Title
Measures of Connectivity   [Streets: Old Paradigm, New Investment]

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Wallingford: Lots

Feet
0   500   1000   1500

Measures

Crossroads: Lots

Feet
0   500   1000   1500
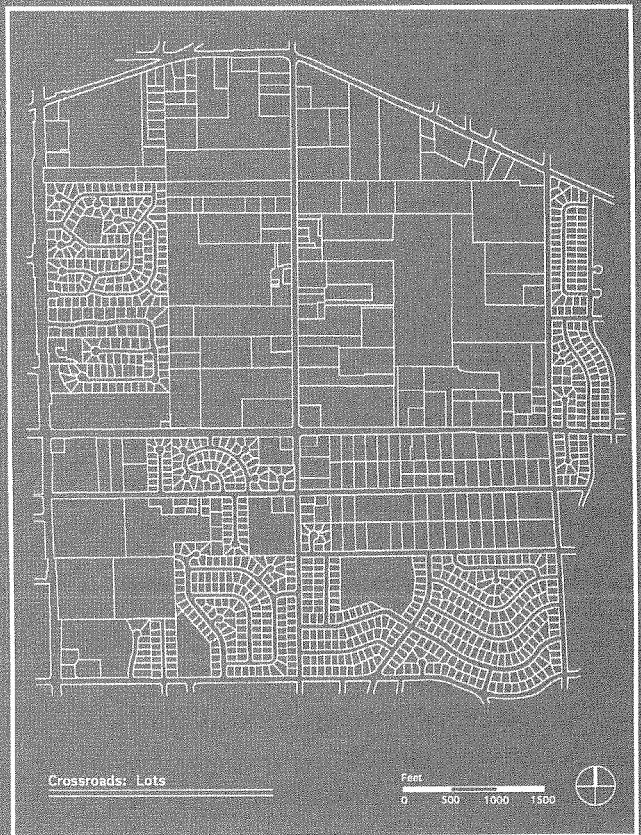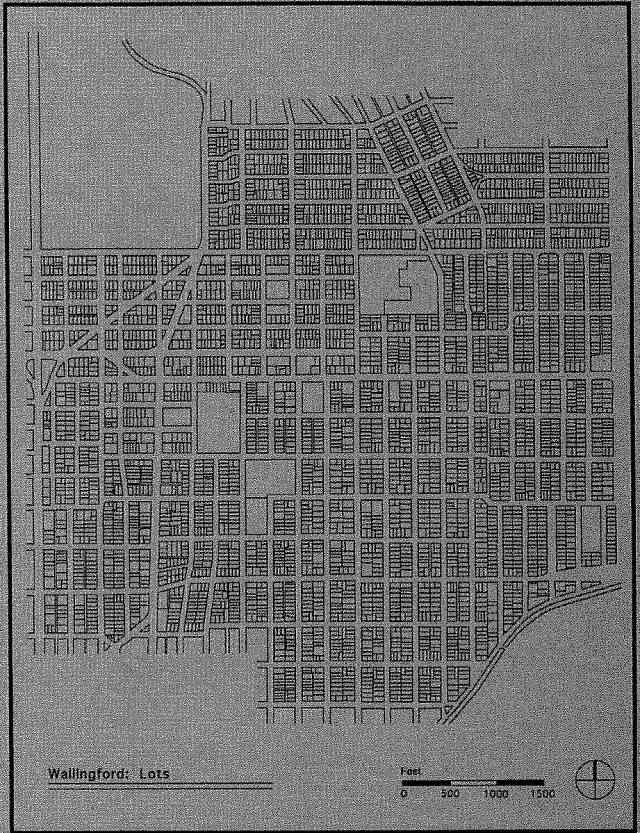
American suburbs are maturing, with apartments, offices and retail stores being built in close proximity to each other. Both the mix of activities and the density of development is beginning to approximate that of more established urban neighborhoods.

