Suburban Clusters

The Nucleation of Multifamily Housing in Suburban Areas of the Central Puget Sound

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Almost 20% of the suburban population in the central Puget Sound lives in 85 small clusters characterized by areas of medium-density residential development in unexpectedly close proximity to retail and office uses and with a high proportion of people of color. These clusters challenge the traditional depiction of suburban housing as decentralized, with low-density single-family tracts segregated from other land uses. They indicate that residential functions in maturing suburbs not only densify, but also nucleate. At the regional level, these clusters form low-level concentrations of activity that have yet to be acknowledged. At the local level, they contain land uses that approximate those of neighborhood planning models devised since the beginning of the 20th century. Recognizing these clusters opens up important new opportunities for housing and transportation policy in suburban areas.

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The beginning of the new millennium marks over 50 years of unprecedented metropolitan growth and sustained suburbanization in the United States. Today, the daily life of more than 50% of the U.S. metropolitan population[1] takes place in residential subdivisions, commercial strips, malls, and office parks, and on limited access roads and "free" ways (U.S. Census Bureau, 1990). The dizzying transformation of enormous areas of agricultural and open land to accommodate a relatively modest growth in population has spurred an expanding national debate about whether and how future growth should be controlled and managed (Barnett, 1995; Downs, 1994). The difficult questions under debate center on the cost and desirability of the further spread of residential development on the one hand, and the further decentralization of employment and retail activity on the other. The debate pits those who view contemporary forms of metropolitan development as acceptable because they result from self-regulating market mechanisms (Gordon & Richardson, 1997; Morrill & Hodge, 1991) against those who point to their economic inefficiencies and social inequities (DeGrove, 1992; Downs, 1994; Ewing, 1997). At immediate stake is the distribution of dwindling dollars for both new and existing infrastructure: Who will pay, who will benefit, and how much? In the longer term, the debate on managing future metropolitan growth is about equity and lifestyle: Will sprawling new development force not only the old city, but also the more mature suburban areas, to crumble in neglect, with further economic and social marginalization of their populations?

Our work adds new empirical data on *postwar residential development* that refine and challenge both laissez-faire and growth management positions on the nature of metropolitan and suburban growth. We found that suburban development in our study area had added more than metrocores (Leinberger, 1996) or edge cities (Garreau, 1991). In fact, its residential fabric has "coarsened," with substantial areas of medium-density multifamily housing, representing significant concentrations of people which have yet to be acknowledged in either practice or the literature.

This unsuspected trend also adds to current theory on metropolitan spatial structure. Pivo (1990) and Gordon and Richardson (1996), among others, have shown that suburban employment is increasingly locating outside of suburban edge cities, in small concentrations which nonetheless have important implications for planning policy. These studies demonstrate the further decentralization of land uses that traditionally have been centralized. Our work highlights a complementary yet opposite trend, namely that postwar residential uses, which traditionally have been thought of as decentralized, have, in fact, nucleated and densified.

Context

Our research has been carried out in the central Puget Sound urbanized region since the mid 1990s. The planning region is defined as an Urban Growth Area (UGA); it includes parts of the four counties of King, Snohomish, Pierce, and Kitsap (see Figure 1). Our study area covers the contiguous lands within the UGA, excluding the older central cities (Seattle, Tacoma, and Everett) and Kitsap County, which has low levels of urbanization due to its location west of Seattle and on the other side of the Puget Sound. Our definition of the central Puget Sound *suburban* region is similar to the census definition of the Puget Sound urbanized area.

The central Puget Sound planning region is a textbook example of urban theories developed over the past several decades. Since the 1950s, it has experienced a three-fold increase in population accompanied by a five-fold increase in geographic spread. Over the past 40 years also, the ratio of people living in and outside of the region's central cities has been reversed, so that today less than 35% of the population resides in the older urban cores (Moudon & Heckman, in press). Further, however, the forces of suburbanization in the Puget Sound have led far beyond the original intent of creating bedroom communities around a central city, to a consistent decentralization of not only housing, but all other metropolitan functions—a phenomenon common to many other regions (Berry & Kim, 1993; Hack, in press). Today, downtown Seattle and downtown Tacoma compete with 19 other Urban Centers (Puget Sound Regional Council [PSRC], 1996), which define the region's multinucleated structure. With all of the functions traditionally held in the central city now distributed throughout the region, the central Puget Sound fits Fishman's concept of the "new city" (Fishman, 1987, 1990). Its form has become "postsuburban" (Kling et al., 1991).

Following Washington State's growth management legislation in 1990-1991, 21 Urban Centers were identified among the central Puget Sound region's 80 current jurisdictions to assume the bulk of future economic activity and physical growth.[2] As locations of existing and future concentrations of activity, the Urban Centers also serve as "organizational units" (Leinberger, 1996, p. 203) for the transit infrastructure improvement projects managed by a new, autonomous regional transportation agency, Sound Transit. Basically, the Urban Centers are a tool to control or even reduce the further decentralization of employment. They currently hold almost 30% of the region's jobs and are slated to assume 30% of the employment growth forecast over the next 20 years (Puget Sound Regional Council, 1996-97). The central Puget Sound's focus on the role of employment centers in shaping transportation and future development parallels the emphasis given in urban location theory on the new social and economic reality of the multinucleated urbanized region (DeGrove, 1992; Gottdiener & Kephart, 1991).

In contrast, planning efforts to address the residential side of future population growth remain less defined. The UGA was drawn in the mid 1990s to contain future growth by increasing residential densities and discouraging leap-frog development. However, the UGA addresses neither the issue of housing types nor the issue of their spatial distribution.[3] This stand reflects the fact that in the "new city," residential location has generated much less research and theory than has employment location. Past research on regional residential distribution patterns has focused on housing prices (e.g., Waddell et al., 1993), the balance between jobs and housing at the local jurisdictional level (e.g., Cervero, 1996), or density (e.g., Ewing, 1997). There seems to be no recent research on the location of suburban housing by type. Follain (1994) notes the lack of data and analysis available on multifamily housing and specifically suburban apartments. A separate literature focuses on housing finance, development, and management, but this work is almost entirely aspatial. Although scholars recognize that postsuburban development includes all types of housing, not only single-family subdivisions (Kling et al., 1991; Rybczynski, 1995), they describe the spatial distribution of residential functions only as a patchwork of *zones* differentiated by housing type (Fishman, 1990).

Our research identifies distinct formal patterns in the distribution of the central Puget Sound's postwar residential development. In this region, residential uses agglomerate, and often do so near commercial uses. This article examines the characteristics of these patterns and discusses their repercussions on the definition of regional nucleation and their implications for regional and local planning policy.
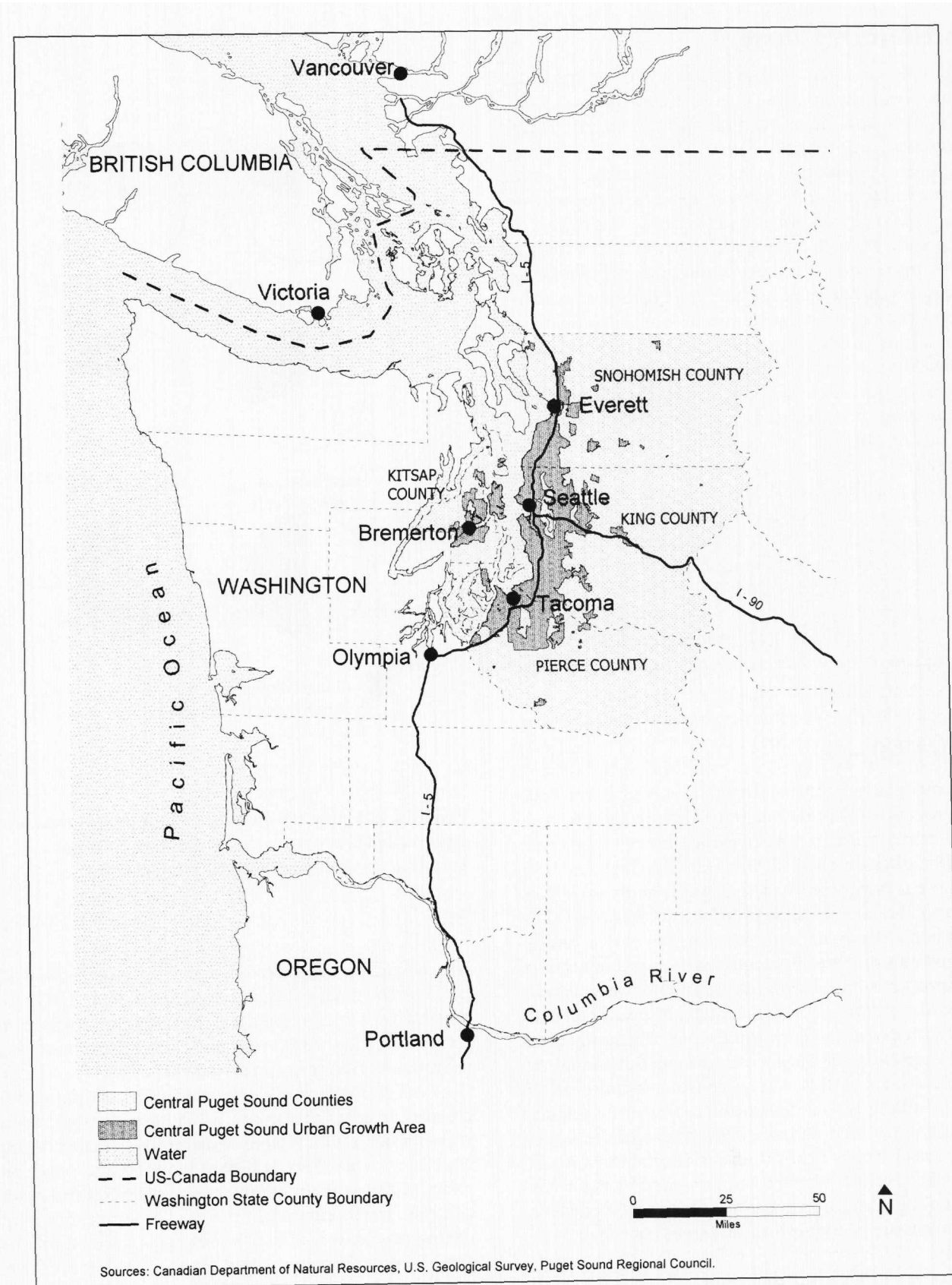
FIGURE 1. Urban Growth Area of the central Puget Sound region in the State of Washington.

