are kept at 15-20 mph, bicycles mix comfortably with cars and trucks. On avenues, boulevards and some main streets, bicyclists should be provided with bike lanes. Parkways should have separate bicycle trails that may or may not parallel the roadway.

Bicyclists using trails that cross lanes and streets should be given favored crossing support, including speed tables and medians. When bicyclists cross avenues, main streets, boulevards, and parkways, they should receive support from medians and well marked crossings. Mid-block signals may be appropriate where traffic volumes are high.

Parents are advised to closely supervise their children on trails, alleys, lanes, and street sidewalks until they are seven or eight years old. At older ages (nine years and older), children will want to go to more distant places. Parents should work with their children to set guidelines for riding on lanes and streets, and select sidewalk riding areas on avenues. At age twelve to thirteen, most children receive permission to use bike lanes as safer and more appropriate alternatives to sidewalk riding. In towns where bicycling is well developed, such as Davis, California, children as young as twelve have access to the entire town.

Element 22. Snow Removal.

Removal and storage of snow from streets and sidewalks is challenging where snowfall levels are significant. Snow accumulation, however, should not be used to justify building conventional neighborhoods with conventional roads. Large snowfalls are often predictable.



Firemen are trained to maneuver on narrow streets. In Monroe County, Florida, they practice backing up an 8-foot-wide lane.

Healthy Neighborhood

Many communities choose not to plow their alleys in the winter. Parking in streets can be limited to one side of the street during heavy snow days. Plows can store snow in the excess street space created. Landscaped street areas also serve as snow storage areas. On avenues, the medians become effective snow storage spaces. Main streets can be plowed to the center for snow removal. Boulevards and parkways can use traditional snow removal techniques. The ITE Traditional Neighborhood Street Design Guidelines suggests that, "If designed appropriately, traditional neighborhood development streets can help minimize the need to truck snow in all but the most severe storms." [p. 32]

Element 23. Emergency Vehicles.



Ben Franklin and Patrick Henry once walked this street in Society Hill, Pennsylvania. The width has never changed. Although tight, there is plenty of room to accommodate cars, bicycles and pedestrians while

Emergency vehicles can often access traditional neighborhoods as fast as, or faster than, conventional ones. Such vehicles have the unchallenged legal right to all physical street space. Properly designed healthy neighborhoods have frequent entry points, fewer stop signs, and few traffic signals. This design allows emergency vehicles to take direct routes to all properties at moderate speed and with minimal or no delay. Properties in new neighborhoods meet modern fire codes, so average response times allow reasonable rescue time.

Unlike conventional neighborhoods, traditional neighborhoods always have at least two means of access to each property. Alleys in healthy neighborhoods provide additional access for emergency vehicles.

Misunderstanding of the national fire code and insurance carrier requirements is widespread. It is frequently argued that streets must be kept wide to accommodate two fire trucks coming into neighborhoods from two directions at once, and either passing one another, or setting extension legs with engines sitting side-by-side. This assertion is not correct.

When responding to fires, fire trucks can come from different directions, set up in different locations, and

Healthy Neighborhood

Appendix A. The Green Book

Selected Extracts from the AASHTO Green Book (1994)
A Policy on Geometric Design of Highways and Streets
American Association of State Highway and Transportation
Officials

☞ Note: Emphasis added; comments in italics by Ken
Sides, P.E.

■ FOREWORD (p. xliii)

"As highway designers, highway engineers strive to satisfy optimally the needs of highway users while maintaining the integrity of the environment."

This is the opening statement of the Green Book (first sentence of the foreword), and sets the tone for the manual. It puts the needs of highway users first. It also recognizes that meeting those needs is constrained by consideration of environmental integrity. "Environment" could be interpreted broadly to encompass impact on humans, not just stormwater quality and air pollution. "Highway users" could be interpreted broadly to include bicyclists and even pedestrians, and indeed, the Green Book explicitly includes them as users further down the first page.

"Unique combinations of requirements that are always conflicting result in unique solutions to the design problems. The guidance supplied by this text...is based on established practices and is supplemented by recent research."

"The intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations."

These two statements on the first page make it clear the Green Book is meant as guide, not as a set of absolute rules. The 1984 AASHTO Preface put it more baldly, stating: "This publication is intended to provide guidance to the design of new and major reconstruction projects."

"Minimum values are either given or implied by the lower value in a given range of values. The larger values within the ranges will normally be used where the social, economic, and environmental (S.E.E) impacts are not critical."