These places should support walking, but many of them do not. We studied six urban and six suburban neighborhoods matched in terms of their population densities, land-use mix and household income, and found that urban neighborhoods still average more than three times the number of pedestrians walking to retail districts.

The character of streets and pedestrian networks affects both pedestrian activity and the quality of life in these neighborhoods. The suburban neighborhoods have few through streets and even fewer sidewalks. Buildings are linked to streets via parking lots and driveways; sidewalk systems are fragmented; pedestrian routes are indirect. As a result, most walking in these places is limited to short trips to and from parked automobiles.

To describe how the character of streets in urban and suburban areas differs, this article compares Wallingford, a neighborhood in Seattle, with Crossroads, a neighborhood in the nearby suburb of Bellevue. Within a half mile of each neighborhood's central business district (an area reachable by a 10- or 15-minute walk), are

	Crossroads	Wallingford
TOTAL AREA (ACRES)	812	807
GROSS POPULATION DENSITY (WITHIN 1/2 MILE OF CENTER)	12.3 people/ac	15.7 people/ac
GROSS HOUSING UNIT DENSITY (WITHIN 1/2 MILE OF CENTER)	6.6 du/ac	7.0 du/ac
COMMERCIAL SPACE	795,000 s.f.	750,000 s.f.
NUMBER OF STORES	85	82

similar amounts of housing and commercial space, and similar numbers and types of stores. These similarities help isolate the contrasts in the pedestrian environments of these places.

Basic Development Patterns

Wallingford was originally developed as a suburban neighborhood with access to and from downtown by streetcar, but it is now firmly considered part of the city of Seattle. The neighborhood was platted largely before 1900, with small grids laid out so they connected with each other. The grids established a framework of small blocks and modest, rectilinear building lots. This pattern created an integrated pedestrian-vehicle circulation system, small buildings and finely mixed land-use patterns.

Development was substantially complete before 1930. The neighborhood filled up with small bungalows, a scattering of apartment buildings and a central retail street with narrow stores oriented toward public sidewalks. Although the area has seen continued development, this original fabric largely remains.

In Crossroads, development began with single-family housing in the late 1950s, a shopping mall in the mid-1960s and substantial amounts of multifamily housing in the late 1960s. Like Wallingford, Crossroads was developed piecemeal with individual landowners subdividing or developing their lots. But in contrast to Wallingford, development did not establish a network of streets.

Each new project connected to existing development via streets located on the section or quarter-section lines of the public land survey system. The resulting pattern is one of single-family subdivisions that rely on curvelinear, loop and cul-de-sac streets that have few connections to arterials. In areas with multifamily housing and commercial development, most buildings connect to arterials via private road and parking lot systems that do not otherwise add to the public network.

