For decades urban designers advocated more walkable cities without much success. Finally, in the past few years the quality of the walking environment has become an important issue in planning and design in the U.S. Previously, transportation planners viewed movement by foot and bicycle as recreational, rather than legitimate transport to be seriously considered. A major shift in policy away from auto-centric planning, to mandated accommodation of the pedestrian and bicycle in federally supported transportation projects has stimulated numerous pedestrian and bicycle policies, plans, and built projects across the country. Recent studies on the many health benefits of walking have helped strengthen the case for making walkable cities.

By Michael Southworth, Ph.D., FAIA, AICP

above: “The Prado” was carved out of Boston’s densely built-up North End and is one of the most successful pedestrian spaces in the city.

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URBAN DESIGN, TRANSPORTATION PLANNING, AND THE PEDESTRIAN

Urban design and transportation planning have evolved along distinctly different tracks over the past century, urban design focusing on the concrete experiential qualities of the built environment, generally at small to medium scale, and transportation planning focusing on more abstract function and efficiency for the motorist, at the scale of cities and regions. Before the “scientific” revolution in transportation planning, civil engineers in the U.S. were trained to deal with the character of the locale. The road was engineered to serve transportation needs, but also to fit in with the landscape and to enhance the experience of the user.
Beginning in the 1930s the profession of street and road design split in two separate directions: those who specialized in the technical aspects of transportation planning and engineering, and those who dealt with place-based design. While transportation planners have focused on abstract "macro" variables like capacity, demand, rate of flow, trip origin/destination analysis, congestion patterns, and regional land use patterns, urban designers and landscape architects have looked at "micro" variables, the walkable, since everyone depended upon ready access by foot or slow moving cart, wagon, or carriage for access to jobs and the marketplace. Activity patterns had to be fine grained, density of dwellings had to be relatively high, and everything had to be connected by a continuous pedestrian path network. Cities of the middle ages were remarkable in their walkability and typically packed all the necessities of urban living into an area no more than ½ mile from the central square. For example, the entire built-up area of Urbino, Italy occupied only 300 acres yet housed 30,000 people. Early American cities like Boston were highly walkable, as well. Before major land filling operations began in the early nineteenth century, everything was on a small peninsula of little more than 800 acres where every point could be reached in a walk of less than one mile or ½ hour. Despite enormous growth and modernization, the central area still maintains its walkability, a rare situation for the American city.

High speed transport and the quest for efficiency killed the walkable city. Each advance in transportation technology—from horse drawn cart or carriage, to horsedrawn streetcar, to electric streetcar, to automobile and superhighway—has degraded the pedestrian environment. Hazardous high speed traffic broke up the fine grained pedestrian network and form and use of local places. The consequences of this split for pedestrians and the built environment have been enormous.

**WALKABLE CITIES OF THE PAST**

Walkability was essential in cities before the automobile era. Streets of the preindustrial city were by necessity lined by elms and civic monuments, Commonwealth Avenue Mall forms an active pedestrian spine in Boston’s Back Bay. Left: A small street corner in downtown Boston was transformed into an intensely used pedestrian space.
imposed barriers to free movement on foot. In ignoring the pedestrian experience, the street lost its intimate scale and transparency, and became a mere service road, devoid of public life. Modernist planning and design separated pedestrians from the automobile, shunting them off to raised plazas, skywalks, barren “greenways,” and sterile pedestrian malls. The automobile oriented values of Modernism have been codified in the transportation and street design standards that we struggle with today.

In the late postindustrial city it is impossible for the pedestrian or bicyclist to navigate freely. The street patterns of most residential areas built after 1950 are based on the discontinuous cul-de-sac rather than the interconnected grid. Block sizes are too large to permit a range of route choices and land use patterns are coarse with activities widely spaced and segregated by type. Streets are often over scaled and inhospitable to pedestrians and frequently lack sidewalks in order to reduce infrastructure construction and maintenance costs. The entire system has been designed for the convenience of the motorist (Southworth and Ben-Joseph 2003). (See Figure below)

WHY WALK?
The benefits of increasing walking are now recognized. Walkability is the foundation for the sustainable city; without it, meaningful resource conservation will not be possible. Like bicycling, walking is a “green” mode of transport that not only reduces congestion, but also has low environmental impact, conserving energy without air and noise pollution. It can be more than a purely utilitarian mode of travel for trips to work, school, or shopping, and can have both social and recreational value. It is also a socially equitable mode of transport that is available to a majority of the population, across classes, including children and seniors.