If it is determined (or declared) that social impacts of a project are critical, this statement on the first page gives designers permission to use the values at the low end of the ranges.

"Emphasis has been placed on the joint use of transportation corridors by pedestrians, cyclists, and public transit vehicles. Designers should recognize the implications of this sharing of

Healthy Neighborhood

the transportation corridors. Designers are encouraged to consider not only vehicular movements, but also movement of people, distribution of goods, and provision of essential services. A more comprehensive transportation program is thereby emphasized."

This statement on the first page of the Green Book explicitly brings pedestrians, cyclists and transit into the category of user, and issues a clear mandate to designers to take them into account. The 1984 AASHTO put it more strongly: "Designers must recognize the implications of this sharing of the transportation corridors."

"The traditional procedure of comparing highway-user benefits with costs has been expanded to reflect the needs of nonusers and the environment."

Here the Green Book signals that now the engineer may depart from the traditional narrow economic analysis to a broader scope that considers more than just motorized vehicles.

"These guidelines are intended to provide operational comfort, safety and convenience for the motorist. The design concepts presented here were also developed with consideration for environmental quality. The effects of the various environmental impacts can and should be mitigated by thoughtful design processes. This principle, coupled with that of aesthetic consistency with the surrounding terrain or urban setting, is intended to produce highways that are safe and efficient for users and acceptable to nonusers and in harmony with the environment."

While making it clear that the Green Book is about motorists, nonusers and the environment are nonetheless granted recognition as elements the designer should thoughtfully consider.

■ CHAPTER II. DESIGN CONTROLS AND CRITERIA

Section: Design Speed (pp.62-63)

"The assumed design speed should be a logical one with respect to the topography, the adjacent land use, and the type of highway. Except for local streets where speed controls are frequently included intentionally, every effort should be made to use as high a design speed as practicable to attain a desired degree of safety, mobility, and efficiency while under the constraints of environmental quality, economics, esthetics, and social or political impacts"

Even while unabashedly advising designers to go for speed, the Green Book is careful to counsel designers that the design speed is constrained by adjacent land use, environmental quality and social impacts.

Healthy Neighborhood

Section: The Pedestrian (pp. 97)

"A pedestrian is any person afoot, and involvement of pedestrians in traffic is a major consideration in highway planning and design. Pedestrians are a part of everyday roadway environment, and attention must be paid to their presence in rural as well as urban areas."

The Green Book recognizes pedestrians as a part of the normal streetscape that must not be ignored.

"Because of the demands of vehicular traffic in congested urban areas, it is often extremely difficult to make adequate provisions for pedestrians. Yet this must be done, because pedestrians are the lifeblood of our urban areas, especially in the downtown and other retail areas. In general, the most successful shopping sections are those that provide the most comfort and pleasure for pedestrians."

Though vehicular traffic demands may cause extreme difficulty in providing for pedestrians in urban areas, designers cannot cite that as a reason not to. The Green Book recognizes that economic success is tied to the comfort and pleasure of pedestrians.

Section: General Characteristics (p. 98)

"Pedestrian accidents can also be related to the lack of adequate sidewalks, which forces pedestrians to share the pavement with motorists."

Section: Environment (p. 112-13)

"A highway necessarily has wide-ranging effects beyond that of providing traffic service to users. It is essential that the highway be considered as an element of the total environment. Environment as used herein refers to the totality of humankind's surroundings: social, physical, natural, and synthetic. It includes human, plant, and animal communities and the forces that act on all three. The highway can and should be located and designed to complement its environment and serve as a catalyst to environmental improvement."

The Green Book charges the highway designer to fully consider the impact he or she will have on the quality of human life and community in the surrounding area, and to actually improve it.

"The area surrounding a proposed highway is an interrelated system of natural, synthetic and sociologic variables. Changes in one variable within this system cannot be made without some effect on other variables. Some of these consequences may be negligible, but others may have strong and lasting impact on the environment, including the sustenance and quality of human life. Because highway location and design decisions have an effect on adjacent area developments, it is

Healthy Neighborhood

important that environmental variables be given full consideration."

Although the Green Book doesn't use the term "holistic," it is here advocating a holistic approach to highway design and location.

■ CHAPTER III. ELEMENTS OF DESIGN

Section: Minimum Radius for Turning Speed (p. 192)

"While it is desirable and often feasible to design for turning vehicles at higher speeds, it is often necessary for safety and economy to use lower turning design speeds at most at-grade intersections."