Rights-of-way and Walking Environments

Public streets in Wallingford are good for walking. The platting of the neighborhood devoted a third of the land to public rights-of-way, and half that space is devoted to sidewalks and landscaping, not roadways.
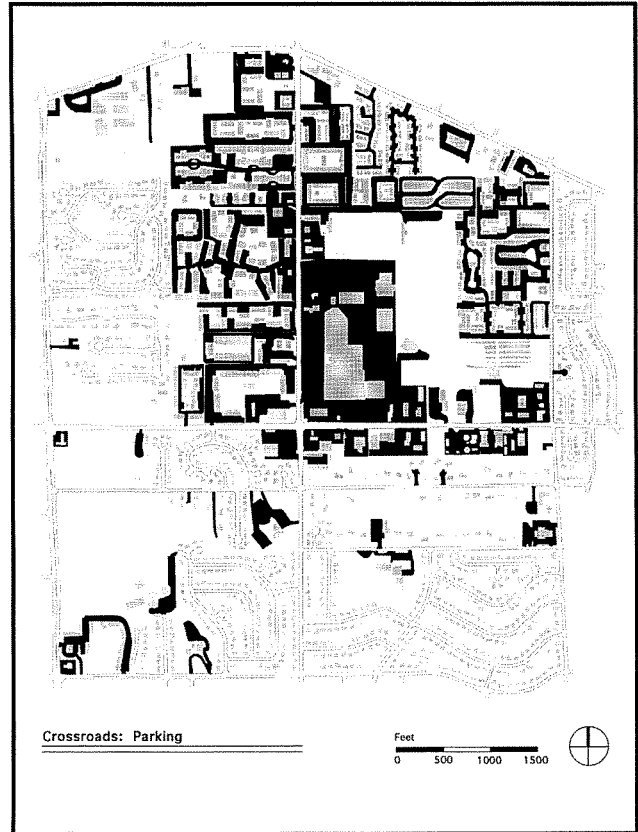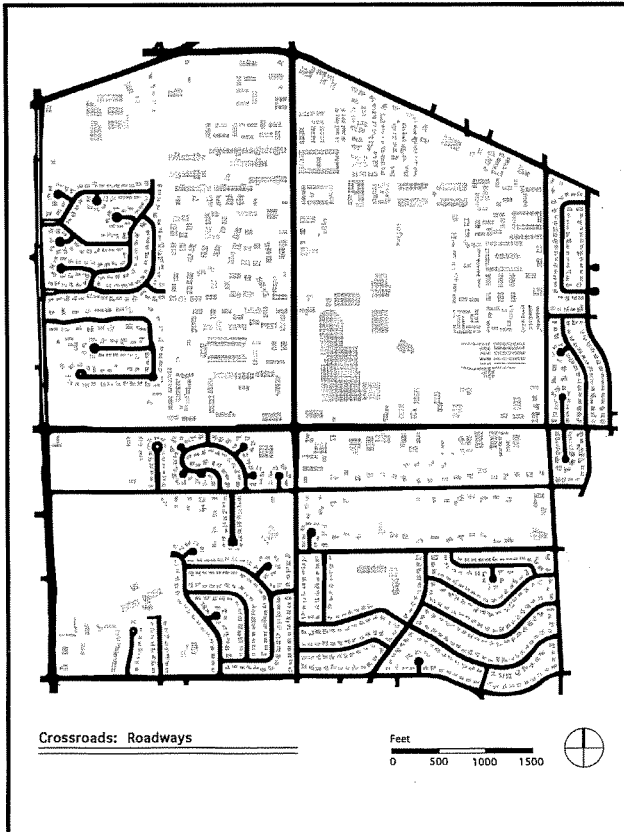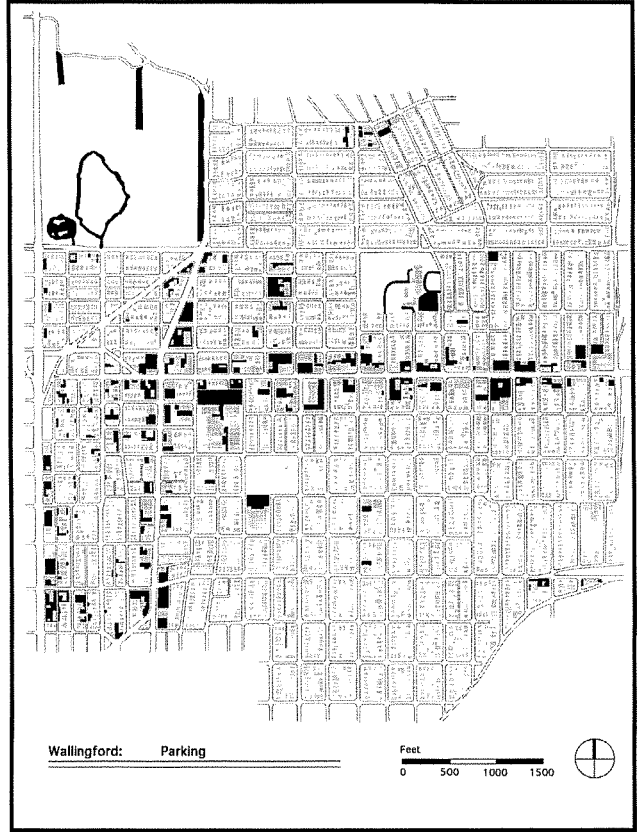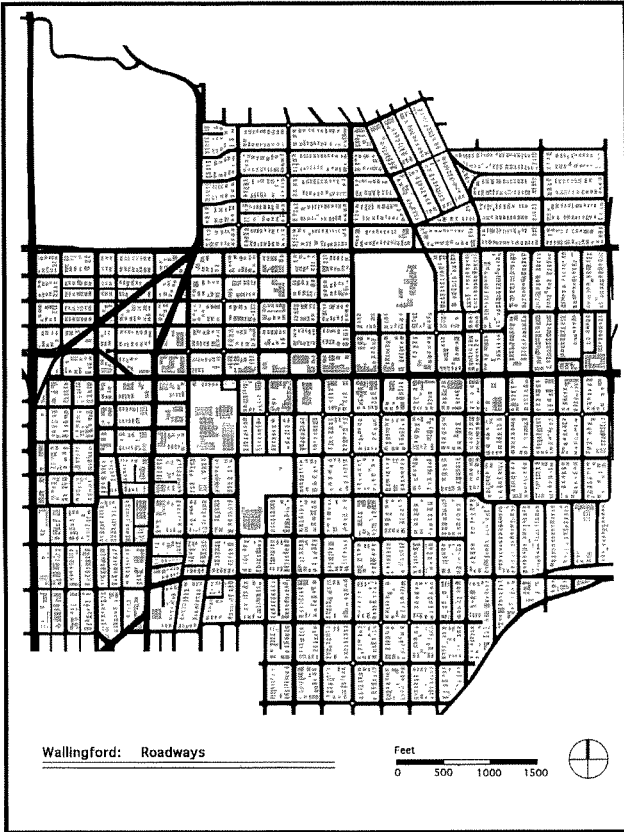