Multifamily Clusters

Outside of their central cities, the three most developed counties in the central Puget Sound—King, Snohomish, and Pierce—exhibit strong patterns of distribution of population density, housing types, and groupings of population by race and ethnic background. In these suburban areas, almost 20% of the population occupies a very small portion of the land—less than 8%—and lives at gross densities which are twice as high as those found in the region as a whole and are higher than the region's three older central cities. Further, these concentrations of people account for 50% of the non-single-family suburban dwellings (structures with more than one dwelling, apartment and condominium buildings, and mobile homes), and about two thirds of the suburban housing units located in large multifamily complexes. Still, this 20% of the suburban population includes almost twice as many people of color as the other 80%. Thus in the central Puget Sound, a population equivalent to more than half of that in the City of Seattle is living in suburban areas that exhibit *quasi-urban sociophysical conditions* (see Figure 2).[4] In the suburban jurisdictions of the Puget Sound region, these quasi-urban conditions correspond to small *clusters* of relatively diverse population living in moderately high-density housing and often in close proximity to retail and office uses.

Methodology

Identification of the clusters involved a trial-and-error process combining census geography (U.S. Census Bureau, 1990) with analysis of aerial photographs taken in 1995 (Moudon et al., 1997a, 1997b). The first step used census geography at the block level to search for blocks with relatively high population densities (10 or more people per acre), high proportions of non-single-family dwellings (50% or more), and high proportions of multifamily structures with more than 10 dwelling units (40% or more). These queries yielded contiguous census blocks with densities and numbers of multifamily units higher than those of the surrounding suburban fabric. However, even at the block level, census geography often does not match actual development patterns, because the blocks may include large amounts of undeveloped land or land in uses other than residential. As a result, census geography must be complemented by the analysis of aerial photographs. A second step involved visual review of aerial photographs of the areas identified in the first step.

In looking for a critical mass of residential development, as well as for proximity to commercial land uses,
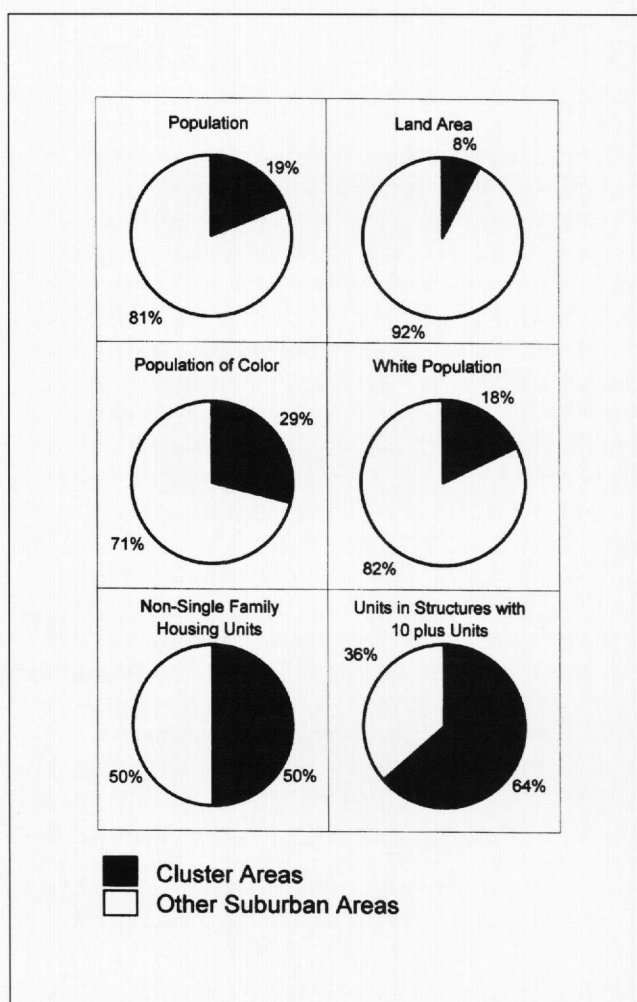

FIGURE 2. Comparison of social, demographic, and geographic characteristics of clusters to other suburban areas excluding the central cities.

the definition of *cluster* needs to remain flexible: The limit of the smallest cluster was defined at 1,400 residents within one mile square; the upper limit was found to be just below 9,000 residents. Patterns of actual development on the ground served as the basis for selecting the contiguous census blocks that eventually defined the clusters. In areas that contained a high number of clusters—some of which were contiguous—cluster boundaries were defined according to land use and street patterns, with retail or main street intersections placed centrally in the cluster. In the case of strip retail dominating the center, cluster boundaries were established at the edges between single-family and multifamily structures.[5]

Findings

Cluster Types and Characteristics

Using this method, we found that the region contained 85 clusters, shown in Figure 3. The suburban clusters were distributed evenly throughout the region. They were found in county jurisdictions and in incorporated cities, in higher- and lower-income areas, and in older and younger parts of the postwar metropolitan region.

As Table 1 shows, in 1990 the average cluster housed 3,200 people on 400 acres of land. Almost 80% of the average cluster's dwellings were in non-single-family housing (three times the percentage found in suburban areas outside the clusters), and almost 50% were in multifamily complexes with 10 units or more per structure (six times the percentage found in suburban areas outside the clusters). At 8 people per acre, average *gross* population density was higher than that of the region's central cities. However, being derived from census block data, this figure underestimates actual residential density because census geography includes large areas of undeveloped land and land in nonresidential uses within the clusters. Given the predominance of multifamily units (market rate rental apartments and condominiums), the average cluster's *net* population density could easily reach 40 persons per acre or higher. Finally, in the average cluster, more than 16% of the population were peo-

ple of color, almost twice as many as in the other suburban areas, and slightly higher than in the region as a whole.

The 85 clusters can be classified into several types. In terms of size, most clusters were small, with a population ranging from 1,400 to 2,500. Twenty three medium-sized clusters housed between 2,500 and 5,000 people. Twelve clusters housing between 5,000 and 8,800 people were large enough to be de facto small towns within their respective suburban jurisdictions. The clusters' size and the residents' demographic profile, including racial mix, were not related. Instead, the clusters' social and economic characteristics corresponded to those found in their host jurisdictions.

In terms of land use, a majority of clusters mixed residential and retail uses within a small area (less than a mile square), and some included open space, office, institutional, and industrial uses as well. Most of the clusters had at least one sizable school campus either within their midst or just at their edges. Only a quarter of the clusters contained strictly residential uses, dominated by market rate rental apartments and condominiums. These single-use clusters consisted of high concentrations of large multifamily complexes alongside or sandwiched between heavily trafficked arterials.

Mixed-use clusters took several forms. The arrangement of land uses could be linear or concentric—the latter occurring along or at the intersection of major roads.