Armed with this Green Book guideline, no designer concerned with safety need hesitate to use lower turning design speeds at most at-grade intersections.

■ CHAPTER IV. CROSS SECTION ELEMENTS

Section: Sidewalks (p. 349)

"Sidewalks are integral parts of city streets, but few are provided in rural areas. Yet, a need exists in many rural areas because the high speed and general absence of adequate lighting increase the accident potential to those walking on or adjacent to the traveled way. The limited data available suggest that sidewalks in rural areas do reduce pedestrian accidents."

The Green Book tells designers that pedestrians are safer on sidewalks than on rural travelways. The 1984 Green Books didn't mince words: "Yet, the need is great in many rural areas because the high speed and general lack of adequate lighting make it risky to walk on the traveled way."

"If sidewalks are utilized, they should be separated from the shoulder."

The Green Book tells designers that if they're going to put in a sidewalk, they should include a buffer strip.

"In suburban and urban locations a border area generally separates the roadway from the homes and businesses of the community. The main function of the border is to provide space for sidewalks."

Regarding that space between building fronts and the street, the Green Book says it's there mainly for designers to put in a sidewalk.

"Sidewalks in residential areas may vary from 1.2 to 2.4 m. The width of a planted strip between the sidewalk and traveled way curb, if provided, should be a minimum of .6 m to allow maintenance activities."

"Justification for the construction of sidewalks depends upon

Healthy Neighborhood

the vehicle-pedestrian conflict, which is governed chiefly by the volumes of pedestrian and vehicular traffic, their relative timing, and the speed of vehicular traffic. Traffic volume-pedestrian warrants for sidewalks along highways are not established. In general, wherever the roadside and land development conditions are such that pedestrians regularly move along a main or high-speed highway, they should be furnished a sidewalk or path area, as suitable to the conditions."

"As a general practice, sidewalks should be constructed along any street or highway not provided with shoulders, even though pedestrian traffic may be light. Where sidewalks are built along a rural highway, they should be well removed from the travelway."

Just because there aren't many pedestrians, doesn't mean no sidewalk is needed, says the Green Book.

"To insure their intended use, sidewalks should have all-weather surfaces. Without them, pedestrians often choose to use the traffic lanes."

"If two urban communities are not far apart, consideration should be given to connecting the two communities with sidewalks, even though pedestrian traffic may be light. Driver-pedestrian conflict on these sections of a through route thus may be avoided."

■ CHAPTER V. LOCAL ROADS AND STREETS

Section: Number of Lanes (p. 431)

"On residential streets in areas where the primary function is to provide land service and foster a safe and pleasant environment, at least one unobstructed moving lane must be ensured even where parking occurs on both sides. The level of user inconvenience occasioned by the lack of two moving lanes is remarkably low in areas where single-family units prevail."

If the designer's intent is to create a safe and pleasant single-family neighborhood, the Green Books says it's perfectly OK and works fine to have streets so narrow there is only one unobstructed moving lane.

Width of Roadway (p. 431-432)

"Street lanes for moving traffic should be at least 3.0 m wide. Where feasible they should be 3.3 m wide, and in industrial areas they should be 3.6m wide. Where available or attainable width of right-of-way imposes severe limitations, 2.7 m lanes can be used in residential areas, as can 3.3 m lanes in industrial areas."

"Where needed and where limitations exist in residential areas, a parallel parking lane at least 2.2 m wide should be provided on one or both sides, as the conditions of lot size and inten-

Healthy Neighborhood

sity of development may require."

Sidewalks (p. 435-437)

"Sidewalks used for pedestrian access to schools, parks, shopping areas, and transit stops and placed along all streets in commercial areas should be provided along both sides of the street."

"In residential areas, sidewalks are desirable on both sides of the street but need to be provided on at least one side of all local streets. The sidewalks should be located as far as practical from the traffic lanes and usually close to the right-of-way lines."

"Clear sidewalk width should be 1.2 m minimum; widths of 2.4 m or greater may be needed in commercial areas. If roadside appurtenances are situated on the sidewalk adjacent to the curb, additional width is required to secure the clear width."

Intersection Design (p. 440)

"At street intersections in residential areas and areas where there are heavy pedestrian movements, the minimum radius of curb return where curbs are used or the outside edge of pavement where curbs are not used should be 5 m. A minimum radius of 8 m is desirable."