Rights-of-way on residential streets are 60 feet wide but roadways are only 25 feet wide. The sidewalks along both sides of these roadways are separated from traffic by wide planting strips and by a row of parked cars, which also slow down traffic. Commercial rights-of-way are 70 feet wide; with roadways taking up 50 feet. Sidewalks are generous, however, at least 10 feet wide, and they are buffered by signs, parking meters, street trees, planters and parked cars.
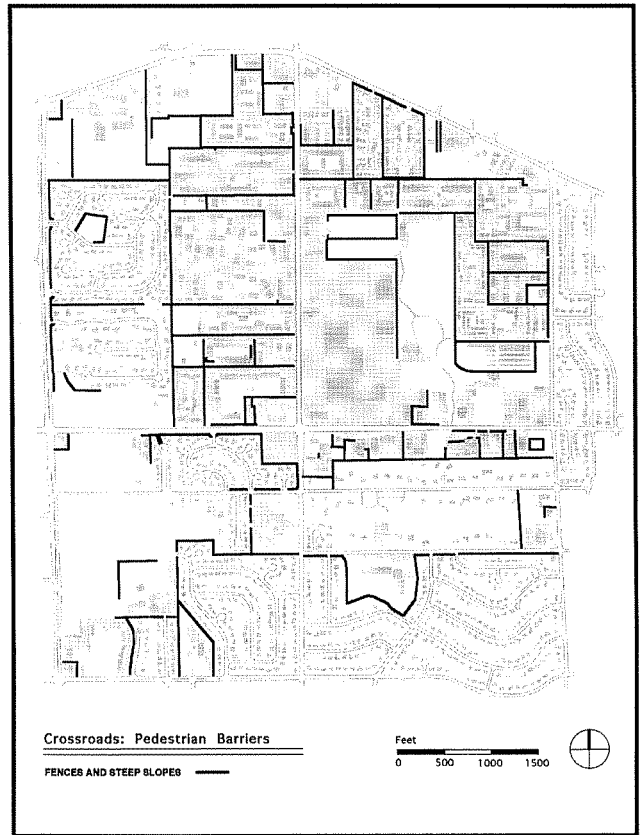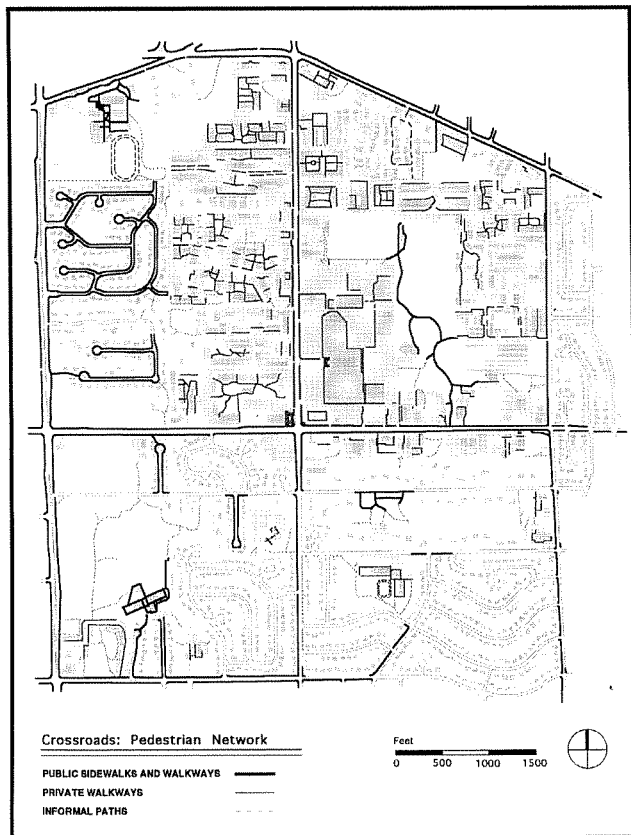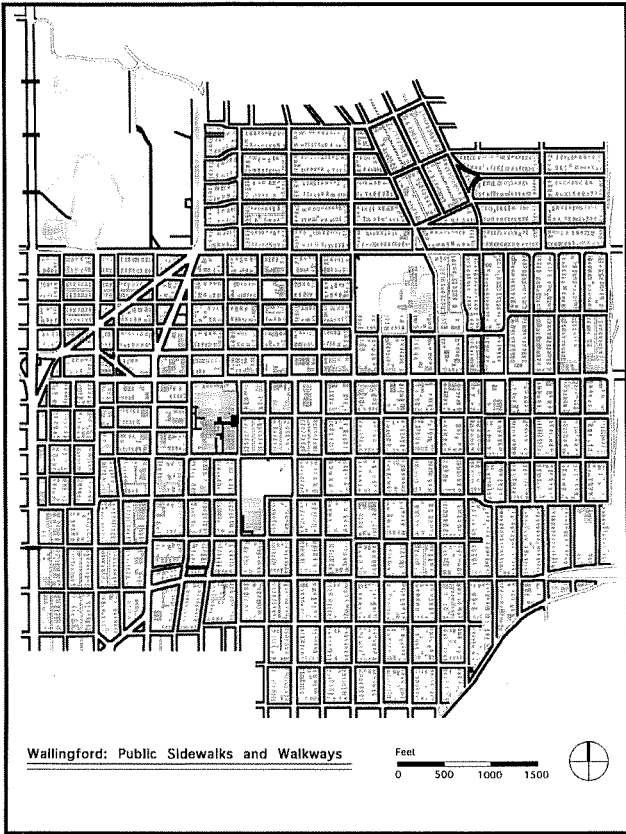
In Crossroads, pedestrians have poor walking environments even where sidewalks exist. rights-of-way account for slightly more than a tenth of the land area, and most of this space is devoted to roadways. Most of the public pedestrian network is along arterial roadways.