TABLE 1. Comparison of sociodemographic characteristics of clusters to the suburban and urban areas and the region, 1990.

| | Clusters | | Suburban area[1] | Urban area[2] | Region[3] |
	Range	Mean	Mean	Mean	Mean
Population size	1,500–8,800	3,200			
Geographic size in acres	100–1,800	400			
Population density					
Persons per acre		8.0	2.9	7.5	4.1
Persons per square mile		5,100	1,900	4,800	2,600
Percent non-single-family units[4]		77.8	23.7	24.8	39.4
Percent multifamily housing structures with 10 units or more		48.6	8.6	15.1	21.5
Percent persons of color		16.4	9.4	22.5	14.9

Source: U.S. Census Bureau, 1990
1. Suburban area excludes clusters.
2. Urban area includes the cities of Seattle, Tacoma, and Everett.
3. Region includes the clusters plus the suburban and the urban areas studied, and represents the area within the contiguous growth boundary of King, Snohomish, and Pierce counties.
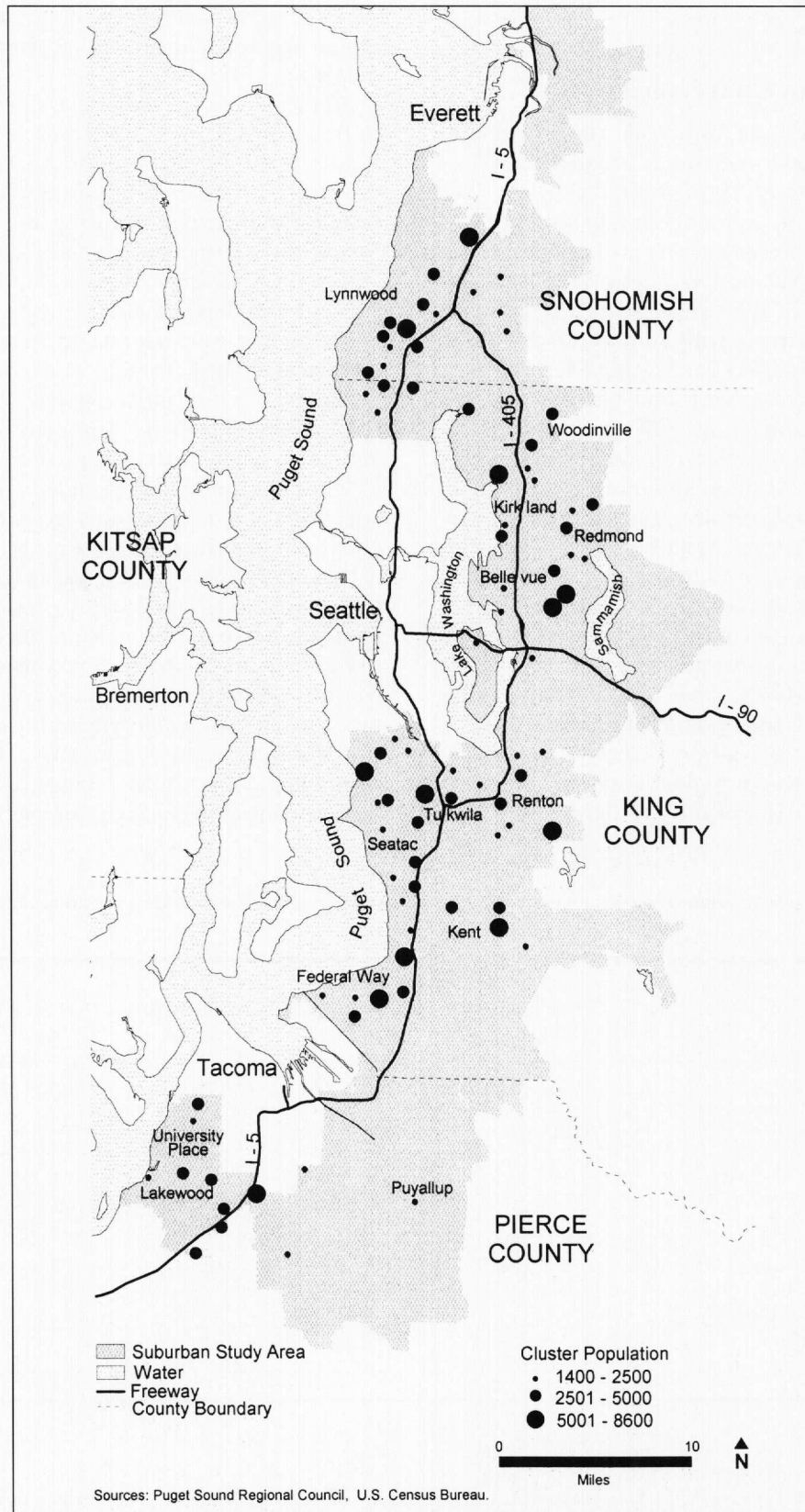4. All units except single-family detached and attached units.

FIGURE 3. Suburban cluster locations by population size.

Figure 4 shows Mariner, an example of a mixed-use concentric cluster. In 1990, Mariner housed 6,300 people on 590 acres; 93% of its housing stock was non-single-family and 10% of the population were people of color. Note the "hub" of commercial development along the arterial to the west of the freeway interchange and the band of multifamily units around the commercial center. Another common type of cluster consisted of a strip of commercial development along an arterial and concentrations of multifamily residences in parcels either behind or interspersed with it. Alternatively, discrete commercial plazas may line the arterials, with multifamily complexes forming a band of development behind the plazas. Figure 5 shows apartments on a hill just behind the retail area in the cluster of Juanita. The size of the area reserved for commercial development can vary considerably, from just a few stores to collections of large, or very large, shopping plazas and centers. Almost 60% of the clusters had a medium-sized commercial center with a 2- to 4-mile market area (Moudon & Hess, 1999).

Most clusters were located at the intersections of major transportation routes, ranging from wide suburban arterials to highways and freeways. Proximity to major thoroughfares reflects the functional needs of the clusters' relatively high densities. It also corresponds to a basic economic principle of land development where land adjacent to major transportation infrastructure is passed over by single-family subdivisions and taken up by denser residential or other uses (Peiser, 1989).

Models and Precedents

These clusters should not be confused with the edge cities, metrocores, or suburban activity centers that have been previously identified in the literature. First, their principal characteristic is concentrated *residential*, rather than employment, land uses. Second, the employment, retail, or entertainment activity the clusters do contain is of lower scale and intensity than that of previously documented urban and suburban centers.[6] Indeed, only 7 of the 85 clusters have retail facilities of regional significance (i.e., with a market area of at least 5 miles). Instead, these suburban clusters form low-level concentrations of combined residential and retail activity that have not been documented in the literature. As well, they are only now beginning to be recognized in the Puget Sound's regional planning process, and are only sporadically acknowledged by suburban jurisdictions.

Precedents for the clusters exist not in activity centers identified for their regional economic significance, but in the locally defined neighborhood planning models devised since the beginning of this century. In many individual clusters, especially the mixed-use ones, the types and spatial arrangement of land uses emulate those delineated in Perry's Neighborhood Unit (Perry, 1929; Stein, 1951) and in the various neotraditional models used today (Calthorpe, 1993; Duany & Plater-Zyberk, 1992; Katz, 1994; Kelbaugh, 1989). For example, the Kingsgate suburban cluster has a land use program similar to that of Perry's Neighborhood Unit. Figure 6 shows a comparison of Perry's Neighborhood Unit to the Kingsgate cluster. The quadrant outlined corresponds to the Neighborhood Unit's area and the diagram to the right shows the different distributions of land uses in the Unit. In 1990, Kingsgate housed 3,330 people on 240 acres; 60% of the housing stock was non-single-family; 12% of the population were people of color.

Perry's proposed Neighborhood Unit was 160 acres bounded by a grid of arterial streets. Its center consisted of an elementary school, also intended to serve as a community center. Single-family houses surrounded the school grounds. The neighborhood commercial area was eccentric to the model, placed at one of the arterial intersections. Apartments were accommodated in a linear zone along one or two of the arterials. Similarly, we found that the suburban clusters had separate zones of multifamily and single-family development, with the apartments or condominiums accessible directly from the arterials. Many clusters also had a school (although not necessarily an elementary school) in the middle of the single-family zone. However, as shown in Figure 6, the major difference between the clusters and the Neighborhood Unit lies in the definition of the center: The cluster's center is not the school, but the neighborhood commercial area at the intersection of arterials. Hence the suburban clusters in effect "assemble" several Neighborhood Units as quadrants defined by the grid of arterials.

The clusters' geographic size corroborates their resemblance to the Neighborhood Unit: They vary from 300 acres (approximately two Neighborhood Units) to 600 acres (four Neighborhood Units). Their small size and land use mix enable close proximity between residences, shops, and institutional and educational facilities. These are all necessary conditions for producing a *neighborhood*, a place which gathers all the services relating to daily life within a small, contained, walkable area. For example, in six mature clusters studied in detail, some 40% of the dwellings located within a half Euclidean mile of the commercial center also lay within a half mile or less actual *walking distance* from the center (Moudon et al., 1997b).