Street and Roadway Lighting (p. 440)

"Properly designed and maintained street lighting will produce comfortable and accurate visibility at night, which will facilitate and encourage both vehicular and pedestrian traffic."

"Determinations of need for lighting should be coordinated with crime prevention and other community needs."

"The objectives of the designer should be to minimize visual discomfort and impairment of driver and pedestrian vision due to glare."

Landscaping (p. 442)

"Landscaping should be provided for esthetic and erosion control purposes in keeping with the character of the street and its environment. Landscaping should be arranged to permit sufficiently wide, clear and safe pedestrian walkways."

Bicycle Facilities (p. 442)

"The local roadway is generally sufficient to accommodate bicycle traffic; however, when special facilities are desired they should be in accordance with AASHTO's Guide for Development of Bicycle Facilities."

■ CHAPTER IX. AT-GRADE INTERSECTIONS

General Design Considerations and Objectives (p. 627)

Healthy Neighborhood

Appendix B. Fire Code Notes

For a detailed discussion of this issue please refer to *Emergency Response, Traffic Calming and Traditional Neighborhood Streets* by Dan Burden, published by the LGC in 2001.

In the course of Dan Burden's extensive travels across this country, the one obstacle to healthy, well-designed streets that is most often cited is "the fire code" or the "fire department." However, our research to date has shown that the national fire code and many state fire codes do not provide specific guidelines for street design, response times or road widths. In most of the cases we have reviewed, the codes simply leave this up to the discretion of the local fire chief.

In preparing these guidelines, we have been careful to consider the needs of fire trucks on even the narrowest streets. We do not believe that any of the guidelines would significantly hinder the operations of fire trucks and other emergency responders. On the contrary, the low volume streets and short blocks arranged in grid fashion with multiple points of access proposed in these guidelines, make it possible for emergency responders to reach their destination more rapidly than if they had to contend with the single-access, long spaghetti-like streets and cul-de-sacs in many conventional suburban neighborhoods.

An issue often mentioned in the context of fire safety is the need for a 20' clearance (so that two fire trucks can pass one another to set up at a fire). This 20' requirement might be necessary on a cul-de-sac street where there is only one access point. However, in a traditional neighborhood, this need is addressed in at least three ways: (1) occasional driveways or light on-street parking characteristic of most light to moderate density neighborhoods, (2) multiple access to each block provided by a grid system of streets, and (3) third points of access offered through alleys.

Fire chiefs have the discretion to determine many ways to achieve this passing width. By understanding the need of fire responders, it is possible to address legitimate concerns, and allow the fire chief to be a player in designing safer, healthier neighborhoods. It has been our experience that conscientious fire chiefs are concerned with all aspects of public safety, not only the rare cases of house fires. This is especially so given that over two-thirds of the neighborhood calls that fire departments receive today are best handled by ambulances (not large hook-and-ladder trucks). In most communities it is best to buy, position and maintain more ambulances in loca-

Appendix C. "Skinny Streets: Better Streets for Livable Communities"

The following excerpts are taken from a document prepared in June 1996 by Livable Oregon, ☎ (503) 222-2182. (reprinted with permission)

Skinny streets are residential streets which are narrower than the modern width usually built in today's residential neighborhoods. Skinny streets are not new, and already exist in many older neighborhoods in Oregon's communities. Skinny streets are cost beneficial for cities and developers and they contribute to the making of great neighborhoods. Increased safety and a greater sense of community for residents are just some of the other benefits of skinny streets.

BENEFITS OF SKINNY STREETS

■ Environmental

More efficient use of land. Land saved by reducing paved surface area provides more opportunities for other land uses, such as open space, farms, community and commercial needs, and housing.

Decrease storm water runoff. Because storm water is not absorbed through paved surfaces, skinny streets reduce storm water runoff by minimizing pavement surface area. Less pavement also reduces the amount of contaminants from road surfaces that are carried into the storm water system by runoff.

■ Financial

Lower maintenance costs. Local governments spend less money building, improving, and maintaining roads when they have less paved surface area. Skinny streets also contribute to more compact development and more efficient land use, minimizing the costs of providing urban services by minimizing the size of service areas.

Increased Market Value. Older residential areas in many existing towns and cities in Oregon often have skinny streets. These areas are characterized by high home values with more of a neighborhood feeling. New developments with skinny streets and other neighborhood friendly elements are currently in high demand.