Compared with Europeans, Americans walk very little. Only 9 percent of total trips in the U.S. were by foot in 1990 but 84 percent were by car, whereas in Sweden 39 percent were by foot and 36 percent were by car. In The Netherlands and Germany walking and bicycle trips increase with age and account for over half the trips for people age 75 and older (Pucher and Dijkstra, 2003). In addition, only 6 percent of trips were by foot for Americans age 75 and older in 2000. (Frank et al 2003).

Walking can promote mental and physical health including cardiovascular fitness, reduced stress, stronger bones, weight control, and mental alertness and creativity. Walking is the most accessible and affordable way to get exercise. As obesity has now become a major public health problem in the U.S., several studies have made connections between health and the design and planning of cities. They make a strong case for better design and planning of the pedestrian environment.

- Three quarters of U.S. adults do not get enough physical activity, and one quarter is inactive in their free time. Nearly two thirds (64.5 percent) of U.S. adults are overweight and almost one third are obese according to a recent National Health and Nutrition Examination Survey (Ewing et al 2003). In contrast, European countries with the highest rates of walking and bicycling have less obesity, diabetes, and hypertension than the U.S. (Pucher and Dykstra 2003).

- As little as ½ hour moderate activity such as walking or bicycling may be adequate for long term health, but only one quarter of the population achieves this (Frank et al 2003; Powell et al 2003).

- People who live in “sprawl” are likely to walk less, weigh more, and have greater incidence of hypertension than people living in more compact areas (Ewing et al 2003). Residents of more walkable San Diego neighborhoods engaged in 70 more minutes of physical activity in the previous week and had less obesity; 60 percent of residents in less walkable neighborhoods were overweight (Saelens et al 2003).
• Women between the ages of 70 and 81 who did more walking and other physical activity tended to have better cognitive function and less cognitive decline than those with less activity. Those with the highest levels of physical activity had 20 percent lower risk of cognitive impairment (Weuve et al 2004). Men over 71 who walked the least (less than ¼ mile per day) had nearly twice (1.8 times) the risk of developing dementia as those who walked the most (Abbott et al 2004).

• People who live in walkable neighborhoods may have higher levels of “social capital,” and are more likely to know their neighbors, participate politically, trust others, and be socially engaged (Leyden 2003).

CRITERIA FOR THE WALKABLE CITY
“Walkability” might be defined as the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network.

Walkability is the foundation for the sustainable city; without it, meaningful resource conservation will not be possible.

What are the qualities of a walkable city? To encourage walking designers and planners need to go beyond utilitarian access and address several qualities of the path network.

1. The path network should be well connected without major gaps or barriers, both locally and in the larger

absence of significant barriers. While it is tempting for simplicity to measure walking distance to destinations radially “as the crow flies,” this approach can be misleading, especially when street patterns are coarse and fragmented. However, as patterns become finer grained and more interconnected, blocks become smaller with higher

connectivity of paths, and the ratio of access for the “crow fly” measure to actual walking distance approaches 1:1.

In addition to path distances to various points, it is important to examine the amount of path choice. Density of path intersections and block sizes can be revealing: a high density of intersections and small block sizes usually correlates with a high degree of connectivity. Barriers to pedestrian access such as cul-de-sacs and dead end streets, or busy arterials, railroad or power line rights-of-way, rivers, or topographic features must be minimized.

Connectivity is best addressed when an area is being designed, of course, and is much more difficult to remedy once a place is built. Most of the post-industrial suburban landscape
suffers from lack of pedestrian connectivity, typically with a pattern of disconnected cul-de-sacs and barrier arterials and highways. In some cases, connectivity retrofits might be possible, with pedestrian overpasses or underpasses across barriers, or traffic calming devices. Cul-de-sacs might be connected to provide a continuous bicycle and pedestrian system (Southworth and Ben-Joseph 2004).

2. Pedestrian paths should be linked seamlessly, without interruptions and hazards, with other modes such as bus, streetcar, subway, or train, minimizing automobile dependence. Walking and bicycling are now seen as essential ingredients in an integrated, intermodal transportation system to give travelers transportation options and to provide continuity from home to destination. Beyond providing an internally well-connected pedestrian network, it is important to provide connectivity with the larger city and region through convenient and accessible links to other modes such as bus, streetcar, subway, or train within a reasonable time-distance. This means that stations need to be spaced frequently enough to allow pedestrian access for residential and commercial zones, usually ¼ to ½ mile, or a 10 to 20 minute walk. A complete pedestrian network will offer full connectivity between all modes so that one can navigate from foot to trolley or subway to train or air without difficult breaks. A small pedestrian district, no matter how well designed, cannot contribute to a reduction in automobile use if it is not well supported by transit and situated within an accessible mix of land uses.