Products of Suburban Development Practices

Though sharing a common land use "program," Perry's Neighborhood Unit and the clusters also differ. The Neighborhood Unit was born out of the pre-World
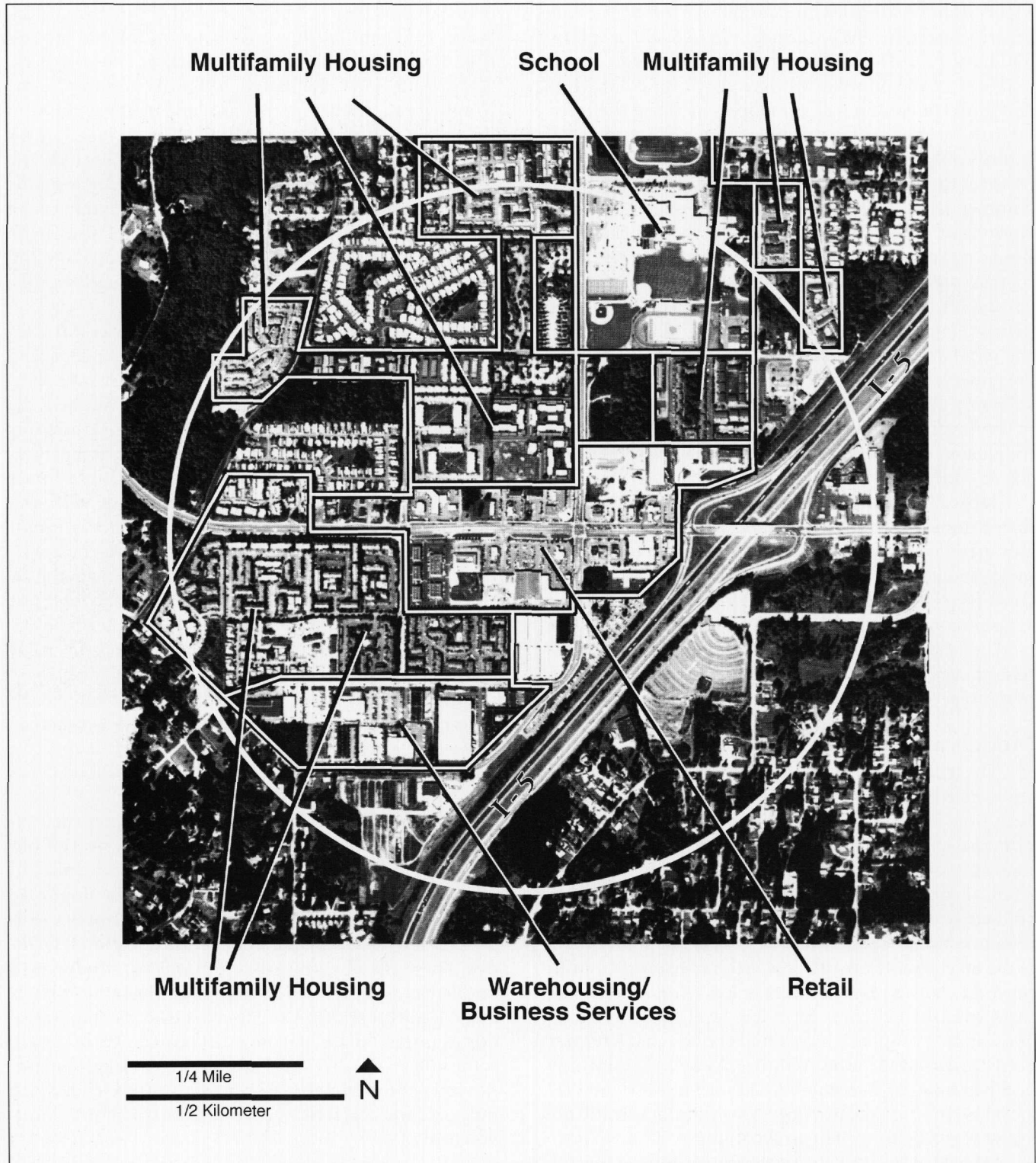
FIGURE 4. Aerial photograph with overlay showing land use in Mariner, a mixed-use concentric cluster near Everett. The white circle is one mile in diameter. (Photograph courtesy of Washington State Department of Natural Resources, 1995.)

FIGURE 5. Land use mix in the clusters: view of interface between retail and multifamily development in Juanita, a cluster in Kirkland, 1997.

War II metropolis where residential and commercial development occurred in geographic units smaller than those of contemporary development. The clusters, on the other hand, are the products of typical postwar suburban development practices, characterized by large units of development and a lack of coordination among land uses and between land uses and transportation infrastructure.

Commercial, multifamily residential, and educational facilities in the clusters typically occupy massive parcels that can reach more than 40 acres. Further, these large-parcel development practices create inward-oriented "compounds" with no through streets. Each compound commonly relies on a single driveway as its connection to a main public transportation route, and all private streets or roads within the individual parcel begin and end at this connection point. As a result, travel routes in and out of the clusters are restricted to the few grids formed by arterial streets and thoroughfares,

which act as the clusters' only public transportation infrastructure.

These thoroughfares intersect at distances that can reach up to 1 mile in length, typically enclosing 30 to 100 acres, or the equivalent of 10 to 30 standard urban blocks. Figure 7 illustrates the differences between Mariner, one of the suburban clusters that developed since the mid 1980s, and Wallingford, one of Seattle's 1920s urban neighborhoods designed for streetcar transit. Note the lack of public streets and the enormous dimensions of the suburban cluster's street-block grid. Arterials in the suburban cluster shown would have to be 10 lanes wide to provide the same vehicular-lane capacity as those in the urban neighborhood. In fact, the two widest of the cluster's arterials are only five lanes wide. Not surprisingly, therefore, the cluster's arterials (which were also championed by proponents of the Neighborhood Unit to create the traffic-free zones) do not effectively handle contemporary volumes of vehicular traffic.
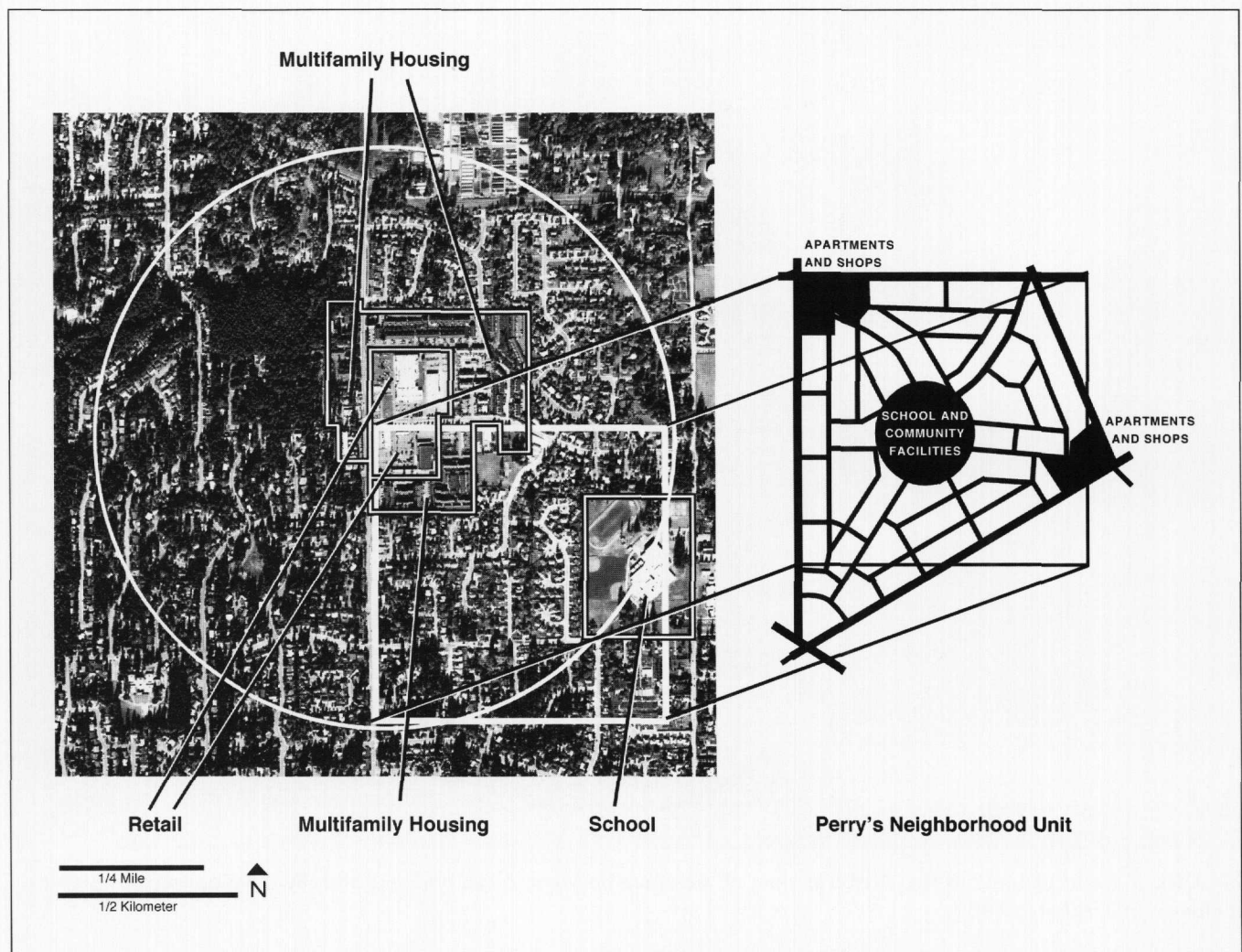
FIGURE 6. One quadrant of Kingsgate, a cluster near Kirkland, compared to Perry's Neighborhood Unit. The white circle is one mile in diameter. (Photograph courtesy of Washington State Department of Natural Resources, 1995; diagram redrawn from Perry, 1929.)

The wide thoroughfares and large blocks also deter pedestrian travel. Missing in the auto-oriented cluster is the formal network of pedestrian paths advocated by Neighborhood Unit planners. At the same time, dirt paths permeate the cluster's landscape, evidence of the many people traveling on foot (Hess, 1997), and pedestrians are a notable, though daunting, presence—with school-aged children significantly over-represented compared to their actual make-up in the local population (Moudon et al., 1997b; Hess et al., 1999).