Healthy Neighborhood

Lower development costs. With less paved surface, narrower streets cost less to build. Skinny streets also allow for more flexibility in subdivision layout by reducing the amount of land designated for streets, and may result in more lots per gross acre of land.

■ Quality of Life

Encourage walking and bicycling. Skinny streets reduce overall distances between destinations by using land more efficiently, making walking and bicycling more attractive to residents. Skinny streets also create a safer environment for pedestrians and bicyclists by encouraging reduced traffic speeds.

Sense of Neighborhood/Community. Skinny streets create an environment of safety and convenience which attracts residents to walk, bicycle and play in the neighborhood. Skinny streets maximize opportunities for other neighborhood amenities like parks and landscaping by using land efficiently.

Traffic safety. Skinny streets encourage more cautious driving and slower speeds by eliminating the "speedway" feel of wide streets in residential areas. The more intimate feeling created by narrower residential streets serves as an additional indicator to drivers that they are in a neighborhood.

IMPLEMENTATION

Oregon's Land Conservation and Development Commission issued the Transportation Planning Rule (TPR) in 1990. The TPR requires local governments to adopt local street standards which minimize street width according to functional purpose. This statewide interest in street width recognizes the positive impact of narrower street standards on local government budgets, community livability, and the environment. Local governments in Oregon must comply with this requirement by May, 1997.

Local governments are granted the authority to establish local subdivision standards, which include street width, by Oregon's land use laws (ORS 92.044). Many of Oregon's cities have already adopted narrow residential street standards. Others have allowed skinny streets by granting variances for specific development projects.

GENERATING SUPPORT / OVERCOMING RESISTANCE

While local governments do have the legal authority to

Healthy Neighborhood

establish local street standards, it is important to recognize that skinny streets may create access issues for local emergency service providers. Generating support for skinny streets requires consideration of their benefits as well as their appropriateness in certain situations.

Local governments can do several things to ensure that the process of establishing narrow residential street standards is sensitive to the concerns of citizens and emergency service providers.

■ Negotiation / Involvement

Emergency service providers have specific concerns about the effects of skinny streets on their response times. Local government officials and staff can pro-actively address these concerns by negotiating with the fire department about their needs for access on residential streets. Both emergency vehicle access and skinny streets should be regarded as public goods which must be balanced to achieve maximum benefit to the community. When emergency service providers are consulted in the development of new street standards, they are less likely to resist the process as a whole.

■ Testing with Fire Trucks

Taking a city's fire trucks through a measured course or out to a neighborhood with existing narrow streets can educate both staff and fire department officials about the capabilities of a fire truck to navigate skinny streets. Hypothetical situations, such as on-street parking with a certain degree of density, can be created to devise conditions under which skinny streets may be appropriate. Fire truck tests are likely to create a level of understanding and trust between city staff and fire department officials that will facilitate the process of establishing narrower street standards.

■ Street Network Design

A better developed street network, which increases street connectivity and decreases cul-de-sacs and dead ends, benefits emergency service providers by giving them additional access routes to a site. When grid-like street patterns are developed in conjunction with skinny streets, emergency service providers may find that access to a site is improved rather than diminished.

■ Long-term Planning for Equipment

Local jurisdictions can plan for future implementation of skinny streets by working with public works and emergency service departments to ensure that future equipment purchases are compatible with narrower streets. For example, trucks with a shorter wheel base or rear loading fire trucks are bet-

Healthy Neighborhood

Resources

A Policy on Geometric Design of Highways and Streets. AASHTO. 1994.

Alexander, Christopher; Ishikawa, Sara and Silverstein, Murray.

A Pattern Language: Towns, Buildings, Construction. Oxford University Press. 1977.

Alexander, Christopher. The Timeless Way of Building. New York Oxford University Press. 1979.

American LIVES, Inc. "1994 Shopper and Homeowner Study, Community Features Home Buyers Pay For." March 1995.

Appleyard, Donald. Livable Streets. University of California Press. 1982.

Burden, Dan with Zykofsky, Paul. Emergency Response, Traffic Calming and Traditional Neighborhood Streets. Local Government Commission. 2001.

Burden, Dan. Streets and Sidewalks, People and Cars: The Citizens' Guide to Traffic Calming. Local Government Commission. 2000.

Burden, Dan. "Twelve Steps Toward Walkable Communities." Florida Department of Transportation. 1995.

City Routes, City Rights: Building Livable Neighborhoods and Environmental Justice by Fixing Transportation. Conservation Law Foundation. Boston, MA, ☎ (617) 350-0990. June 1998.