The widths of arterial roadways in Crossroads are comparable to the widths of those in Wallingford, but because parking is not allowed on Crossroads' streets, more of their right-of-way is devoted to moving vehicles. Where sidewalks exist they abut roadways without any buffer between pedestrians and moving traffic. Where landscaping exists, it is usually located between sidewalks and private lots, not between sidewalks and roadways. Fences and walls designed to protect housing from roadways trap pedestrians with traffic, creating walking environments that feel exposed to moving traffic and are devoid of visual interest.

Street Systems

The differences in the amount of land devoted to rights-of-ways in the two neighborhoods indicate differences in the extent and distribution of their street systems. Wallingford has more than 40

Wallingford: Roadways

Feet
0   500   1000   1500

Wallingford: Parking

Feet
0   500   1000   1500

Crossroads: Roadways

Feet
0   500   1000   1500

Crossroads: Parking

Feet
0   500   1000   1500

Wallingford: Public Sidewalks and Walkways

Feet
0   500   1000   1500

Crossroads: Pedestrian Network

Feet
0   500   1000   1500

PUBLIC SIDEWALKS AND WALKWAYS ————
PRIVATE WALKWAYS ————
INFORMAL PATHS - - - -

Crossroads: Pedestrian Barriers

Feet
0   500   1000   1500

FENCES AND STEEP SLOPES ————

miles of streets defining 253 blocks, most of which are small, averaging about two acres. This creates a very dispersed street system with many alternate travel routes.

Crossroads has only 16 miles of public roadway, half of which are arterial through streets, and only 28 blocks, averaging more than 25 acres each. Single-family areas have the smallest blocks, but block sizes in areas with multifamily housing and commercial uses are dramatically larger because they rely on private parking and street systems for internal circulation (the block containing Crossroads Mall, for instance, measures a full 193 acres). This lack of streets increases walking distances for pedestrians and congestion for vehicles.

Sidewalk Systems
The differences in the two neighborhoods' sidewalk networks are even more dramatic. Public sidewalks run along both sides of all of Wallingford's streets, creating a public network that is more than 65 miles long. In Crossroads, the total public network measures less than 15 miles; it would have to double in length for sidewalks to run along both sides of all streets.

In Crossroads, an additional 12 miles of private walkways exist in apartment complexes and commercial areas, but these private systems tend to be fragmented and have few connections to the public network. Combined, the private and public systems are still less than half the length of the public system in Wallingford.

A sign of the inadequacy of the existing facilities in Crossroads is the network of informal paths — paths that are clearly visible on the ground but not formally constructed — found there. Many of them skirt around the elaborate system of fences that surround most subdivisions and apartment developments in the neighborhood. In some places these fences have been repeatedly broken down by pedestrians seeking

short cuts. Many have also been repeatedly repaired, with "no trespassing signs" added for emphasis.

Pedestrian Route Directness
Another way to compare Wallingford and Crossroads is by examining the directness of pedestrian routes. To measure this, we selected points that were one-eighth, one-quarter, three-eighths and one-half mile from the center of each neighborhood. We then mapped and measured the most direct formal pedestrian route to the center, and compared it to the distance between these origins and each center measured as the crow flies.

In Wallingford routes are quite direct — on average, about 1.2 times as long as straight-line distances. Routes in Crossroads are indirect, averaging almost 1.7 times as long as straight-line distances.

A walking distance contour, or "walking shed," is a similar measure. It delineates the area from which a place is reachable by a half-mile walk.

The walking shed around Wallingford's retail center is quite regular in shape, reflecting the grid street pattern. It covers 67 percent of the area and includes 73 percent of the housing located within a half-mile radius circle centered on the same location. The walking shed in Crossroads is very irregular, reflecting changes in street patterns and pedestrian barriers, such as fences. It covers only 45 percent of the area and includes only 49 percent of the housing in its one-half-mile radius circle.

Dividing the number of housing units in the walking-shed by the area of the half-mile-radius circle provides a measure of the efficiency of the circulation system, given the distribution of land uses, that we call "effective density." Even with similar gross housing densities, the neighborhoods have quite different effective densities — Wallingford's is 5.1 units per acre compared to 3.3 units per acre for Crossroads.