Movement between residential and commercial land uses in the clusters is further impeded by the lack of connections between these uses. Even where they are contiguous, multifamily housing complexes, schools, retail outlets, and other commercial facilities all turn away from each other. As Figure 8 shows, high fences surround most properties. In the suburban cluster of Crossroads (top photo), the area's public park is fenced off; shopping mall owners try to maintain a landscaped area between the fence and the mall's back wall. In the Mariner cluster (bottom photo), multiple fences separate an apartment complex from a daycare center. Note the landscaped berm between the two fences. It is not clear which one of the neighbors maintains this area, which can be accessed through a gate in the cyclone fence. Additional barriers to travel exist in many mixed-use clusters where commercial development occupies flat land while multifamily complexes are built on steep

Mariner
Average Block Size: 29.8 Acres
Street System Extent: 6.2 Miles

Wallingford
Average Block Size: 1.8 Acres
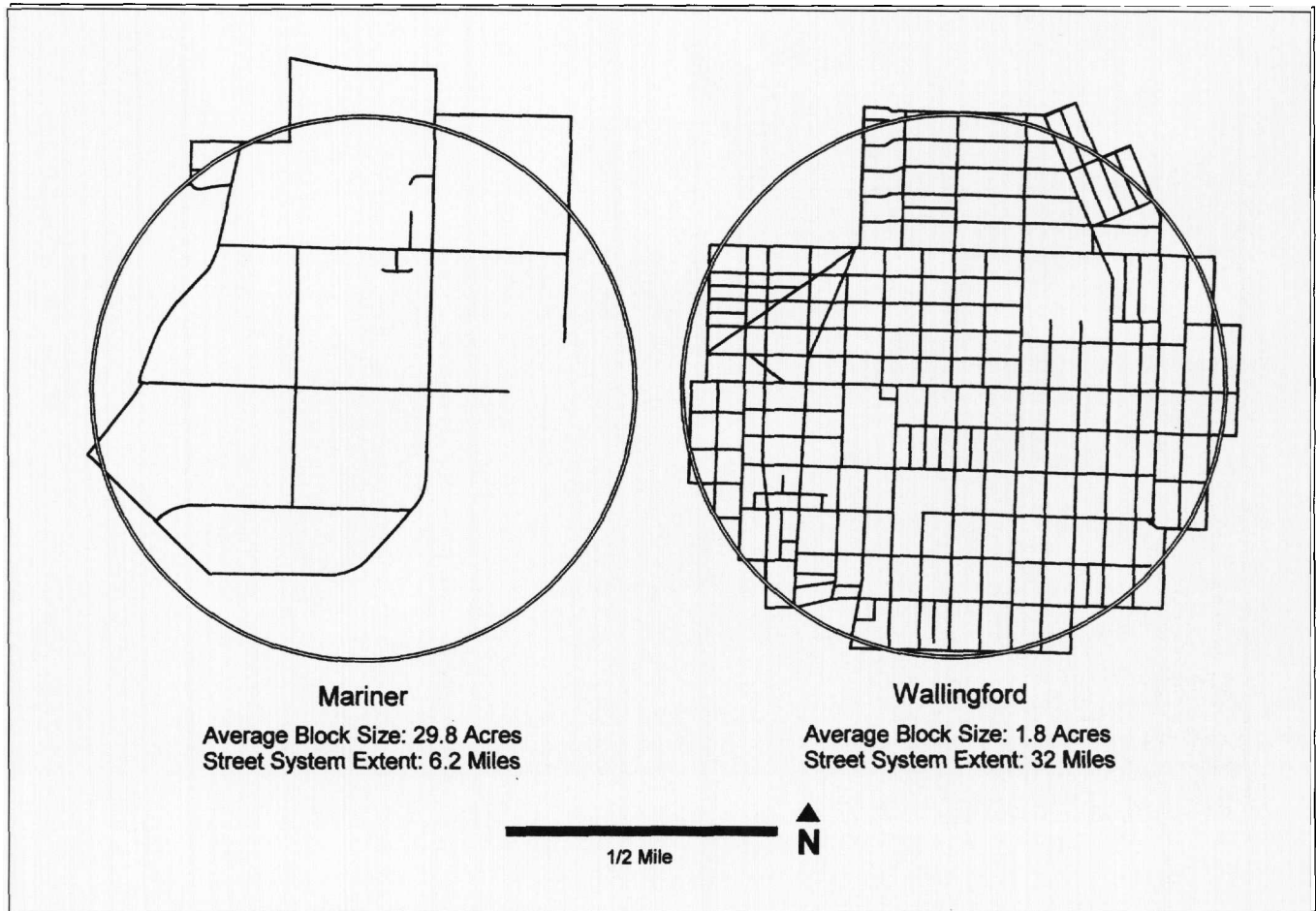Street System Extent: 32 Miles

1/2 Mile

▲
N

FIGURE 7. Comparison of local street networks in Mariner, a cluster near Everett, and Wallingford, a typical urban neighborhood in Seattle, 1997. The circles are one mile in diameter.

slopes above (see Figure 9). Major roads or even freeways often separate areas of multifamily development from commercial zones.

Clusters' Origins and Development

The clusters' sparse, disjointed network of through-streets is an indicator of their haphazard growth from a lack of neighborhood-level planning. The clusters have been an integral part of regional development since at least the 1960s (Stanilov, 1998), yet only a handful have origins as planned communities.[7] Instead, the majority developed as ordinary, *opportunistic forms*, the result of the combined interests of the retail and apartment building industries to follow an existing and rapidly expanding market of suburban single-family subdivisions. Planners sanctioned these development practices by zoning the land around the edges of single-family areas for commercial and multifamily uses. No formal plans guided

these actions, whose primary purpose was to facilitate the arrival of new commercial development and to protect existing single-family homeowners. Apartments were commonly used as buffers from the perceived nuisances of retail development (King County, 1964). Further, locating the clusters along major roads fit with the planners' concern for adequate transportation. It did not interfere with the single-family communities for whom arterial roads constitute undesirable neighbors. This situation also explains the presence of school facilities in or near the clusters, as school districts wanted to locate their new suburban facilities near emerging or newly established markets of single-family residents, as well as along transportation corridors (King County, 1962).

The clusters' initial growth was typically accommodated, and indeed often even fostered, by county-level zoning activity (Hess & Moudon, 1997). For many years, county governments have improved their tax bases by

FIGURE 8. Fences and buffer areas surround individual parcels in suburban clusters, 1997. (Top: the public park and the shopping mall in Crossroads, Bellevue. Bottom: a multifamily complex and a daycare center in Mariner, near Everett.)

FIGURE 9. Difficult connections between land uses in the suburban cluster of Mariner, 1997. (Top: industrial uses next to a multifamily complex. Bottom: steep terrain and retaining wall between the retail and the multifamily areas.)

capturing new commercial development via appropriate zoning actions affecting areas just outside the boundaries of cities. Counties have also been able to accommodate the much needed "lower" land uses such as multifamily housing because their constituencies are politically more diffuse than those of suburban cities. However, as suburban development progressed unchecked and with the now-familiar side effects of traffic congestion, these county zoning policies have unexpectedly precipitated the incorporation of suburban cities. One of the important but questionable intents of incorporation is halting further multifamily development (Downs, 1994). Accordingly, many clusters (especially the older ones) now belong to newly incorporated suburban cities. Those that are still found in unincorporated areas are often the newest and least developed.

Significance of Clusters

Though not intentionally created, these 85 clusters have developed in the suburban central Puget Sound region—and many more are in the process of formation. These small areas differ in three basic ways from other residential areas of suburban Puget Sound:

- comparatively *dense* residential development formed as an integral part of suburban development,
- residential and retail land uses close enough to yield a *mix of land uses* characteristic of neighborhood planning models, and
- concentrations of ethnically and racially *diverse* populations.

At the neighborhood level, the clusters offer a compact land use program that approximates that of established neighborhood planning models. However, their burgeoning forms remain primitive versions or imperfect realizations of neighborhoods, preventing them from fully realizing their potential as social and economic entities.

At the regional level, the clusters document that some of the higher-density suburban residential uses do in fact nucleate, and typically do so with commercial uses. The significant number of people living in such nuclei suggests that, given special attention, the clusters could have important repercussions on metropolitan planning and transportation policy.

The remainder of this article explores the opportunities the clusters bring to future metropolitan planning and the ways in which adverse conditions within them can be ameliorated.

Clusters in the Future

The 85 clusters have evaded scrutiny, in spite of extensive coverage of metropolitan suburbanization in both the popular press and the professional literature (previously cited). Unlike edge cities, the small clusters are inconspicuous—no glittering towers, no fancy stores, no powerful corporate headquarters. From the ground, the clusters' landscape is undistinguished. Retail areas blend in with the image of low-density development to which everyone is now accustomed. The clusters' trademark—the multifamily complexes—disappear behind curtains of greenery, the result of well enforced zoning and building codes in the Puget Sound (Kim, 1992). Only those multifamily developments that have begun to emerge on steep hills above freeways are readily visible. Otherwise, the presence of large, dense, multifamily concentrations only becomes apparent to the trained eye, to the few visitors who venture into these complexes, and, of course, to their residents.