Corbett, Judith and Joe Velasquez. "The Ahwahnee Principles: Toward More Livable Communities." Western City Magazine. September, 1994.

Engwicht, David. Reclaiming Our Cities and Towns: Better Living With Less Traffic. New Society Publishers. 1993.

Ewing, Reid. Transportation & Land Use Innovations: When You Can't Build Your Way Out of Congestion. Planners Press. 1997.

Ewing, Reid. "Transportation Service Standards - As If People Mattered." Joint Center for Environmental and Urban Problems. 1996.

Guidelines for Residential Subdivision Street Design. Institute of Transportation Engineers. 1993.

Healthy Neighborhood

Hamblen, Matt. "The Kentlands Charrette." Urban Land. September 10, 1988.

Jacobs, Allan. Great Streets. MIT Press. 1995.

Jacobs, Jane. The Death and Life of Great American Cities. Vintage Books. 1993.

Kulash, Walter.. Residential Streets. Urban Land Institute. 2001. ☎(800) 321-8050.

Livable Neighborhoods: Rethinking Residential Streets. American Public Works Association. 1996.

Making Streets That Work: Neighborhood Planning Tool. City of Seattle Design Commission, Engineering Department, Office of Management and Planning. May 1996.

Murray, Maryanne. "City considers 'the big picture'." Fort Pierce Tribune. January 29, 1995.

Muschamp, Herbert. "Can New Urbanism Find Room for the Old?" The New York Times. June 2, 1996.

Neighborhood Traffic Management Program. Collier County Transportation Services Department. 1995.

Pacelle, Mitchell. "More Stores Spurn Malls for the Village Square." Wall Street Journal. February 16, 1996.

"Reclaiming Our Streets." A Community Action Plan to Calm Neighborhood Traffic, prepared by the Reclaiming Our Streets Task Force. Portland, Oregon, Bureau of Traffic Management, Office of Transportation (1120 SW 5th Ave., Suite 730). 1993.

Swift, Peter, Dan Painter and Matthew Goldstein. "Residential Street Typology and Injury Accident Frequency." Swift and Associates. March 2002. www.swiftllc.com.

Take Back Your Streets. Conservation Law Foundation. Boston, MA ☎(617) 350-0990.

Traditional Neighborhood Development: Street Design Guidelines.

TTE Transportation Planning Council Committee 5P-8. June 1997. ☎(202) 554-8050.

Traffic Engineering Handbook. Institute of Transportation Engineers. 1992.

Wynne, Sharon Kennedy. "Good Sidewalks, Good Neighbors."

Healthy Neighborhood

A large, empty rectangular area defined by dashed lines, intended for content or a drawing.



Appendix D. Design Matrix for Healthy Streets

developed by
Walkable Communities,
Inc.

NOTES

- 1) Ideal speeds and widths are given.
- 2) Flexibility is permitted, but design speeds must be adhered to.
- 3) These guidelines are not recommended for Conventional Neighborhood Development
- 4) Traditional Neighborhood Design layout, a strict adherence to TND principles of mixed use, walking and bicycling emphasis, a central place, trip containment, on-street parking, trails, traffic volumes and speeds are all linked.
- 5) Multiple entries aid fire response times.

Street Type	Max. Width	Max. Design Speed	Maximum Corner Radius	Max. Ctrline Radius	Curb	Median	Street Length	Maximum Vehicle Volume	Walk Way	Bike Lanes	Trees	2-Way Traffic	Parking
Trail	8-14'	20 mph	n/a	95'	no	n/a	n/a	n/a	n/a	n/a	yes	yes	no
Alley	10-12'	10 mph	15'	50'	no	n/a'	400'	200	no	no	no	yes	no
Lane	16-18'	20 mph	15'	90'	option	no	600'	200	both	no	yes	option	1 side
Street	26'	20 mph	15'	90'-120'	option	no	1,320'	600	both	no	yes	yes	2 sides
Avenue	varies	30 mph	15-25'	250'	yes	option	n/a	3-20K	both	yes	yes	yes	option
Main Street	varies	15-25 mph	15-25'	600'	yes	option	2,600'	3-10K	both	option	yes	yes	option
Boulevard	varies	30-35 mph	25'	500'	yes	yes	n/a	20-40K	both	yes	yes	yes	option
Parkway	varies	45+ mph	25'	1,000'+	no	yes	n/a	20-60K	no	trails	yes	yes	no