Notes

1. Anne Vernez Moudon, Paul M. Hess, Mary Catherine Snyder and Kiril Stanilov, "Effects of Site Design on Pedestrian Travel in Mixed Use, Medium-Density Environments," *Transportation Research Record* (forthcoming).

2. These are parts of areas first compared by Peter Owens. See "Neighborhood Form and Pedestrian Life: Taking a Closer Look" *Landscape and Urban Planning* 23:1-4 (October, 1993), 115-135.

3. David Bruce Saxen, *Where Will People Walk?: Pedestrian Use and Network Connectivity in Wallingford in Seattle, and Crossroads in Bellevue, Washington* (Seattle: Department of Landscape Architecture, University of Washington, 1994), unpublished master's thesis.

Roadways and Parking

Considering the differences in street and pedestrian networks, the two neighborhoods have surprisingly similar amounts of land devoted to automobiles. Wallingford has a total of 176 acres devoted to roadways and parking, accounting for 22 percent of the land in the neighborhood. In Crossroads, there are 198 acres of land in roadways and parking, or 25 percent of the land in the neighborhood.

This demonstrates that it is possible to create positive pedestrian environments without excluding automobiles. The difference is in how space for automobiles is distributed. About 80 percent of Wallingford's automobile space is in the form of public roadways that are used for both traffic and parking. The rest is in parking lots, most of which are small and scattered along commercial streets, mostly next to or behind stores.

In contrast, only a third of the automotive space in Crossroads is in public roadways. The rest, 131 acres of private roadways and parking, is mostly associated with multifamily housing and commercial development. Parking lots are often the only connections between buildings and streets in these areas, but they make very poor pedestrian environments.

Pedestrian Volumes

Given the lack of streets and sidewalks, indirect pedestrian routes and generally hostile pedestrian environment in Crossroads, it should not be surprising the neighborhood has many fewer pedestrians walking to its commercial district than Wallingford does.

A study by David Saxen measuring pedestrian flows found 288 pedestrians per hour entering Wallingford's commercial district and 112 pedestrians per hour walking to Crossroads mall; counts were made on weekday afternoons in good weather. The surprise in these findings is not that more people walk in Wallingford but that so many people do, in fact, walk in Crossroads.

Conclusions

The most important differences between urban and suburban streets are how comfortable and interesting they are for walking, but the more quantitative comparison in this article helps explain why suburban streets are such hostile places.

Crossroads is one of the better suburban neighborhoods in the Seattle region, but other medium-density, mixed-use neighborhoods exhibit similar patterns: they have very few streets that create very large blocks, small and fragmented public sidewalk systems, indirect walking routes and large areas devoted to parking. Although often overlooked, such suburban neighborhoods are and important and growing part of American metropolitan landscapes.

Retrofitting these existing suburban places is an important challenge, more important, perhaps, than creating new master planned neighborhoods on the urban fringe that finally "get it right" with connected street and pedestrian networks. Simply put, medium-density suburban neighborhoods have a severe infrastructure deficit and need any more streets (and less at-grade parking).

This is a long-run and difficult goal, but even in the short run public sidewalk systems can be completed and improved, and private walkway systems can be built that make direct connections between all building entrances and public sidewalks. We can also work towards pulling down fences and making connections between subdivisions, apartments and commercial developments. This used to be a normal part of the development process and should now be required for all new development.

These efforts will neither turn suburban development patterns into urban ones, nor will they cause people to abandon their cars. They will, however, help make suburban neighborhoods into more functional places where walking to a nearby store is a reasonable thing to do.

Wallingford: Walking Routes for Directness Ratio

Feet
0 500 1000 1500

Wallingford: 1/2 Mile Walking Distance Contour

Feet
0 500 1000 1500

Crossroads: Walking Routes for Route Directness Ratio

Feet
0 500 1000 1500

Crossroads: 1/2 Mile Walking Distance Contour

Feet
0 500 1000 1500