Fully realizing the potential of the clusters goes beyond seeing them in their everyday garb. By adjusting the paradigms used to understand contemporary suburban development, the significance of the clusters becomes clear at the levels of both the region—as they permeate the region geographically and over time—and the local area—as they constitute alternative suburban communities.

Challenges at the Regional Level

The suburban clusters constitute concentrations of residential and retail activity that can contribute significantly to transportation and housing policy. At present, however, they are not part of the central Puget Sound region's acknowledged nucleation. As Figure 10 shows, none of the clusters falls within the official boundaries of an Urban Center, and few lie near the planned stops of the regional Sound Transit agency's transportation network. They are omitted because the Urban Centers have been defined as concentrations of *employment* uses, while the clusters stand out for the intensity of their *residential* uses. This oversight is now being reconsidered as part of the Puget Sound Regional Council's (PSRC's) Metropolitan Transportation Plan Update. The region's growth management and transportation policies call for concentrating future growth in *mixed use areas* that include housing and neighborhood services. Applied to both the regional Urban Centers and to the smaller activity and transit centers existing in or planned by local jurisdictions, these policies aim at encouraging nonmotorized travel and promoting areas that can be used on a 24-hour basis. In this context, therefore, the compact clusters of 1,400 to 9,000 residents already consti-

tute a substantial number of areas exhibiting the same characteristics as the ones demanded by policy. Hence the PSRC jurisdictions are now exploring ways to integrate the clusters within the Metropolitan Transportation Plan. Further integration of the clusters in the region's comprehensive plans will help establish and secure the functional relationship sought between residential and other uses in order to promote effective regional growth strategies (McOmber, 1999).

Such integration can take different forms. For example, 12 of the clusters are adjacent or in close proximity to the boundaries of Urban Centers, which could be expanded to include them. This would allow the focused planning efforts applied to the Urban Centers to acknowledge that these employment concentrations are already surrounded by existing concentrations of residential uses. Similarly, five clusters next to other significant regional centers (which are not designated as Urban Centers) could be considered integral parts of these centers for planning purposes. Finally, the remaining clusters with small, locally oriented retail uses, though they constitute a low level of nucleation in terms of employment, are significant in terms of their concentrations of suburban population and could be recognized and planned for as mixed-use areas.

The clusters also have potential for refocusing social and economic planning in suburban areas. The unexpectedly diverse racial and ethnic composition of many of the clusters suggests that the incomes of their populations may be lower than that of the suburban population as a whole.[8] This in turn heralds the presence of a diverse work force that could be encouraged to grow in suburban areas (Downs, 1994). In considering this opportunity, however, equity issues must be examined carefully. Further clustering of the less wealthy population can be tantamount to condoning NIMBYism if parallel economic development and community-building efforts are not successfully carried out. Also, the clusters' current insufficiencies in infrastructure need to be addressed to ensure their long-term viability as communities.

Significant adjustments in the types of research instruments used will be required to integrate the clusters into regional planning efforts. The current reliance on census tracts, forecast analysis zones, or transportation analysis zones has contributed to the clusters' obscurity. These units are simply too large to detect all but a few of the actual clusters. In suburban King County, for example, census tracts average over 3 square miles in area, more than four times the area of the typical cluster. In most census tracts, concentrations of multifamily development within the clusters get grouped with larger areas of single-family or commercial development and undeveloped land, effectively averaging out the medium-density pop-

ulations of the clusters with those of neighboring low-density subdivisions. As a result, the clusters "disappear" or become indistinguishable from their surroundings.

Analyses at the census block level can better highlight differences in sociophysical patterns, but the data available at this scale are limited—excluding, for example, such important indicators as income and employment. Furthermore, even at this finer scale, the boundaries of the units of analysis generally bear little relationship to the distribution of land uses on the ground. Unit boundaries correspond to major transportation routes, which typically cut through the centers of the clusters. As a result, the clusters' distinct land use characteristics become distributed among three or four units within which the quantities of housing or employment are then too small to approximate the clusters' intensity of development. Lastly, the clusters often lie across jurisdictional boundaries, further diluting the statistics and compounding the problem.

Recent developments in GIS may provide relief in addressing the increased complexity of suburban development and in defining a secondary level of nucleation. Using these tools, jurisdictions can map and analyze with increasing precision the location and distribution of housing units and retail facilities by type, building and occupancy permits, and other attributes of suburban land development (PSRC, 1997).

Challenges at the Local Level

Early plans for the Puget Sound region did consider the neighborhood as an organizing unit (King County, 1964). However, the concept remained abstract and was not implemented in the process of developing the land. Only five clusters were intentionally masterplanned. Today, most local officials are unaware of the clusters' densities, land use mix, and compactness. They typically approach them as *separate* retail and multifamily areas—the retail areas as commercial establishments that bring in needed services and consolidate their jurisdiction's tax base; the multifamily housing complexes as concentrations of people who, because of their comparatively high numbers, require more city services and generate more traffic than populations in single-family residential areas. Also, while condominiums are considered to house a relatively stable population of sometimes actively involved taxpayers, rental apartments often symbolize ill-considered decisions made in the past by "others," typically the counties. Indeed, large concentrations of multifamily housing often constitute the main reason why many suburban areas have broken away from county administration through incorporation.[9]

The challenge at the local level is to regard the clusters as a positive rather than a negative phenomenon in
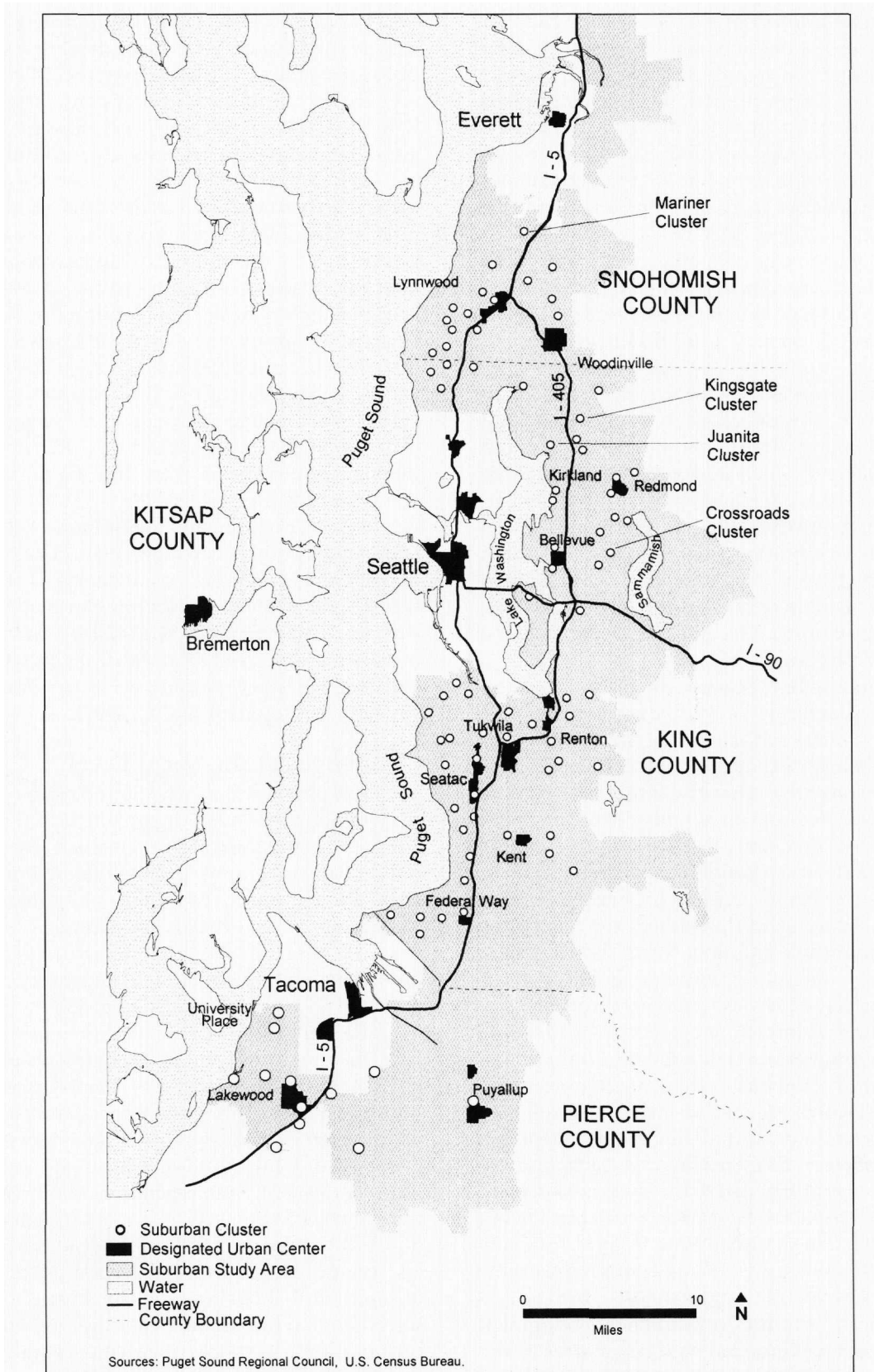
FIGURE 10. Suburban cluster locations in relation to designated Urban Centers.

suburban development, and indeed, as an opportunity to better manage future growth. Of the three characteristics of the clusters—high residential density, social diversity, and land use mix—land use mix is perhaps the most acceptable and desirable in the minds of local officials today. The notion of a neighborhood center has become popular thanks to numerous proponents from a variety of areas of the planning profession. An important next step will be for officials in local jurisdictions to recognize the clusters' commercial areas as emerging neighborhood centers. This step has already been taken in a handful of jurisdictions. For example, the suburban cities of Kirkland, Tukwila, and Woodinville have recently developed or are currently working on plans for some of the clusters within their jurisdictions. A major mixed-use development is planned on the vacant land portion of one of Kirkland's clusters. The newly incorporated City of University Place has designated a cluster as its "town center."