3. Land use patterns need to be fine grained and varied, especially for local serving uses, so that pedestrians can actually walk to useful destinations. Studies have indicated that distance to destinations is the single factor that most affects whether or not people decide to walk or to take the car, and is more of a determinant than weather, physical difficulty, safety or fear of crime (Funihashi 1985; Handy 1996; Komanoff and Roelofs 1993). Several studies have found that the distance Americans will walk for typical daily trips is quite limited, ranging from 400 feet to about ¼ mile (Weinstein 1996). Untermann found that 70 percent of Americans would walk 500 feet for daily errands and that 40 percent would walk 1/4 mile; only 10 percent would walk ½ mile (Untermann 1984).

A walkable neighborhood or city has an accessible pattern of activities to serve daily needs. This means that one can reach most local-serving uses on foot within 10 to 20 minutes or up to ½ mile. The types of activities that fall within this “neighborhood access” category include shops, cafes, banks, laundries, grocery stores, day care centers, fitness centers, elementary schools, libraries, and parks. However, most post-industrial development in the U.S. has lost walkability and the necessary fine-grained pattern of uses so that it is impossible in many areas to reach even one everyday activity on foot within ½ mile.

Could a very low density city ever become walkable? Land use intensity and diversity, like connectivity of the path network, are established at the very beginning of the development process. Once a low density coarse grained pattern is put in place, it is a legal and physical challenge to insert density and variety.

4. The pedestrian network needs to be safe for people of varied ages and degrees of mobility, both from traffic hazards and crime. Perhaps the best understood and most fully developed aspect of walkability is pedestrian safety. In most U.S. cities transportation and land use policies have made walking and bicycling inconvenient, unpleasant, and dangerous. Each year 6000 pedestrians and bicyclists are killed in traffic in the U.S.; pedestrians are 23 times more likely to get killed than auto-
mobile passengers (Federal Highway Administration 2003). Environments that maximize fast and efficient auto travel are rarely enjoyable or safe for pedestrians and bicyclists.

A recent trend across the country has been “traffic calming,” techniques for making streets more pedestrian friendly by slowing down traffic through a variety of devices: chokers, chicanes, speed bumps, raised crosswalks, narrowed streets, rough paving, traffic diverters, roundabouts, landscaping, and other means.

5. **Pedestrian paths need to be well designed in terms of width, paving, landscaping, signing, and lighting.** The quality of the path itself, of course, is essential to walkability. Perhaps the least hospitable pedestrian path is the auto oriented commercial strip, a tree-less expanse dominated by several lanes of noisy traffic, polluted air, glaring lights and raucous signs. The street has few, if any, designated crosswalks and is much too wide for a pedestrian to cross comfortably. The chaotic frontage is poorly defined, lined by blank big boxes, large parking lots, and drive-in businesses. Haphazard utility poles and boxes, street lights, traffic control signs, hydrants, mail boxes and parking meters dominate the sidewalk, which is constantly interrupted by driveways to businesses (Southworth and Lynch 1974).

If the strip is pedestrian hell, then the ideal pedestrian path will provide for the comfort and safety of pedestrians of varied ages and physical abilities. It should be continuous, without gaps, and should have a relatively smooth surface without pits, bumps, or other irregularities that could make walking and wheelchair access difficult. It should be at least wide enough for 2-3 people to pass one another or to walk together in groups, and much wider in very urban situations. Terrain can be a significant factor in walkability, especially in cities with snow and ice. Encroachments into the pedestrian right-of-way such as utility poles, mail boxes, or newspaper vending machines can compromise walkability by constricting the pathway or blocking crossings. Landscape elements such as planted verges help insulate the pedestrian from the moving traffic, and street trees provide protection from the sun and help define the street space. Pedestrian scaled path lighting can enhance nighttime walking and provide a greater sense of safety.

6. **The path context, including street design, architecture and landscape, needs to offer visual interest and overall explorability.** Perhaps the most problematic and least developed of walkability criteria are those related to quality of the path context. A safe, continuous path network in a monotonous physical setting will not invite pedestrians. The path network must engage the interest of the user. Many aspects of the path context can contribute to a positive walking experience: visual interest of the built environment, design of the street as a whole, transparency of fronting structures, visible activity, views, lighting, and street trees and other landscape elements.