On the other hand, residential density and social diversity remain unfamiliar, and hence disturbing, notions in the suburban context. Perhaps the next step in this regard is to build on the existing awareness of the increasing importance of multifamily units in the provision of suburban housing (Moudon & Hess, 1999).[10] Suburban cities such as Kirkland, Redmond, and Kent are fully aware that, respectively, 39, 35, and 56% of their populations live in non-single-family housing (U.S. Census Bureau, 1990). Those cities now need to take these housing statistics one step further and consider their spatial or locational attributes. In doing so, they will realize that *almost all* of their populations living in multifamily accommodations also live in *clusters*—indeed, respectively, 33, 30, and 53%.

Understanding the effective clustering of multifamily housing and acknowledging its proximity to neighborhood commercial centers will help suburban jurisdictions rethink their sociophysical structures. *Clustered* housing bears fewer negative connotations than *dense* housing. Also, the fact that one third to one half of their populations live in "nascent" neighborhoods, villages, or small "towns in towns" extends alternative ways to consolidate the diverse social and economic mix of the communities involved and to achieve economies in infrastructure and services (McOmber, 1999). For example, the transportation behavior of people living in higher-density clusters is likely to be substantially different from that of suburban residents as a whole (as indicated in previous research by Cambridge Systematics, 1994; Hess et al., 1999; Holtzclaw, 1994; Moudon et al., 1997b; Rutherford et al., 1995). Hence recognizing the clusters of multifamily units suggests unusual (and exciting) opportunities for public and nonmotorized transportation.

The positive aspects of the clusters should also be recognized. Without exception, the multifamily complexes we studied were astonishingly clean and free of trash, and their landscaped areas were well maintained. The social environment within the apartment sites was generally congenial, indicating that the potential is present to create neighborly places. Most of the complexes were easy to enter—even if they had intimidating gates and numerous signs at their entry points warning intruders of their impending arrest. Whether in a car or on foot, a visitor was not confronted, and indeed, was often greeted pleasantly by passing residents. The complexes appeared to be large enough that people cannot know everyone, yet safe enough that a stranger was assumed to be a neighbor (the opposite is true in single-family neighborhoods).

Challenges for Neighborhood Planning and Design

Planning and design strategies must be put in effect to realize fully the potential of clusters as neighborhoods (Southworth & Parthasarathy, 1996). The two principal areas of concern are the inadequacies of transportation infrastructure, for both motorized and nonmotorized travelers, and the segregation of land uses between individual parcels of development that is perpetuated by private sector site planning practices.

Infrastructure. Breaking down the size of large parcels and street blocks is essential to accommodate both auto traffic and an increasing number of pedestrians. New through streets or alleyways (whether public or private) must be planned to provide connections between, as well as within, the clusters' large developments. Similarly, a network of continuous sidewalks and walkways will support nonmotorized travel. Local area plans may serve to ensure that proper, neighborhood-wide linkages are provided. These plans should be coordinated with the various state and county departments as well as school districts to develop realistic implementation programs.

Interconnections. On the other hand, site planning standards need to be revised to reduce the inward orientation of each parcel in private development. As noted, the clusters we studied are replete with fences, hedges, steep slopes, and other impediments to people moving freely between homes, schools, and shops. Yet schools, for example, now developed as compounds, can be better connected to surrounding uses through a simple network of walkways and upgraded sidewalk systems on public streets. These measures will serve the large numbers of middle school and high school children observed to leave school grounds to make the trip to the local commercial center in even the most hostile pedestrian

environments (Hess et al., 1999). They may also convince the many parents who report "unsafe walking conditions" as the primary reason why they drive their children to school, to change their habits.

Site design for the large multifamily housing complexes demands similar attention. Typical suburban multifamily developments with 200 to 400 or more units cover areas equivalent to at least three and often more than eight traditional urban blocks. In Figure 11, the five multifamily housing complexes in Crossroads correspond to approximately 24 blocks of development in Wallingford, a traditional urban neighborhood with a grid of small street-blocks. Yet current industry standards for multifamily development provide few of the amenities found in urban blocks: There are no sidewalks beyond those that connect parking lots to building entries, no protected backyards, and no front porches or equivalent transitional spaces at entrances to the units. Instead, the multifamily housing complexes' internal world revolves around a maze of driveways and parking lots. In addition, each complex usually provides only one or two automobile and pedestrian access points to arterials, a situation that increases traffic within the complex, extends travel routes to adjacent development, and creates bottlenecks at arterial connection points. Site planning standards for apartments and condominiums need to go beyond mandating green shields around the complexes to include functional routes within the sites, to support pedestrian movement, and to balance collective and private open space.

With regard to commercial areas, experience is slowly building up on ways to redevelop suburban malls and shopping centers into "people places" that are better integrated with their surrounding communities and that support walking and public transit (Lassar, 1995). Strategies to encourage these "second-generation malls" need to be pursued. Furthermore, revising parking standards to discourage large parking lots will help to create more viable neighborhoods. Such measures are feasible, as many building codes inappropriately apply parking standards suitable for regional shopping centers to all types of commercial development, thereby creating a significant oversupply of commercial parking (Shoup, 1997; Snyder, 1997). Site planning standards can also be used to establish pedestrian connections at short, regular intervals between the isolated pieces of walkway that are common along suburban storefronts, as well as between buildings, their parking lots, and the public sidewalks. Pedestrian "pass throughs" should be required to connect apartments directly to stores. Finally, most suburban retail buildings should not be allowed to present blank walls and trash containers to adjoining multifamily housing complexes.

Acknowledging Different Stages of Development

The clusters in this study are at different stages of development, which affects what can be done to improve both their internal conditions and their future roles in regional development. They range from *mature clusters*, where most of the land has already been developed, to *emerging clusters*, which still have large amounts of land available for future development.

Mature clusters present the biggest challenge for planning authorities. Retrofitting their infrastructure requires resources that are generally not available. However, the private housing sector can serve as a model for public action: In one of the mature clusters, for example, private apartment owners have upgraded their properties to a higher standard. Gentrification is taking place selectively, demonstrating the actual desirability as neighborhoods of at least some of the mature clusters. Commercial areas are also being redeveloped in many mature clusters. Whenever upgrading and redevelopment occur, planning authorities need to be ready to direct and implement infrastructure improvements. In these cases, cooperation with school authorities can help provide some of the clusters with needed community facilities and open space for recreation.

In the many emerging clusters, infrastructure can be improved by the private sector as development takes place on substantial amounts of vacant land. Such infrastructure would include sidewalks and easements for through streets to reduce traffic congestion. Connections to schools, parks, and multifamily complexes can be mandated. Parking requirements, especially those for retail facilities, can be reduced and parking lots can be designed so that people can also walk safely through them.

It is also important to monitor the emergence of new clusters at the suburban fringe. In these cases, special area plans can address neighborhood design issues—such as requiring small grids of streets in retail areas, safe pedestrian walkways through parking lots and to streets, interconnections between multifamily residential and other land uses, etc.—*before* development takes place, and direct future growth so that residential and commercial land uses work together to form actual neighborhoods. Examples of such plans exist and design guidelines are available from the literature on transit-oriented development (Calthorpe, 1993; PSRC, 1999).