The postindustrial city has become an increasingly closed and hidden world as processes of production and marketing are hidden from view. Big box shopping, introverted shopping malls and office parks, vast parking lots and reliance on electronic communications have all contributed to urban landscapes that are difficult to read. A transparent environment allows one...
to sense the social and natural life of a place through first hand observation. Such qualities are impossible to deal with at the macro scale of most transportation analysis and planning, but require detail design and attention to the special qualities of places. In most large developments of mass produced housing, repetitive architecture and uniform street designs devoted to the automobile have produced neighborhoods with little pedestrian appeal.

In the past century a few notable exceptions to the general trend of post war development have sought ways of maintaining pedestrian access, while accommodating the automobile. In the 1920s and 30s, Clarence Stein structured his designs for new garden suburbs such as Greendale, Wisconsin and Radburn in Fairlawn, New Jersey around a continuous green core with pedestrian and bicycle paths that connected homes with school, local shops, and transit. In Britain in the 1960s, Gordon Cullen and others developed plans to restore or reinvent the traditional townscape as an engaging “sequence of revelations” for the pedestrian (Cullen 1961). The idea is still alive, although not commonly seen, in places like Village Homes in Davis, California and Reston, Virginia. Many New Urbanist developments emphasize walkability, as well. In The Kentlands in Gaithersburg, Maryland particular design attention was given to creating pedestrian scaled streets with varied architecture and landscape. Small-scale detail along the streets, as well as changing vistas and focal points from neighborhood to neighborhood make it an enjoyable place to go for a walk. Every district has numerous alternate pathways. It has been so successful in this regard that people drive to it from other suburbs just to take a walk (Southworth, 1996). In all of these cases walkability has been an important feature, but regrettably each of the developments is a rather small, auto dependent island stranded in motopia.

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There is no general theory of spatial design for the pedestrian environment that applies everywhere. Although many urban designers have attempted to develop formulas for street width, setbacks, or ratios of enclosure height to street width, for every rule that is made, examples of successful streets can be found that break the rule. The canyon streets of Manhattan are often perceived as attractive and walkable, as are the small seventeenth century lanes of Marblehead, or the broad tree-canopied boulevards of the Country Club district of Kansas City. Street trees and other vegetation almost always enhance walkability, but several European examples immediately come to mind that violate this ideal such as the treeless, arcaded streets of Bologna or the stone streets of Venice, Florence and Siena. Here the architecture, street space, and street life provide the interest and engage the pedestrian in exploration. Many U.S. neighborhoods such as streetcar suburbs built from the 1880s to 1920s are rather nondescript architecturally, but still have a high degree of walkability. They are valued for the comfortable scale of the streets and blocks, the canopy of street trees, the variety of architectural expressions, and the connection of buildings to the street.

Successful approaches will vary by culture, place, and city size. Nevertheless, a few attributes are likely to contribute to the quality of path context in most urban and suburban settings: scale of street space, presence of street trees and other landscape elements, views, visible activity and transparency, scale and coherence of built form. The important thing is to engage the pedestrian’s interest along the route.

A focus on the walkable city will transform the way we live in fundamental ways, benefiting health, social relations, and the natural environment.
CONCLUSION
It will not be easy to achieve walkable cities in the U.S., especially since more than half of the typical American metropolis has been built according to automobile dominated standards. There may be resistance to improving things for the pedestrian or bicyclist, fearing space will have to be taken away from the car. Often it is more difficult to retrofit built-up areas because the patterns are already established. While it is not impossible to alter existing street networks to serve pedestrians and to insert some density and mixed uses into low density cities, it will require imagination and persistence.

To create the walkable city in the automobile age, emphasis will need to shift from almost total auto orientation, to acceptance and promotion of pedestrian and bicycle access at all levels. The regulatory environment will need to shift toward encouragement of walkability, and the design and planning professions will need to work toward creation of integrated pedestrian access at all scales of movement. The tasks are challenging but the benefits for urban life will be substantial. A focus on the walkable city will transform the way we live in fundamental ways, benefiting health, social relations, and the natural environment.

ACKNOWLEDGMENTS
I am grateful for the assistance provided by Sungjin Park and Jeff Williams.

For a more detailed discussion of this subject see: Southworth, Michael, “Designing the Walkable City,” Journal of Urban Planning and Development, Fall 2005.

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