Conclusions

The clusters in this study indicate that suburban residential functions are both densifying and nucleating, often in conjunction with commercial functions. They
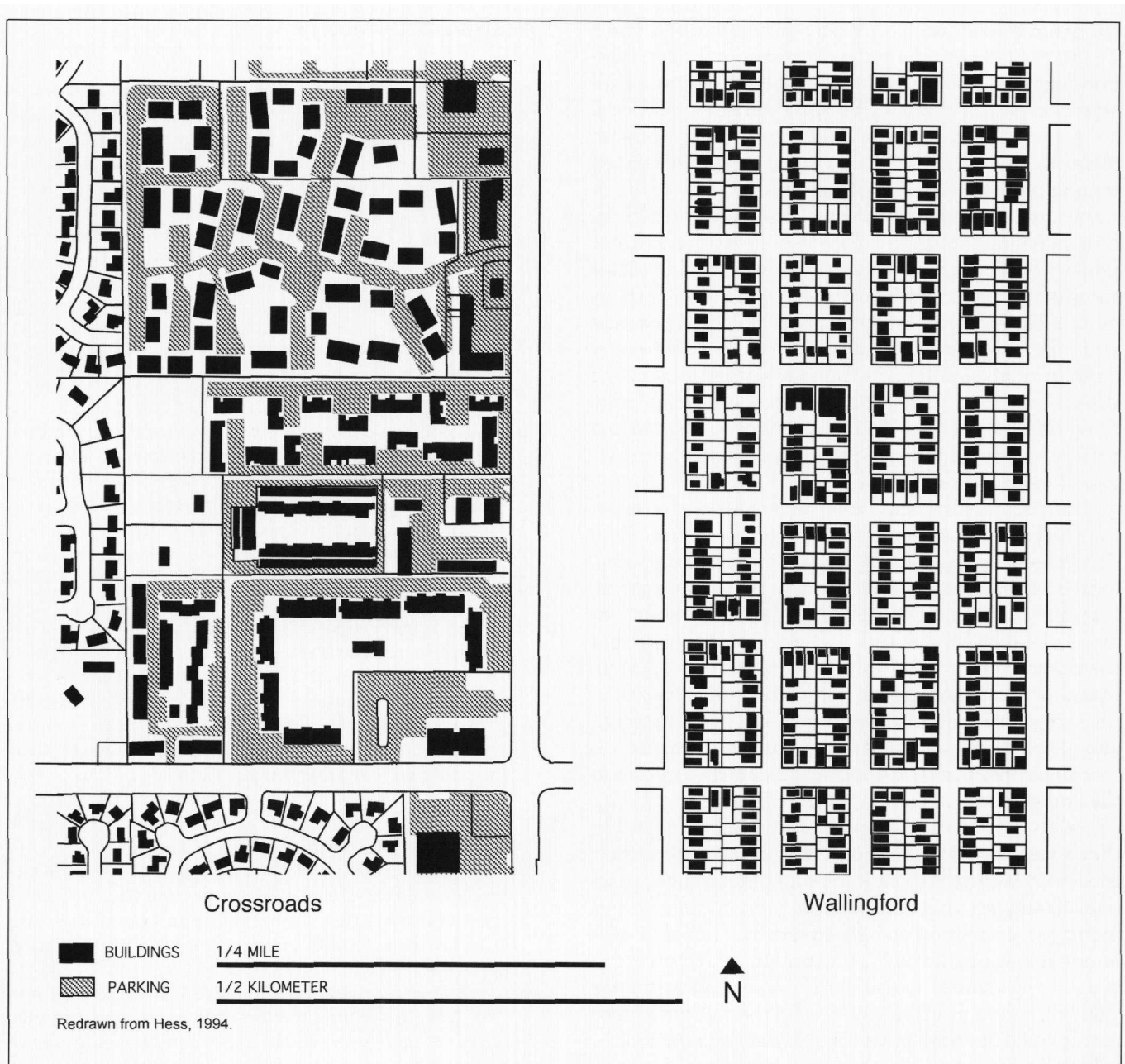
BUILDINGS 1/4 MILE

PARKING 1/2 KILOMETER

Redrawn from Hess, 1994.

Crossroads

Wallingford

N

FIGURE 11. Comparison of buildings, lots, and parking in multifamily development in Crossroads, a suburban cluster in Bellevue, to buildings, lots, and blocks in Wallingford, an urban neighborhood in Seattle.

demonstrate that the market-driven suburban structure is not all low-density single-family residential development and segregated land uses. Indeed, higher-density suburban residential concentrations appear next to retail facilities, and do so in spite of regulatory frameworks set up to encourage land use segregation. Hence suburban development appears to be evolving in much the same way as urban areas have in the past, following a

process where increased maturity leads to increased intensity and complexity in land use distribution.

The clusters form nuclei that are distributed throughout the region. Although this nucleated regional structure is of a lower order than that of commonly acknowledged suburban employment or activity centers, it adds an important component to current planning theory and practice. That is, patterns of postwar *residen-*

tial development also contribute to regional structure. To integrate this residential nucleation into policy, however, regional and transportation planning must consider the *spatial attributes* of housing statistics. Of special concern is the location of multifamily development, identified by using small units of analysis that accurately represent development on the ground.

From the perspective of growth management in the central Puget Sound, the clusters suggest that current policies to channel some future growth into *mixed-use* suburban centers may be easier to implement than expected: They indicate that increased residential densities and mixed land uses have already been achieved under conventional development frameworks and as a part of the suburban aging process. The task now is to integrate the clusters as existing concentrations of residential and retail uses within policies and plans governing the regional nucleation structure.

Further research should be directed at understanding the forces that shape the emergence of suburban clusters—including transportation investments, zoning, local fiscal policies, characteristics of the regional structure, and housing markets. This will enable planners to target the locations of future clusters and ensure that they have the appropriate infrastructure and site design. Planners must also address some of the deficiencies in the infrastructure and site design of existing clusters to allow them to function properly as mixed-use areas.

It is unlikely that suburban clusters are unique to the Puget Sound. Their temporal and spatial persistence (through the 4 decades of postwar development and in the various parts of the urbanized region), as well as their roots in conventional planning and development practice, all suggest that the phenomenon exists in other metropolitan regions as well. In fact, the central Puget Sound is a comparatively young urbanized region in the U.S., so residential densification and nucleation are likely to be even more pronounced in the country's more mature metropolitan areas. Census data show that U.S. urbanized areas with a population of over one million have a higher average share of suburban housing units in multifamily dwellings than the central Puget Sound region and a higher share of suburban population living in those units.[11] This situation warrants the investigation of suburban residential land use patterns in the nation's urbanized regions, with special attention given to the location of multifamily housing development, its clustering characteristics, and its relationship to regional and local retail facilities.

ACKNOWLEDGMENTS

NOTES

1. This conservative figure is based on the distinction the 1990 U.S. Census of Population and Housing makes between central-city and non-central-city residents in U.S. "urbanized areas." According to the more widely used census metropolitan area data, an even greater share of the population lives outside central cities—based on county population and taking into account exurban as well as suburban areas.

2. These 21 Urban Centers vary in size and importance. They comprise the downtowns and other areas of the region's older central cities (9 centers), as well as suburban locations slated for future employment growth (12 centers). The identification of these centers followed an extensive regional planning process (PSRC, 1996). Criteria for their selection included existing and planned patterns of concentrated employment, as well as a politically "fair and even" distribution of future economic growth among the region's various jurisdictions.

3. Within the UGA, the designated Urban Centers are targeted as mixed-use areas. However, the Urban Centers now house less than 5% of the region's population and they are slated to accommodate only 8% of its population growth.

4. This language reflects the ambivalent attitudes that prevail when describing the late-20th-century metropolis. *Urban* usually refers to the sociophysical conditions of older central cities, while *suburban* defines conditions outside of these cities. These definitions differ for East Coast and West Coast cities in that most West Coast cities were developed during the 20th century and hence, from an East-Coast perspective, would be termed suburban. On the West Coast, however, except for the Los Angeles area, it is common to call urban those areas of cities developed before World War II, and suburban those developed since 1945. Agreements on terminology are further impeded by the fact that older central cities now often exhibit some of the same characteristics as their suburban counterparts (Sorkin, 1992), just as some suburban areas begin to show signs of "urbanity," as discussed in this article.

5. This method is currently being applied to the four-county planning region as part of the Metropolitan

Transportation Plan Update performed by the Puget Sound Regional Council. The method is also in the process of refinement to reduce the time-consuming reliance on aerial photograph analysis and to address some of the shortcomings of census data in describing the sociophysical attributes of cluster development patterns. (For example, census-based income and employment data are only available at the block group level, covering areas that are much larger than the clusters.) New county-level parcel-based GIS are currently used to perform analyses of cluster location and to measure cluster characteristics as part of a grant by the U.S. and Washington State Departments of Transportation.

6. The definition and relative importance of urban and suburban centers has long been debated in the literature. Issues have focused on how to measure the scale and land use intensity of centers (Giuliano & Small, 1991). The growing consensus is that employment figures are no longer sufficient to capture the intensity of activities as they affect service and infrastructure provision. Alternative measures of intensity include number of trips generated by the center or subcenter (Gordon & Richardson, 1996). Difficulties in defining centers and their relative importance are compounded by the fact that centers grow at different and not always predictable rates. Leinberger (1996) refers to the consecutive emergence over the past 4 decades of primary cores, and identifies different generations of metrocores. Accurate employment and travel data are unavailable for most of the clusters because they are smaller than the spatial units at which these data are available.

7. Those have been identified as Skyway, south of Seattle, and Kingsgate, near Kirkland (1960s); Fairwood, near Renton, and West Campus, in Federal Way (1970s); and Mill Creek, east of Lynnwood (1980s).

8. Income data are only available at the census block group level and therefore convey information for areas that are significantly larger than the clusters.

9. The recent high rate of incorporation of suburban jurisdictions, which was in part fueled by discontent with respect to "dense" housing development, appears to be accompanied by a lower rate in multifamily housing construction. Building permits for multifamily housing development in the region have been down to one third of pre-1992 levels (PSRC, 1997).

10. In 1960, only 14% of the region's multifamily housing was located outside of central cities. In 1990, this figure had more than doubled to 32% (U.S. Census Bureau, 1990).

11. In cities with a population over one million, 36% of the suburban stock is in multifamily units—versus 31% in the Puget Sound. And 29% of the suburban population in the same cities live in multifamily units—versus 25% in the Puget Sound (U.S. Census Bureau, 1990). For this urbanized area data, multifamily housing includes single-family attached units—so-called townhomes—and all multiunit residence buildings.

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